DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

AGENDA, TERMS OF REFERENCE, WORK PROGRAMME AND PROPOSED TIMELINE
FOR DGP/24

(Presented by the Secretary)

1. INTRODUCTION

1.1 The agenda for the twenty-fourth meeting of the Dangerous Goods Panel (DGP/24), as approved by the Air Navigation Commission (192-8) on 21 February 2013, is reproduced in Appendix A. For ease of reference in compiling the report, the numbers and headings of the agenda items will be included exactly as written in Appendix A. The report will show all information and action taken relative to the agenda item.

1.2 The terms of reference and work programme, as approved by the Air Navigation Commission, are presented in Appendix B.

2. LANGUAGES OF THE MEETING

2.1 The working languages of the meeting, as approved by the Air Navigation Commission, are Arabic, Chinese, English, French, Russian and Spanish.

3. ORGANIZATION OF THE MEETING

3.1 The timeline for DGP/24 agenda items appears in Appendix C. This is a provisional timeline which will be approved by the meeting during the opening session as an initial guideline for the time that is expected to be spent on each item. It should be noted that the approved timeline may, if the need arises, be adjusted at any time during the session by further agreement among the members.

3.2 The meeting will sit as a whole to deal with the agenda. Small drafting groups or ad hoc working groups may also be formed as necessary. Such groups, if established, will have a nominated rapporteur, will work informally without interpretation facilities and will normally meet outside of the hours of the main meeting.
4. WORKING HOURS

4.1 The working hours proposed are 0930 (except for the special opening session) to 1230 hours and 1400 to 1700 hours with short coffee breaks. The opening session on Monday, 28 October will begin at 1000 preceded by an informal meeting of panel members only at 0945.

5. ACTION BY THE DGP

5.1 The DGP is invited to:

a) note the agenda at Appendix A;

b) note the terms of reference and work programme at Appendix B; and

c) approve the proposed timeline in Appendix C with the understanding that it will be subject to further review and amendment if necessary as the meeting progresses.
APPENDIX A

AGENDA FOR THE TWENTY-FOURTH MEETING OF THE DANGEROUS GOODS PANEL (DGP/24)

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

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

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

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

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:

5.1: Review of provisions for the transport of lithium batteries
5.2: Dangerous goods incident and accident data collection
5.3: Dangerous goods requirements in Annex 6 — *Operation of Aircraft*
5.4: Development of guidance material on countering the potential use of dangerous goods in an act of unlawful interference
5.5: Development of performance standards for air operators and designated postal operators

Agenda Item 6: Other business

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APPENDIX B

TERMS OF REFERENCE AND WORK PROGRAMME OF THE DANGEROUS GOODS PANEL (DGP)

Terms of reference

To recommend changes to maintain the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) in an up to date condition and to carry out other tasks related to the ICAO dangerous goods programme as directed by the Air Navigation Commission.

Work programme

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<th>Task Description</th>
<th>Expected output</th>
<th>Estimated Completion Date</th>
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<td>Develop amendments to the <em>Technical Instructions for the Safe Transport of Dangerous Goods by Air</em> (Doc 9284) and its related documents so as to ensure that the document remains up-to-date.</td>
<td>Amendments to the Technical Instructions, its Supplement, and the <em>Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods</em> (Doc 9481).</td>
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APPENDIX C

PROPOSED TIME SCHEDULE FOR DISCUSSION AT DGP/24

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A The special session is the opening session at 1000; this will be preceded by an informal meeting of panel members only at 0945.

B Due to budget constraints, interpretation services cannot be provided for the full duration of the meeting. The meeting will therefore meet as a working group of the whole or, if necessary, as working groups on specific subject areas during the morning session of 4 November and the afternoon sessions of 29 October, 30 October, 1 November, 6 November and 8 November.
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 6: Other business

REPORT OF THE MEETING OF THE
WORKING GROUP OF THE WHOLE (DGP-WG12)
Montréal, 15 to 19 October 2012

(Presented by the Secretary)

SUMMARY

This paper presents the report of the DGP Working Group of the Whole (WG12) Meeting held in Montreal, Canada from 15 to 19 October 2012. The appendix to the report includes a consolidation of proposed amendments to the Technical Instructions.

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

1. INTRODUCTION

1.1 The meeting of the Dangerous Goods Panel Working Group of the Whole (DGP-WG/12) was opened by Mr. Vincent Galotti, Deputy Director, Standardization and Infrastructure of ICAO’s Air Navigation Bureau (ANB), on 15 October 2012. Mr. Geoff Leach was elected Chairperson of the meeting and Ms. Janet McLaughlin was elected Vice-Chairperson.

2. ATTENDANCE

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

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<tr>
<th>Members</th>
<th>Advisers/Observers</th>
<th>State/International Organization</th>
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<tr>
<td>M. Böhm</td>
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<td>Members</td>
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3. REVIEW OF THE REPORT

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

3.1.1 Recommendation Pertaining to Airmail in Annex 18 (DGP-WG/12-WP/1)

The working group was reminded of the new provisions for lithium batteries contained in equipment in the mail which were developed for inclusion in the Technical Instructions and its Supplement. It was recalled that the development of the provisions was prompted by a request from the Universal Postal Union (UPU) to align the Technical Instructions with the UPU convention so that lithium batteries contained in equipment would be permitted in airmail. Before discussion on the working paper began, the Secretary advised the panel that the UPU had recently moved the specific provisions for lithium batteries from their Convention to their parcel post and letter post regulations.
3.1.1.2 The focus of discussion at the DGP/23 and DGP-WG/LB meetings was on amending the Technical Instructions. It was noted that paragraph 11.4 of Annex 18 contained a recommendation for States to establish procedures for controlling the introduction of dangerous goods into air transport through its postal services. The group was asked to consider whether the status of this recommendation should change, based on the fact that designated postal operators’ procedures would now be subject to civil aviation authority review and approval.

3.1.1.3 It was apparent that there were still areas that needed clarification in relation to the postal provisions. The roles and responsibilities of the civil aviation administrations (CAAs) and the designated postal operators (DPOs) in relation to legal and oversight authority needed to be clearly defined. Difficulties in interpreting the new provisions were also raised in DGP-WG/12-WP/44 (see paragraph 3.6.5); it was decided to continue discussions on these issues once that paper was presented.

3.1.1.4 Although the meeting agreed that the recommendation in Annex 18 should be changed into a Standard, no formal amendment was proposed. A proposal would be developed based on continued discussions at DGP-WG/12 and presented at DGP-WG/13. It was suggested that when developing the amendment, consideration be given to relocating the Standard to Chapter 2, the applicability chapter, which was more in line with the location of the postal provisions in the Instructions. It was also suggested that consideration be given to removing reference to the UPU Convention in Part 1;2 of the Technical Instructions.

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

Part 1 — General

3.2.1 Establishment and Maintenance of Training Programmes (DGP-WG/12-WP/3)

3.2.1.1 Part 1;4.1.1 requires the establishment of dangerous goods training programmes by or on behalf of dangerous goods personnel. A proposal to add a reference to independent training centres in this requirement was made.

3.2.1.2 Some members understood the proposal to be a requirement for training to be provided by specialized training centres, which they could not support. The presenter explained that this was not the intent; instead, it was to recognize new sources of training which might not have been common when the training requirements were introduced. Some panel members felt that the wording of the existing provisions did not preclude the use of training centres and that no change was needed. Others felt that adding a note to 1;4.1.1 to clarify that training centres could be considered would be useful.

3.2.1.3 A revised proposal was prepared during the meeting. Some questioned whether the revised proposal implied that the actual training centre needed to be approved or if dangerous goods training programmes needed to be approved. It was suggested to include independent training organizations as a separate entity in 1;4.1.1. There was another suggestion to include text in an introductory note similar to the one at the beginning of Part 7 which refers to ground handling agents.

3.2.1.4 Although there was agreement that specialized training centres should be covered in the Technical Instructions, there was no agreement on specific text. Members who dealt with independent training centres in their States were invited to provide comments to the presenter. The presenter would
continue to work on text in consultation with other members and bring a new proposal to the DGP-WG/13 meeting.

3.2.2 Keys Identifying Different Categories of Personnel Listed in Tables 1-4 and 1-5 of the Technical Instructions (DGP-WG/12-WP/4)

3.2.2.1 It was noted that the same numbers (“keys”) were used in Tables 1-4 and 1-5 to distinguish between different categories of operator and ground handling agent personnel. Table 1-4 listed the subject matter which different categories of personnel of operators carrying dangerous goods should be familiar with, while Table 1-5 listed the subject matter which different categories of personnel of operators not carrying dangerous goods as cargo should be familiar with. The subject matter listed for three of the five categories (7, 9, and 11) was the same in both tables, making the use of the same key appropriate. It was suggested that using the same key for the categories of personnel which had different training requirements, however, could lead to confusion. A proposal to assign different keys to categories 8 and 10 in Table 1-5 was therefore made. An amendment to the title of Category 10 in Table 1-5 was also proposed, in order to distinguish it from the similar category in Table 1-4. The titles for Category 8 were already different, therefore no change was proposed to it.

3.2.2.2 It was noted that when Table 1-5 was added to the Instructions, the panel made a conscious decision to keep the numbers the same as in Table 1-4 because they were assigned to the same staff. The only difference was that staff in Table 1-4 worked for airlines which carried dangerous goods while those in Table 1-5 did not. Some members felt that this philosophy should be reconsidered and that a different set of numbers should be used for Table 1-5. This would make it very clear to which table a particular category applied. Accordingly, it was agreed to renumber the categories in Table 1-5 from 7, 8, 9, 10 and 11 to 13, 14, 15, 16 and 17.

3.2.2.3 It was felt that the new text proposed at the end of the title for Category 10 was not appropriate and also redundant, therefore it was not agreed. It was suggested that text in the title for Category 7 might also be considered redundant. This could be considered under a separate proposal.

3.2.3 Training for COMAT Shippers (DGP-WG/12-WP/16)

3.2.3.1 It was suggested that some operators did not think training was required for staff shipping dangerous goods as company material (COMAT). A proposal to include operator’s staff preparing dangerous goods for shipment as company material (COMAT) in Table 1-4 was therefore made. The proposal also included a note for Table 1-5 referring to dangerous goods training requirements.

3.2.3.2 There was much sympathy for the intent of the proposal in that operators not understanding that they took on the role of a shipper when they shipped their company material was a common problem. The working group did not feel, however, that the proposal would solve this problem. It was suggested that the problem was part of a larger one related to the lack of reference to dangerous goods requirements in Annex 6 — Operation of Aircraft. It was agreed to revisit the COMAT problem when considering draft dangerous goods material for incorporation in Annex 6 (see paragraph 3.6.4).

3.2.4 Training Nomenclature (DGP-WG/12-WP/17)

3.2.4.1 It was noted that the terms “key” and “category” were used interchangeably to refer to the subject matter different categories of personnel should be familiar with in Part 1;4. For the sake of consistency, it was proposed that one term be used throughout. Replacing “Key” with “Category” was
agreed. It was also agreed to add a row above the category numbers in Tables 1-4, 1-5 and 1-6 to clarify that these referred to categories of staff.

3.2.5 Definition of Dangerous Goods Event and Discrepancy
(DGP-WG/12-WP/19)

3.2.5.1 The DGP Working Group on Training held in Montreal in August 2012 developed a new definition for dangerous goods events for inclusion within the competency framework for designated postal operators (see paragraph 3.6.1). In addition to dangerous goods incidents and accidents, the dangerous goods event would account for the discovery of postal items containing dangerous goods not permitted in the mail, and the discovery of postal items containing dangerous goods permitted in the mail but which were improperly prepared.

3.2.5.2 A suggestion to simplify this definition was made which involved the addition of a new definition for dangerous goods discrepancy. This definition would be similar to the definition for dangerous goods events developed by the training working group, but would eliminate reference to incidents and accidents. The definition for dangerous goods event would then be simplified by referring only to incidents, accidents, discrepancies. Corresponding amendments to the reporting requirements in Part 7 of the Instructions, the reporting requirements in Part S-7 of the Supplement and the enforcement chapter in the Supplement were made.

3.2.5.3 A member of the DGP Working Group on Training cautioned that “dangerous goods event” was originally defined by that working group for the purpose of the competency framework for designated postal operators and might not be suitable for incorporation in the Instructions.

3.2.5.4 Although there was support for the intent of the amendments proposed, many members felt the changes would present challenges, particularly in relation to the definition for discrepancy and the reporting requirements. It was anticipated there would be a massive increase in reporting for relatively trivial discrepancies such as a torn label.

3.2.5.5 Others felt that reporting discrepancies could be a useful tool from an SMS perspective. A panel member from one State indicated that a mechanism for reporting discrepancies existed in their national regulations for quite some time. Although they did not investigate every discrepancy, the reporting system provided useful information which had been used to reveal problem areas which needed to be focused on. Another panel member felt that an internal reporting system could be a valuable tool for operators to have in place.

3.2.5.6 The meeting appreciated the work undertaken by the panel member in developing the proposal. Although it was not supported as presented, it was felt that the ideas it raised were worthy of further discussion. The presenter would continue to work on the proposal in consultation with other members and bring a new proposal to the DGP-WG/13 meeting.

3.2.6 Net Quantity for Unpackaged Articles
(DGP-WG/12-WP/36)

3.2.6.1 The definition for net quantity was amended at DGP/23 to clarify what quantity must be stated on the dangerous goods transport document for articles containing dangerous goods such as fire extinguishers. The revised definition specified that the mass or volume should refer to the proper shipping name of the article or substance. In the case of fire extinguishers, since the proper shipping name was “Fire extinguishers”, the net quantity on the transport document would refer to the mass of the fire extinguisher and not the dangerous goods within.
3.2.6.2 It was suggested that a discrepancy was inadvertently introduced when revising the definition in that referring to dangerous goods “contained in a package” excluded articles, such as vehicles, which would not be contained in a package. An amendment to the definition was proposed to eliminate this discrepancy. This was agreed.

PART 2 — Classification

3.2.7 Exceptions for Medical Devices or Equipment Containing Infectious Substances
(DGP-WG/12-WP/23)

3.2.7.1 The working group was asked to consider whether a proposed amendment to the UN Model Regulations by the Council on Safe Transportation of Hazardous Articles, Inc. (COSTHA) addressed concerns raised at DGP/23 related to new exceptions for medical devices or equipment containing infectious substances. These exceptions were introduced in the 17th Revised Edition of the UN Model Regulations and, for the sake of harmonization, the 2013-2014 Edition of the Technical Instructions. The concerns included:

   a) the possibility of applying the exceptions to smaller-sized equipment with Category B infectious substances present (since there was no definition limiting the size of medical devices and equipment);
   
   b) ambiguity with the intent of the drop test, i.e. what was meant by “capable of retaining the medical devices and equipment”;
   
   c) the feasibility of performing the drop test on large equipment; and
   
   d) the possibility of infectious substances being shipped unregulated when applying the exception in the note under paragraph 2.6.3.2.3.3 of the Model Regulations; this note was not adopted in the Technical Instructions.

3.2.7.2 A representative from industry provided a summary of the paper prepared for the UN Sub-Committee. The working group appreciated the work undertaken, but several concerns remained, including:

   a) The structure of the provisions was felt to be too complex. A distinction was made between surface-contaminated equipment and equipment or devices containing free liquid. A more consolidated approach should be considered.

   b) The proposal as written allowed for all used equipment or medical devices (big and small) known to be or potentially contaminated with Category B infectious substances to be transported under this exception. It was questioned whether this was adequate or if smaller pieces should still be transported under the provisions of Packing Instruction 650. It was felt a clear decision needed to be taken.

   c) Issues related to the drop test did not appear to be addressed. Surface contaminated medical devices were still required to be capable of withstanding a drop test from 1.2 m. Whether or not this would be feasible for very heavy devices was questioned.
d) The note related to the exception for medical devices drained of free liquid remained in proposal 3. The working group strongly believed this note should be removed.

3.2.7.3 The meeting felt that more consideration needed to be given to the provisions at the Sub-Committee meeting in December. Recognizing that the agenda for that meeting was very full, it was recommended that an informal paper consolidating comments from panel members be prepared for the meeting to facilitate the review. Members were asked to submit their comments to the Secretary which would be incorporated in an informal paper to the Sub-Committee.

3.2.8 Use of the Term "Net Mass"

(DGP-WG/12-WP/8)

3.2.8.1 It was recalled that the term “net mass” was used in Part 2; Introductory Chapter 5.3 d) when referring to the requirements for transporting samples. It was not clear, however, whether the definition for “maximum net mass” or “net quantity” should be applied. An amendment clarifying that the quantity referred to was maximum net mass was proposed. Although there was sympathy for the proposal, it was felt that it should first be considered by the UN Sub Committee, since it was UN Model Regulation text. It was suggested that the amended text could also be simplified by reading “with a maximum net mass per package not exceeding 2.5 kg”.

3.2.8.2 The presenter agreed to raise the issue to the UN Sub-Committee.

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

3.2.9 UN 2796 sulphuric acid with not more than 51% acid and UN 1790 hydrofluoric acid not more than 60% strength

(DGP-WG/12-WP/8)

3.2.9.1 A proposal to assign Special Provision A3 to UN 1790, Hydrofluoric acid with not more than 60% strength and UN 2796, Sulphuric acid with not more than 51% acid for Packing Group II was made. It was suggested that a corrosive hazard would not apply to Packing Group II when these substances contained lower concentrations of acid.

3.2.9.2 It was noted that the values assigned to these substances in Table 3-1 aligned with those in the UN Model Regulations and that it would be inappropriate to make any changes before asking for the UN Sub-Committee’s consideration. The presenter would raise the issue to the Sub-Committee.

3.2.10 UN3242 — Azodicarbonamide (DGP-WG/12-WP/9)

3.2.10.1 It was noted that UN 3242, Azodicarbonamide, was forbidden for transport on both passenger and cargo aircraft. It was suggested that this was unjustified, on the basis that formulations of azodicarbonamide classified as UN 3224 or UN 3226 were permitted on both passenger and cargo aircraft, even though they each have a lower self-accelerating decomposition temperature (SADT). It was also noted that the maximum net quantity per package when shipped as a limited quantity listed in the UN Model Regulations for UN 3224 and UN 3226 was higher than the quantities listed for regular shipments in the Instructions. A proposal to amend Table 3-1 to permit UN 3242 was made, along with a corresponding amendment to Packing Instruction 459.

3.2.10.2 It was suggested that the SADT value was not the determining factor in making these substances forbidden. The determining factor was the fact that these substances had desensitized
explosive properties. Permitting them could therefore not be supported without further analysis and review. It was noted that the UN packing provisions for these substances were more restrictive than those in Packing Instruction 459; this packing instruction would therefore be inappropriate even if UN 3242 were permitted for transport by air.

3.2.10.3 The proposer would consider the comments from the working group and present a new proposal to DGP-WG/13 if it was determined appropriate.

3.2.11 Clarification on Limited Quantity Allowances
(DGP-WG/12-WP/10)

3.2.11.1 It was suggested that the criteria for determining whether the provisions for dangerous goods in limited quantities could be applied (Part 3;4.1.2) was not up-to-date. An amendment adding UN 3473, UN 3476, UN 3477 and ID 8000 to the list was proposed. It was agreed, subject to a minor change to the note.

3.2.12 Certain 1.4S Articles in Limited Quantities
(DGP-WG/12-WP/12)

3.2.12.1 A proposal to allow certain 1.4S articles to be shipped in limited quantities was discussed. The proposal was considered at DGP/23 but was not accepted on the basis that the requirement for UN package testing was retained. Recognizing that the only benefit in transporting dangerous goods in limited quantities for the air mode was an exception from the package testing, it was unclear what benefit limited quantities would provide. Adopting the proposal would cause confusion in training and potentially delay acceptance checks. The panel felt very strongly that the general philosophy applied to limited quantities should not be changed. It was noted that in accordance with Part 5;2.4.13, packages bearing the limited quantity mark of other modes could still be accepted for air transport provided the requirements of the Instructions were complied with.

3.2.12.2 It was reported that since DGP/23, there had been difficulties shipping limited quantities of 1.4S articles by both surface and air modes. Surface enforcement authorities were questioning the presence of hazard labels on limited quantity packages, and operators sometimes rejected packages containing a surface limited quantity mark together with hazard marks. The working group was therefore asked to reconsider the proposal presented at DGP/23.

3.2.12.3 The working group did not ignore that the problems raised in the working paper existed, but it was felt that the problems should be solved in a manner which would not involve changing the philosophy of the limited quantity provisions. It was believed these problems would affect shippers of all classes of dangerous goods, not just 1.4S articles, and that they needed to be solved more comprehensively.

3.2.12.4 It was recalled that the new limited quantity markings were developed with the intention of facilitating intermodal transport. This was demonstrated through a short presentation showing how all shippers shipping dangerous goods under limited quantity provisions for road or sea could benefit from allowing the road/sea limited quantity mark in addition to all markings and labels required by the Technical Instructions for a fully regulated package.

3.2.12.5 It was evident that some shippers and operators were not aware of this. To solve the problem, each entity would need to be distinctly addressed:
a) **For operators refusing surface limited quantity marking:** The Technical Instructions allow for additional labels required by other international or national transport regulations. The working group believed the fact that certain operators were not accepting them could be attributed to misinformation, a lack of awareness, and a lack of proper training. It was felt that developing good guidance material for publication on the ICAO website would help. The panel member nominated by IATA reported that explanatory text and illustrations were developed for the next edition of the IATA Dangerous Goods Regulations in order to clarify the issue.

b) **For inspectors of the road and sea mode not willing to accept packages bearing a surface limited quantity mark when hazard labels were also present:** It was suggested that some additional text may be needed in the UN Model Regulations and in the ADR/IMDG to explain that fully regulated packages for air transport may travel under the limited quantity provisions for road and sea. It was believed that this could easily be solved by adding a paragraph in section 3.4 of the UN Model Regulations.

The working group believed that these steps would benefit all shippers of dangerous goods, not only those shippers shipping 1.4S articles.

3.2.12.6 The proposer appreciated that the working group did recognize the problems and accepted the decision not to adopt limited quantity provisions for 1.4S articles. However, the presenter believed that some airlines had a policy of not accepting packages bearing the road/sea limited quantity mark and that this policy would be difficult to change. Some operator representatives present at the meeting were of the opinion that the education of their staff would indeed be a challenge but were optimistic it would be feasible.

3.2.13 **Review of Certain Division 4.2 Substances**  
(DGP-WG/12-WP/21)

3.2.13.1 The working group was asked to consider permitting certain self-heating substances of Division 4.2, Packing Group III on passenger and/or cargo aircraft. Based on classification criteria and the criteria for assignment of packing groups, it was suggested that the forbidden/forbidden status could be removed. It was noted that although these substances were forbidden in excepted quantities in the Technical Instructions, they were permitted in excepted quantities by other modes of transport. The working group was also asked to consider if the current packing instruction provisions for other Division 4.2 solids in Packing Group III were appropriate, specifically Packing Instructions 469 and 471.

3.2.13.2 Recognizing that the danger posed by these substances might not be present in smaller quantities, the meeting was asked to consider permitting the substances for transport under the excepted quantity provisions while maintaining the forbidden status for regular quantities. Although there was sympathy for the idea, it was strongly felt that straying from the general philosophy of the excepted quantity provisions would not be appropriate. This argument against was strengthened during the discussion on DGP-WG/12-WP/25 (see paragraph 3.2.15).

3.2.13.3 The working group was then asked to consider developing a special provision whereby a safe limit for transport would be set. Since no criteria existed for setting such a limit, the idea was not supported. It was noted that the quantities set in the UN Model Regulations had been around for a really long time, and it was suggested determining the values was based on human experience. Criteria would need to be determined at the UN before any changes were made. In the same vein, removing the forbidden/forbidden status of these substances was not supported.
3.2.14 Harmonization of Excepted Quantity Codes in the UN Model Regulations and the Technical Instructions (DGP-WG/12-WP/25)

3.2.14.1 It was reported that a number of substances which are forbidden on passenger aircraft were permitted in excepted quantities in the Model Regulations. A paper which listed these substances along with other anomalies was presented at the Forty-first session of the Sub-Committee of Experts on the Transport of Dangerous Goods (Geneva, 25 June – 4 July 2012) (ST/SG/AC.10/C.3/2012/25). A review of the differences was performed by the Secretariat and would be presented at the December meeting of the Sub-Committee. The working group was invited to provide comments to the Secretary on this review. The results of the working group’s discussion would be provided in an informal paper to the Forty-second Session of the UN Sub-Committee.

3.2.14.2 Background information on how the excepted quantity provisions were incorporated into the Model Regulations was provided during discussion of the working paper. It was explained that excepted quantity provisions had been unique to air transport for quite some time. The UN decided to incorporate the provisions into the Model Regulations to facilitate transport between modes. They developed a rationalized approach to assigning excepted quantity codes which was based on the provisions of the 2005-2006 Edition of the Technical Instructions. Any inconsistencies in the Model Regulations were not intentional. The Sub-Committee was prepared to address these inconsistencies, but asked that the DGP consider whether there was a need to be more restrictive in the air mode.

3.2.14.3 It was noted that when packages were shipped in excepted quantities, there was no way to identify what that package contained. The only identification on the package was the excepted quantity mark and an indication of the class or division. If a package was shipped using excepted quantity provisions permitted by other modes but not by air, there would be no way for an air operator to know that that package was not in compliance with the air mode. For this reason, the excepted quantity provisions needed to be harmonized.

3.2.14.4 It was strongly agreed that the criteria used by the DGP to assign excepted quantity codes should not change. Harmonization of the codes for the other modes with the air mode was crucial, but it was also recognized that it was difficult for the other modes to keep up-to-date with the Technical Instructions. Excepted quantity codes assigned to substances may change and it would be up to the DGP via the Secretariat to inform the Sub-Committee of these changes.

3.2.15 Compatibility Requirements for Excepted Quantities (DGP-WG/12-WP/28) and Packagings Forbidden in Packing Instructions but not in Excepted Quantities (DGP-WG/12-WP/35)

3.2.15.1 It was noted that a number of packing instructions for various Class 8 substances contained a specific “compatibility requirement” for hydrofluoric acid but that there was no equivalent requirement when substances assigned to these packing groups were shipped as excepted quantities. Two different proposals were presented to address this issue. The first added a requirement for compliance with the compatibility requirements of Part 4;1.1.3.3 by way of a reference in Part 3;5.1.1 e). The second added a requirement in Part 3;5.5.1 for inner packagings to be of a type permitted by the packing instruction applicable to the substance.

3.2.15.2 The meeting preferred the proposal to add a reference to the compatibility requirements in Part 3;5.1.1 e) over referring to the packing instructions on the basis that a shipper might not be familiar with the packing instructions if they were accustomed to only shipping using the excepted
quantity provisions. The shipper should, however, be very familiar with the compatibility requirements. The fact that there was potential for more than one packing instruction (passenger/cargo/limited quantity) for a particular substance might also cause confusion. Finally, referring to the packing instructions could complicate multimodal transport in that the applicable packing instruction in the Technical Instructions might not be the same for the other modes.

3.2.15.3 The proposal in DGP-WG/12-WP/28 was agreed. A suggestion to refer more generally to 4;1.1.3 instead of 4;1.1.3.3 was not supported since the applicable sub-paragraphs had already been referenced in 3;5.1.1 e) and the ones which weren’t referenced applied only to the air mode.

3.2.16 UN Numbers not Included in the List of Dangerous Goods (DGP-WG/12-WP/29) and Dangerous Goods not Listed in Table 3-1 (DGP-WG/12-WP/34)

3.2.16.1 The working group was asked to consider adding entries to Table 3-1 which, although assigned UN numbers and listed in the UN Model Regulations were not currently listed in the Instructions. It was suggested that their absence in the Instructions was based on the belief that there would never be a need to transport the items by air. However, enquiries about the air transport of some of these items had been received. In order to eliminate the potential for confusion, it was proposed to add these items to the Technical Instructions. It was recognized that some of the items should be forbidden for transport by air and others, while considered dangerous goods by other modes of transport, might not be considered dangerous when transported by air. A new special provision, based on special provision 960 in the IMDG code, was proposed for these substances.

3.2.16.2 A second paper on the same subject was presented which included an itemized list of the substances which the working group was asked to review.

3.2.16.3 There was strong support for adding these substances to the Technical Instructions. The presenters agreed to analyse each substance and prepare a proposal for the DGP-WG/13 meeting. In addition, the Secretariat was asked to research when the decisions were taken to remove these substances from the list of dangerous goods.

3.2.17 Excepted Quantity Provisions — Absorbent Material — Count of Packages (DGP-WG/12-WP/39)

3.2.17.1 The working group was presented with a proposal prepared for consideration by the UN Sub-Committee on the placement of absorbent material when applying the excepted quantity provisions. It was noted that the current provisions required that intermediate packaging for liquid dangerous goods contain sufficient absorbent material to absorb the entire contents of the inner packagings. It was argued that this was cumbersome for some end users who wished to unpack the intermediate packagings from the outer packaging and store them. The proposal suggested that the absorbent material could also be placed in the outer packaging without compromising safety. An alternate proposal was also presented whereby the absorbent material could be placed in the outer packaging subject to the intermediate packaging containing the inner package passing a drop test. The working group was asked to comment on the proposals.

3.2.17.2 Although one member showed some support for one of the alternatives there was no support expressed by other members. The presenter, recognizing that there was some sympathy for the problem, asked that members give it further consideration and provide ideas for alternative solutions.
Part 4 — Packing Instructions

3.2.18 Provisions for Cylinders
(DGP-WG/12-WP/11)

3.2.18.1 A number of inconsistencies between the Model Regulations and the Technical Instructions were identified during a review of the provisions for cylinders. The meeting was invited to consider amendments to remove these inconsistencies.

3.2.18.2 Some of the general provisions for cylinders contained in paragraph 4.1.3.6 of the UN Model Regulations were not incorporated in the equivalent Part 4;2.7.1 of the Technical Instructions. Provisions for cylinders were instead included in applicable packing instructions of the Technical Instructions. The meeting was asked to consider whether the text in the Model Regulations should be incorporated in Part 4;2.7.1.

3.2.18.3 The meeting was also asked to consider whether Packing Instruction 361 was mistakenly assigned to UN 3983, Ethylene oxide and propylene oxide mixture. This packing instruction permitted the use of both combination and single packagings, whereas the Model Regulations permitted only the use of cylinders. A new packing instruction requiring the use of cylinders was therefore proposed.

3.2.18.4 Finally, it was reported that the Model Regulations permitted the use of cylinders as single packagings for UN 2881, Metal catalyst, dry, but they were not listed as a permitted packaging type in the Instructions. An amendment to Packing Instruction 473 was therefore proposed.

3.2.18.5 The amendment to Part 4;2.7 was not supported on the basis that it would introduce the possibility of using a cylinder even if it was not listed in the applicable packing instruction and even if single packagings were not permitted. It was felt that the current provision in 2.7 permitting cylinders for liquids and solids when indicated in a packing instruction was sufficient. It was noted that Part 4;2.8 could provide for the use of a cylinder or any other packaging not listed in a packing instruction with the approval of the appropriate national authority of the State of Origin.

3.2.18.6 There was initial support for the amendment to Packing Instruction 361 on the basis that it was currently less restrictive than the UN Model Regulations. It was noted, however, that there was a current lack of harmonization between other regulations as well and that the Model Regulations was the most restrictive. It was suggested that UN 3983 had been transported safely for years and that there did not seem to be any justification to change the requirements. It was agreed that the issue would be instead raised at the UN.

3.2.18.7 The proposal to amend Packing Instruction 473 to allow for cylinders was agreed, but the other amendments proposed in the paper were not.

3.2.19 Fuel Cell Industry Update (DGP-WG/12-WP/13) and its addendum

3.2.19.1 The meeting was asked to add a reference in Packing Instructions 216, 375, 496, 874 and Table 8-1 to Amendment 1 to IEC 62282-6-100, the international standard for fuel cell technologies and micro fuel cell power systems. This proposal was made at DGP/23, but the reference was not included in the 2013-2014 Edition of the Technical Instructions since IEC members had yet to vote on adopting it. It was reported that Amendment 1 to IEC 62282-6-100 had since been unanimously approved by all IEC voting member nations. The working group was also asked to consider incorporating the reference in the 2013-2014 Edition of the Instructions by way of an addendum.
3.2.19.2 The meeting supported the addition of a reference to Amendment 1 to IEC 62282-601-100. Those who expressed concerns with the content of the addendum at DGP/23 reported that their concerns were addressed. They felt the changes made the standard more technically sound and accurate.

3.2.19.3 Recognizing that the IEC standard added clarifications which would enhance safety, it was felt an addendum to the 2013-2014 Edition of the Technical Instructions was justified. It was also felt that the Instructions should align with the most up-to-date standard. The Secretary reported that the fall schedule for the Air Navigation Commission (ANC) and the Council was very full. She would bring the request for an addendum to the ANC during its winter 2013 Session.

3.2.20 Review of Packing Instruction Y963
(DGP-WG/12-WP/22)

3.2.20.1 An amendment to Packing Instruction Y963 was proposed for the sake of alignment with the limited quantity provisions in Part 3;4. The working group was reminded that Packing Instruction Y963 for consumer commodities was structured as a self-contained packing instruction with minimal reference to other parts of the Technical Instructions. It was discovered, however, that certain provisions related to the drop test in the packing instruction were inconsistent with the drop test requirement in Part 3;4.4.1. An amendment to remove these inconsistencies was agreed.

3.2.21 Period of Use for Plastic Drums, Jerricans and IBCs
(DGP-WG/12-WP/30)

3.2.21.1 It was noted that the period of use requirement in Part 4;1.1.20 did not apply to UN 3291 (Biomedical waste, n.o.s., Medical waste, n.o.s., Clinical waste, unspecified, n.o.s. and Regulated medical waste, n.o.s.). Although this exception was specified in Packing Instruction 622, there was no indication of it in paragraph 1.1.20. A new note in Part 4;1.1.20 referring to the exception was proposed.

3.2.21.2 Although there was sympathy for the proposal, it was not accepted on the basis that introducing a note would be redundant and would set a precedence whereby redundant provisions would be expected elsewhere.

Part 5 — Shipper’s Responsibilities

3.2.22 Label Dimensions
(DGP-WG/12-WP/5)

3.2.22.1 It was reported that changes to the UN Model Regulations to more clearly specify the required design and dimensions of labels and markings were being considered by the UN Sub-Committee. It was expected that these changes would be adopted, and that the corresponding changes to the Technical Instructions would be considered at DGP-WG/13. Noting that there were a number of labels specific to air transport in Part 5;3 of the Instructions, it was proposed that these be also amended.

3.2.22.2 The proposal was agreed, subject to the following revisions:

a) a minor editorial amendment to 3;5.2.1 to improve the readability;

b) the dimension for the width of the cryogenic liquid label in Figure 5-28 was modified for the sake of alignment with the other handling labels;
c) measurement for the spacing between the dashed lines and the solid border of the keep away from heat label in Figure 5-29 was added; and

d) provision for a smaller label size as provided for in 5;3.5.2.2 was added to the lithium battery handling label in Figure 5-31.

3.2.23 Dangerous Goods Transport Information — Documentation — Indication of a Country (DGP-WG/12-WP/14)

3.2.23.1 It was reported that dangerous goods shipments were often rejected because of incorrect references to the destination country in the address (e.g. using the abbreviation “US” for “United States”). The working group was asked to consider whether new provisions in the Technical Instructions were justified to address this problem, such as requiring the use of an ISO two-digit codes for countries.

3.2.23.2 Although there was sympathy for the problem, the working group felt that adding any new specific requirement to the Instructions would only create further rejected shipments. It was felt that the problem could only be solved through proper training.

3.2.24 Overpacks Containing “Cargo Aircraft Only” Dangerous Goods (DGP-WG/12-WP/32)

3.2.24.1 A proposal to remove the provisions under which an overpack can contain “cargo aircraft only” dangerous goods in Part 5;1.1 e) was discussed at DGP-WG/08. At that time, it was agreed that further consideration was needed and that a new proposal would be brought to DGP-WG09. The subject was, however, never revisited. DGP-WG/12 was invited to reconsider the proposal. The group was reminded that it was originally developed on the basis that earlier changes made to the provisions concerning label visibility and accessibility of packages and overpacks containing cargo aircraft only dangerous goods made the provisions in Part 5;1.1 e) unnecessary. The current provisions required accessibility to the overpack, not the individual packages contained within, making reference to packages in 5;1.1.1 e) redundant.

3.2.24.2 It was noted that there was hesitation in supporting the proposal when it was originally presented at DGP-WG/08 on the basis that the loading requirements were new and time was needed to ensure they did not introduce any problems. Since they did not, the proposal was agreed.

Part 6 — Packaging Nomenclature, Marking, Requirements and Tests

No papers were submitted under this agenda item.

Part 7 — Operator’s Responsibilities

3.2.25 Stowage of Toxic and Infectious Substances (DGP-WG/12-WP/20)

3.2.25.1 The working group was asked to consider a revision to the stowage of toxic and infectious substances requirements in Part 7;2.9. It was noted that the provisions limit the loading of these substances to separate compartments unless loaded into separate unit load devices (ULDs) which were not adjacent to each other or loaded into separate closed ULDs. It was explained that the aft hold of containerized aircraft was typically divided between a forward portion, designed to hold ULDs, and a
smaller aft portion, designed for bulk loading (non-containerized). The bulk hold was often used to transport pets checked in as part of passenger baggage. The restrictions set out in Part 7;2.8 created issues in being able to transport the animals, as there was no provision made for goods or animals that were not loaded into a ULD. A note was therefore proposed to clarify that for the purposes of 7;2.9, this bulk hold could be considered an open unit load device.

3.2.25.2 It was also noted that although the UN Model Regulations have similar segregation provisions for toxic substances, no such provisions exist for infectious substances. An amendment to remove the segregation requirement for infectious substances was therefore proposed.

3.2.25.3 There was support for the intent of the proposed note, but the wording needed to be clarified. Some of the terms in it were not clearly defined anywhere in the Instructions.

3.2.25.4 Removing the reference to infectious substances while keeping reference to toxic substances was not supported. It was felt that the two should be considered in tandem. Perhaps the segregation requirements were no longer necessary, but further study was needed. This would need to be addressed at the UN.

3.2.25.5 Based on the discussion, a new proposal would be prepared for DGP-WG/13.

3.2.26 Acceptance Checks (DGP-WG/12-WP/31)

3.2.26.1 It was suggested that although a consignment of dangerous goods might be transported on more than one aircraft or by more than one operator on its journey to its destination, an acceptance check was only required prior to the dangerous goods first being accepted for carriage. Prior to loading on subsequent aircraft, the operator should be responsible for ensuring a consignment continues to be compliant, but that verifying those parts of 7;1.3 which cannot change since initial acceptance would not be necessary (e.g. quantity limits were respected, packaging used was appropriate, etc.). A proposal to clarify this was made by way of an amendment to 7;1.3.1 and a new note to that paragraph.

3.2.26.2 Some members were strongly opposed to the proposal. Referring to Part 1;2 of the Instructions, the meeting was reminded that it was the responsibility of the operator to transport dangerous goods in compliance with the Instructions. Whether or not an acceptance check was performed did not relieve the operator of any responsibility to transport dangerous goods in compliance with the Instructions. These members also believed that not requiring an acceptance check was contrary to safety management principles. They referred to incidents where packages which weren’t prepared properly were discovered during a second acceptance check.

3.2.26.3 The majority felt that the amendment was a necessary clarification. Once an acceptance check had been done, there was no need for it to be repeated. They believed that repeated acceptance checks could result in damage in the case where a pallet or container would need to be unpacked. Rechecking would be inefficient and seriously affect some operator’s operations. It was noted that dangerous goods moving through the system were continuously scrutinized by operators. They checked for damage, leakage, labels falling off etc.

3.2.26.4 The amendment was agreed.

3.2.27 Requirement for the Technical Name on the Written Information to the Pilot-In-Command (DGP-WG/12-WP/50)
3.2.27.1 Eliminating the requirement to provide the technical name with the information to the pilot-in-command was proposed. It was suggested that the names provided little benefit to safety, particularly during the initial stage of emergency response. Providing the names was becoming an increasingly cumbersome task for operators; an increase in substances requiring a technical name, particularly in relation to environmentally hazardous material, only added to this. It was noted that the technical name was not provided for in the Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods (Doc 9481) nor was it provided for in the North American Emergency Response Guidebook. It was not needed to determine the drill code and the associated emergency response procedures to be followed in the event of an incident.

3.2.27.2 Some members felt that the additional information was important and that the requirement should remain. The member nominated by IFALPA reported that in his experience, pilots were interested in having as much information as possible. Others reported talking to pilots and emergency responders who indicated the information they needed was the class or division and the UN number and that the technical name was not needed.

3.2.27.3 It was acknowledged that the technical name would be required by emergency responders in the phases following initial emergency response, but it was suggested that they would be looking for more detailed information that could only be provided by the shipper. This argument was countered by members who suggested that in some States, it was difficult to obtain timely information and the NOTOC provided a mechanism to obtain information more quickly.

3.2.27.4 Some members felt that a decision should not be taken on adopting the proposal until the next working group meeting on the basis it was a late proposal. Others felt that even though it was a late submission it was a subject that had been previously discussed at length. The counterargument was that previous discussions were more general and did not specifically address the technical name.

3.2.27.5 Although there were some members who did not support the proposal, the majority did. It was agreed, subject to a small editorial amendment.

Part 8 — Provisions Concerning Passengers and Crew

3.2.28 Information about Dangerous Goods Carried by Passengers and Crew (DGP-WG/12-WP/15)

3.2.28.1 It was recalled that the pilot-in-command must be informed of the location of certain dangerous goods permitted for carriage by passengers and crew when they are carried. There were no provisions, however, on how this information should be conveyed to the pilot-in-command. A new paragraph 8.1.1.5 was proposed which would require this information to be included on the NOTOC. A consequential amendment to Table 1-5 adding “Pilot notification” to the list of subject matter which applicable personnel should be familiar was also proposed.

3.2.28.2 Although there was support for creating a mechanism for informing the pilot-in-command, members were uncomfortable with providing it on a NOTOC. A NOTOC applied to dangerous goods carried as cargo and required information that would not apply to passengers.

3.2.28.3 A revised proposal would be developed for DGP-WG/13 based on the discussion.
3.2.29  Gas Cartridges Carried by Passengers (DGP-WG/12-WP/33)

3.2.29.1  An amendment to the passenger provisions in Table 8-1 was proposed in order to restrict the carriage of small gas cartridges to only those without a subsidiary risk. It was noted that the introduction of small cartridges containing carbon dioxide or other suitable gases in Division 2.2 was made to allow for equipment such as safety vests and bicycle tyre inflators. One panel member reported cases of passengers carrying small gas cartridges containing nitrous oxide with a subsidiary risk of Division 5.1 and that these items were used as a legal narcotic. The amendment was agreed. The group considered whether the amendment should be incorporated into the 2013-2014 Edition of the Technical Instructions. The group felt there was no strong justification for an addendum, on the basis that it was not a significant safety issue. If at a later time it was determined an addendum was justified to address a separate safety issue, the amendment to Table 8-1 would be included.

3.2.30  Pacemakers (DGP-WG/12-WP/37)

3.2.30.1  It was noted that some cardiac pacemakers were externally fitted on a patient but that the provision in Part 8 of the Technical Instruction referred to pacemakers implanted into a person. An amendment to allow for externally fitted pacemakers was therefore proposed.

3.2.30.2  It was noted that the provisions for portable medical electronic devices would apply to externally fitted pacemakers, but these provisions were subject to operator approval. It was also felt that although it was apparent to members of the DGP that portable medical electronic devices would apply, it might not be to anyone else. A more descriptive entry would be more appropriate.

3.2.30.3  One panel member suggested that the provision for cardiac pacemakers was intended to apply to any device implanted in a person; cardiac pacemakers were simply provided as an example. However, the proposed amendment would provide for any device powered by lithium batteries fitted externally on a person.

3.2.30.4  The amendment as presented was not supported; a revised proposal would be prepared for DGP-WG/13.

3.2.31  Electric Mobility Aids (DGP-WG/12-WP/43)

3.2.31.1  A small amendment to the recently-agreed provisions for electric mobility aids in paragraphs 5), 6) and 7) of Table 8-1 was proposed in order to clarify what must be done to immobilize the mobility device. It was noted that batteries should not be routinely disconnected or removed, as this was difficult to do and if not done correctly could increase the risk of fire. On reflection it was felt that the requirements in the provisions for the electrical circuits to be “isolated” could be interpreted to mean a battery had to be disconnected at the terminals, something that the new text was trying to avoid.

3.2.31.2  It was suggested that a very simple way of preventing the drive mechanism of an electric mobility aid from inadvertently operating was the insertion of an inhibiting plug. When it is used, the term “isolated” used in the current provisions would not be appropriate. The amended text therefore replaced the word “isolated” with “inhibited”.

3.2.31.3  Although there was support for the intent of the proposal, panel members had difficulties with the use of the term “inhibit”, particularly in some languages where it could be interpreted to mean “slow down”.

3.2.31.4  The presenter would develop a new proposal based on the discussion for DGP-WG/13.
3.2.32 **Marking of Fuel Cells** *(DGP-WG/12-WP/48)*

3.2.32.1 It was suggested that the “APPROVED FOR CARRIAGE IN AIRCRAFT CABIN ONLY” manufacturer marking requirement for fuel cells was inconsistent with the provision in Table 8-1 for spare fuel cell cartridges in checked baggage. Removing “CABIN ONLY” was therefore proposed.

3.2.32.2 It was clarified that the marking applied to fuel cells and not to the fuel cell cartridges. Fuel cells were not permitted in checked baggage, making the marking appropriate.

3.2.32.3 The presenter withdrew the amendment proposal.

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

No papers were submitted under this agenda item.

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

3.4.1 **Emergency Response Drill Number 4, Letter "W", Firefighting Procedure** *(DGP-WG/12-WP/2)*

3.4.1.1 A proposal to recommend using a dry fire extinguishing agent for drill code “4W” was proposed. It was noted that “all agents according to availability” was specified for drill number 4, along with “no water” when drill letter “W” was assigned. Drill code “4W” was assigned to substances which included alkali metals such as UN 1415, **Lithium**. It was suggested that halon and carbon dioxide would not extinguish a fire involving such substances, making it necessary to amend the firefighting procedure.

3.4.1.2 There were some concerns with the proposal:

   a) Dry agents were not usually available on board an aircraft. It might be appropriate to use halon if that was all that was available.

   b) It was felt that more information on the effects of halon on these fires was needed.

   c) Some members were uncomfortable with the use of the term “dry agents” since it was not defined.

It was felt more consideration was needed before an amendment could be agreed. A new proposal would be brought to DGP-WG/13.

3.4.2 **Emergency Response and Portable Electronic Devices** *(DGP-WG/12-WP/46)*

3.4.2.1 An amendment to the amplified cabin crew checklist for fires involving portable electronic devices during flight was proposed. It was recalled that the checklist included an instruction to
not move the device, and it was suggested that this might not be an appropriate instruction under all circumstances. An example of an electronic device catching fire in the flight deck was given; moving the device would be important so as to prevent electronic instruments from being exposed to flames, smoke, or fire fighting agents. Clarifying that the device should only be moved to prevent an additional safety hazard was therefore proposed, along with instructions on how to move the device.

3.4.2.2 There was sympathy for the proposal, but members felt the wording needed to be strengthened. It was recalled that the recommendation at one time was to move the device. It became apparent that this was not always safe as it was not always possible to guarantee that a fire was completely out. The text, therefore, was changed to recommend people move away from the device.

3.4.2.3 A revised proposal which would make it clear that the device should only be moved if absolutely necessary would be prepared for DGP-WG/13.

3.5 Agenda Item 5: Issues related to lithium batteries

3.5.1 Secondary Lithium Batteries (DGP-WG/12-WP/40)

3.5.1.1 A new special provision was proposed to allow for the transport of lithium ion batteries larger than 35 kg on cargo aircraft without an approval as currently required pursuant to Special Provision A99. The provision would be restricted to one battery per package, and the package would be subject to all requirements in the Instructions in addition to some specific requirements such as Packing Group I performance requirements, fire and flame resistant packaging, and specific marking and documentation requirements. The working group was asked to consider incorporating this special provision in the 2013-2014 Edition of the Technical Instructions by way of an addendum.

3.5.1.2 There was general support for the amendment in that it would provide a uniform way of transporting what was now being transported through State approvals. It was felt, however, that the amendment was not yet mature enough to be incorporated in the Instructions. Some of the concerns raised were:

a) Some of the terms used (e.g. impact resistant, fire and flame resistant, non-combustible) were not clearly defined; this would cause the potential for confusion and a lack of consistency in implementation.

b) Whether or not the maximum size permitted (400 kg) was appropriate would need to be considered. It was questioned whether there was a need for this large a battery. Some felt a lower limit, based on current experience with approvals, should be established. The size could be adjusted in the future based on new data and new experience.

c) Reduced state of charge was not included as a requirement in the special provision and some members felt it should be. A lower state of charge provided an extra level of safety.

3.5.1.3 In addressing the concerns raised, the presenter explained that these batteries were robust and constructed to extremely high standards. They were designed to be safe at 100% state of charge. The maximum size was based on Packing Group I packaging types; there was much experience in the industry with batteries above 150 kg and it was felt that larger batteries would still be safe based on the high safety standards they were required to meet.
3.5.1.4 A representative from the battery industry convened a lunchtime working group meeting to discuss the issues raised in DGP-WG/12-WP/40. The group agreed to establish a correspondence working group, distribute information on Special Provision A99 approvals issued by competent authorities and begin developing a new proposal for DGP-WG/13.

3.5.2 **Application of Provisions for Lithium Batteries**
(DGP-WG/12-WP/45)

3.5.2.1 The working group was reminded of the new provisions in Part 2;9.3 which required that lithium batteries must be manufactured under a quality management programme. Although references to this paragraph were added to the specific packing instructions for lithium batteries (Packing Instructions 965 to 970), none were added to other packing instructions which referenced lithium batteries (i.e. Packing Instruction 950 for flammable liquid-powered vehicles, Packing Instruction 951 for flammable gas-powered vehicles and Packing Instruction 952 for battery-powered vehicles). Adding references to Part 2;9.3 in these packing instructions was therefore proposed. The amendment was agreed subject to a minor editorial revision.

3.5.2.2 It was also noted that the paragraph specifying the requirements for lithium batteries in Packing Instruction 952 (assigned to UN 3171) made reference to “equipment” containing lithium batteries. Recognizing that Special Provision A21 was assigned to UN 3171 and that this special provision required equipment powered only by lithium batteries to be consigned under UN 3090 or UN 3481, it was proposed that the reference to equipment be deleted. This was agreed.

3.5.3 **Packing Instructions 966, 967, 969 and 970**
(DGP-WG/12-WP/7) and **Lithium Ion and Lithium Metal Button Cells Installed in Equipment**
(DGP-WG/12-WP/51)

3.5.3.1 The meeting was reminded of the exception in Section II of Packing Instructions 967 (lithium ion batteries contained in equipment) and 970 (lithium metal batteries contained in equipment) whereby button cell batteries installed in equipment did not need to be considered in determining whether a lithium battery handling label needed to be applied. It was queried whether this exception also applied to the other lithium battery packing instructions and that if it did, this should clearly be stated.

3.5.3.2 A representative from the battery industry explained that the vast majority of lithium button cell batteries were non-rechargeable lithium metal and were found in thousands of electronic and electrical devices. They were generally designed to provide backup power for real time clocks and BIOS configuration data in devices such as cellular phones, computers, printers, watches and calculators. He explained that they contained a very small amount of lithium metal and suggested that when installed in equipment, they presented virtually no risk in transportation. He also explained that it was often impossible for shippers to know if equipment contained a button cell battery.

3.5.3.3 The meeting was asked to consider adding a note to the end of the additional requirements in Section II of Packing Instructions 966, 967, 969 and 970 to clearly state that the lithium battery handling label, documentation and air waybill requirements did not apply to button cell batteries installed in equipment or on circuit boards.

3.5.3.4 There was support for the proposal in that it clarified the original intent of the provisions. The effectiveness of including the text in a note was questioned, and it was suggested it be included as a separate bullet under the additional requirements of Section II in Packing Instructions 967 and 970. A revision to the proposal specifying that the exception did not apply to button cell batteries which were not the primary power source to operate the equipment was not supported, as this would conflict with the
existing exceptions in Packing Instructions 967 and 970 for devices such as radio frequency identification tags, watches and temperature loggers.

3.5.3.5 A new proposal based on the discussion would be prepared for DGP-WG/13.

3.5.4 30-Day Transition Period for New Lithium Battery Regulations (DGP-WG/12-WP/52)

3.5.4.1 A transition period for the new lithium battery provisions was proposed. It was reported that large quantities of lithium batteries currently qualified for the exceptions in Section II of Packing Instructions 965 and 968. Starting 1 January 2013, many of these would be subject to full regulation. It was expected that a large amount would be offered for transport in December 2012 under the current exceptions but would not reach their final destination until January 2013 when the exceptions would no longer apply. The working group was asked to consider an addendum to the 2013-2014 Edition allowing for a thirty-day transition period for batteries shipped in December 2012.

3.5.4.2 It was generally felt that current practices would allow for shipments offered for transport under the 2011-2012 exceptions to be accepted in January 2013. But some members felt a transition period in January 2013 should be provided, recognizing that it would take some time for shippers to familiarize themselves with the new requirements. This would be especially true of shippers who were currently shipping under the exceptions and might never have been exposed to dangerous goods regulations.

3.5.4.3 It was agreed that a thirty-day transitional period would be recommended through a guidance document on the ICAO public website.

3.5.4.4 Noting that a transition period had been introduced when other significant changes were introduced into the Instructions in the past, it was suggested that the meeting develop criteria and a mechanism for considering transition periods for future editions of the Technical Instructions.

3.5.5 Hazard Communication for Energy Storage Devices (DGP-WG/12-WP/53)

3.5.5.1 The working group was informed of discussions at the 41st Session of the UN Sub-Committee on hazard communication related to energy storage devices. Discussions were based on a paper presented by the DGP Secretary informing the Sub-Committee of concerns raised at the DGP Working Group of the Whole on Lithium Battery Meeting (DGP-WG/LB/1) that the hazard labels on packages containing lithium batteries did not provide appropriate hazard communication. The Sub-Committee agreed that hazard communication for energy devices would be considered during the next biennium.

3.5.5.2 The working group was asked to form a working group tasked with developing material for consideration at the 43rd Session of the UN Sub-Committee of Experts on the Transport of Dangerous Goods. Recognizing that the deadline for submission of working papers to the UN for consideration was 27 March 2013 and that the Spring DGP working group of the whole meeting might only take place after this date, it was proposed that this working group meet through correspondence.
3.6 Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by Air Navigation Commission or the Dangerous Goods Panel

Agenda item 6.1: Competency-based training

3.6.1 Competency Framework for Operators (DGP-WG/12-WP/27) and Competency Framework for Designated Postal Operators (DGP-WG/12-WP/41)

3.6.1.1 The working group was informed of the progress made in developing competency frameworks for designated postal operators (DPOs) and for operators at the DGP Working Group on Training (Montreal, 13 to 16 August 2012). The chairman of the working group reported that the focus of its work at that meeting was on developing a mature competency framework for designated postal operators. Although the group completed a framework for DPOs, it was recognized that this was a living document that could be modified based on work between CAAs and DPOs. The framework for operators was an initial draft.

3.6.1.2 The working group was invited to review the frameworks and to provide comments to the chairman of the training working group. A more mature framework for operators would be prepared for DGP-WG/13.

3.6.1.3 One member noted discussions in her State on how to systematically relate the training tables in Part 1;4 of the Technical Instructions to the competency frameworks. A training officer from the ICAO Secretariat recommended the development of guidance material explaining how to build a training programme using the two. This would be considered by the DGP Working Group on Training.

3.6.1.4 The meeting expressed its thanks to Mr. Teun Muller, the chairman of the working group on training, and its appreciation for the work done.

Agenda Item 6.2: Incident data collection

3.6.2 Dangerous Goods Incident and Accident Collection and Reporting System (DGP-WG/12-WP/24)

3.6.2.1 Guidance was sought from the working group on developing an ICAO dangerous goods incident reporting system. The Secretary reported that ICAO was placing considerable importance on data collection and analysis in support of safety management systems (SMS). During the Air Navigation Commission’s review of the DGP/23 Report and the Report of the DGP Working Group of the Whole on Lithium Batteries, the Secretariat was asked to consider developing a dangerous goods incident reporting system with standardized methods and procedures for gathering and coordinating data.

3.6.2.2 There was strong support for the development of a global database system. There were concerns related to confidentiality, but the group was optimistic these could be addressed. The intent of the system would be to improve safety and not to punish. It was understood that the system would do more than simply collect data; it would provide information to identify risks. It was noted that identifying risks and eliminating them was key to SMS. Without information, risks would never be identified.

3.6.2.3 Identifying the needs and the scope would be the first step towards developing a global system. Recognizing that the needs of the global system might differ from the needs within a more localized system was important.
3.6.2.4 A demonstration of a reporting system developed and used in one State was provided to the panel. Other members described similar systems in their States. Members who had not already done so were encouraged to share designs of incident reporting systems used within their States. The group was encouraged by the amount of relevant information which already existed in some States and the potential for sharing it. It was recognized that this would be difficult for some unless a clear policy for maintaining confidentiality was developed.

3.6.2.5 Work on the system would continue through correspondence. A progress report would be presented at DGP-WG/13.

**Agenda Item 6.3: State of overflight involvement in the exemption process**

### 3.6.3 State of Overflight in the Exemption Process

(DGP-WG/12-WP/18)

3.6.3.1 The working group was asked to revisit the subject of State of Overflight in the exemption process. This was discussed at length at DGP/23, at the Working Group of the Whole on Lithium Batteries Meeting, and through correspondence after those meetings. For ease of reference, the proposals presented at the two meetings and through correspondence were presented to the working group. The meeting was asked to determine which of the proposals should be used as a basis for further discussion.

3.6.3.2 The meeting was also informed of ICAO’s continuous monitoring approach (CMA) system and how it might support efforts to acquire and maintain an up-to-date list of appropriate authorities responsible for compliance with Annex 18. Not having this information was cited as a major hurdle in eliminating the difficulties encountered with obtaining exemptions from the State of Overflight.

3.6.3.3 The working group once again revisited many of the same issues. For some removing State of Overflight from the exemption process was the only solution, but most felt that this was not an option or at least something that should not be considered by a technical group such as the DGP. It was a legal issue which would need to be considered by legal experts. It was also suggested that the transport of dangerous goods by air was not the only aviation segment that needed to consider State of Overflight; it was felt that the issue should be considered on a wider scale.

3.6.3.4 The Secretary would report back to the ANC and seek guidance on whether another ICAO body could find a solution to the problem.

**Agenda Item 6.4: Coordination with the Operations Panel with regard to Annex 6**

### 3.6.4 Dangerous Goods Requirements for Annex 6

(DGP-WG/12-WP/42)

3.6.4.1 At DGP/23, the meeting was briefed by the Secretary of the Operations Panel (OPSP) on work being carried out by that panel to strengthen the relationship between Annex 6 — *Operation of Aircraft* and Annex 18 requirements. The work was prompted by safety oversight audits which revealed that some civil aviation authorities were not aware of the scope of their operational responsibilities for oversight of dangerous goods activities, particularly in relation to packers, shippers and handlers. DGP agreed to work with OPSP to develop dangerous goods material for Annex 6.

3.6.4.2 Since that time, a draft new chapter for Annex 6 had been developed which was presented to the Fourteenth Meeting of the OPSP (10 to 14 September 2012). The OPSP agreed to use the
draft as a baseline for the development of a proposal for an amendment to Annex 6. It was agreed that a working group made up of OPSP would meet with DGP members to review the new chapter.

3.6.4.3 It was reported that the OPSP had nominated five members to work on a joint working group. The panel members nominated by Australia, Canada, Germany, the United Kingdom and IATA would make up the DGP portion of the joint working group.

3.6.4.4 It was noted that the next meeting of the OPSP would be in the fall of 2013. The joint working group would review the dangerous goods material for Annex 6 with the goal of developing a formal amendment proposal for that meeting. DGP members who were not part of the OPSP/DGP joint working group would be kept apprised of major developments throughout the process and their comments would be sought.

**Agenda Item 6.5: Coordination with international organizations (e.g. UPU)**

3.6.5 **New Requirements for Designated Postal Operators**  
(DGP-WG/12-WP/44)

3.6.5.1 Difficulties in interpreting the new provisions for dangerous goods in the post were reported; these were also raised during discussions on DGP-WG/12-WP/1 (see paragraph 3.1.1).

3.6.5.2 It was clear that the new requirement for CAA approval of DPO training programmes (Part 1;4.1.2) applied to all DPOs, regardless of whether they wished to accept lithium batteries in equipment in the mail. There were differences of opinion, however, in relation to whether all DPOs needed their procedures for controlling the introduction of dangerous goods in the mail approved. These issues were also raised during discussions on DGP-WG/12-WP/1 (see paragraph 3.1.1), and it was determined they would best be addressed through an ad hoc working group. The report of the group is presented in DGP-WG/12-IP/5.

3.6.5.3 Some members interpreted the provisions to mean that DPOs that did not have CAA approval would no longer be permitted to accept dangerous goods which were currently permitted in the mail. Others felt that the requirement for CAA approval only applied to those DPOs wanting to accept lithium batteries contained in equipment and that the note under 1;2.3.4 clarified this. Even if the latter was the case, it was acknowledged that it would be impossible to consider a DPO’s procedures for controlling the introduction of lithium batteries in the mail without considering the procedures for controlling the introduction of all dangerous goods in the mail. Most agreed that CAA approval even for DPOs not electing to transport dangerous goods was essential. One member pointed out that having no controls for introducing dangerous goods by post was a danger to civil aviation and to postal operators.

3.6.5.4 It was also recognized that DPOs should already have systems in place to control the introduction of dangerous goods into air transport through the mail, based on the Universal Postal Convention and the recommendation in Annex 18 (paragraph 11.4). The approval process could therefore be considered a formalizing exercise.

3.6.5.5 Most agreed that in hindsight, a transition period for general DPO approval would have been helpful. However, it was recognized that any additional changes at this time would not be practicable. The most effective way forward would be through collaboration between ICAO and UPU and between CAAs and DPOs. In an effort to facilitate collaboration, the group developed guidance material which would be disseminated through a State letter and eventually in the Supplement to the Technical Instructions.
3.6.5.6 The working group was optimistic that collaborative efforts between all parties would impact positively on safety.

3.7 Agenda Item 7: Other business

3.7.1 Guidance Material on Aircraft Fire Fighting and Rescue Procedures for Accidents Involving Dangerous Goods
(DGP-WG/12-WP/26)

3.7.1.1 The working group was invited to review guidance material on aircraft fire fighting and rescue procedures for accidents involving dangerous goods. The material was developed by ICAO’s Rescue and Fire Fighting Working Group (RFFWG) for incorporation in the Airport Services Manual, Part 1 — Rescue and Fire Fighting (Doc 9137). Although it was agreed to review the material through correspondence following DGP/12, several preliminary comments were made:

a) A reference to a NOTOC in paragraph 12.4.8 was made, but there was no explanation of what information was included with the NOTOC. It was suggested that this would be useful information and that an example could be given.

b) References to hazard labels were also made, it was suggested examples of all should be provided.

c) A careful review of paragraph 12.4.10.1 which dealt with dangerous goods loaded on cargo aircraft was needed.

The working group was asked to submit their comments by 30 November 2012.

3.7.2 Cooperation with the Aviation Security Panel
(DGP-WG/12-WP/49)

3.7.2.1 The working group was informed of a letter sent to the chairmen of the Dangerous Goods and the Aviation Security (AVSEC) Panels by the ICAO Secretary General requesting the establishment of a small task force to develop guidance material on countering the potential use of dangerous goods, particularly those of high consequence, in an act of unlawful interference. The Secretary General’s request was made following the review of the DGP/23 Report by the Council at which time the Council supported the President of the ANC’s recommendation for increased coordination.

3.7.2.2 There was strong support for the establishment of this task force. The working group welcomed the opportunity to work more closely with AVSECP in order to strengthen the relationship between dangerous goods and security. It was suggested that a joint group should be established consisting of six DGP and six AVSECP members. Members who wished to be part of the group were invited to inform the Secretary.
APPENDIX

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

FOREWORD

Part 1

GENERAL

Chapter 3

GENERAL INFORMATION

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

3.1 DEFINITIONS

Net quantity. Either:

a) the mass or volume of the dangerous goods contained in a package excluding the mass or volume of any packaging material; or

b) the mass of an unpackaged article of dangerous goods (e.g. UN 3166).

For the purposes of this definition, “dangerous goods” means the substance or article as described by the proper shipping name shown in Table 3-1, e.g. for “Fire extinguishers”, the net quantity is the mass of the fire extinguisher. For articles packed with equipment or contained in equipment, the net quantity is the net mass of the article, e.g. for lithium ion batteries contained in equipment, the net quantity is the net mass of the lithium ion batteries in the package.
Chapter 4

TRAINING

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

4.2 TRAINING CURRICULA

DGP-WG/12-WP/4 and DGP-WG/12-WP/17

Table 1-4. Content of training courses

<table>
<thead>
<tr>
<th>Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum</th>
<th>Shippers and packers</th>
<th>Freight forwarders</th>
<th>Operators and ground handling agents</th>
<th>Security staff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Categories of staff</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>General philosophy</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>Limitations</td>
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<td>General requirements for shippers</td>
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<td>x</td>
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<tr>
<td>Classification</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>List of dangerous goods</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Packing requirements</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Labelling and marking</td>
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<td>Dangerous goods transport document and other relevant documentation</td>
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<td>x</td>
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<tr>
<td>Acceptance procedures</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Recognition of undeclared dangerous goods</td>
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<tr>
<td>Storage and loading procedures</td>
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<td>x</td>
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<tr>
<td>Pilots’ notification</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Provisions for passengers and crew</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Emergency procedures</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

CATEGORY

1 — Shippers and persons undertaking the responsibilities of shippers
2 — Packers
3 — Staff of freight forwarders involved in processing dangerous goods
4 — Staff of freight forwarders involved in processing cargo or mail (other than dangerous goods)
5 — Staff of freight forwarders involved in the handling, storage and loading of cargo or mail
6 — Operator’s and ground handling agent’s staff accepting dangerous goods
7 — Operator’s and ground handling agent’s staff accepting cargo or mail (other than dangerous goods)
8 — Operator’s and ground handling agent’s staff involved in the handling, storage and loading of cargo or mail and baggage
9 — Passenger handling staff
10 — Flight crew members, loadmasters and load planners
11 — Crew members (other than flight crew members)
12 — Security staff who are involved with the screening of passengers and their baggage and cargo or mail, e.g. security screeners, their supervisors and staff involved in implementing security procedures
Table 1-5. Content of training courses for operators not carrying dangerous goods as cargo or mail

<table>
<thead>
<tr>
<th>Contents</th>
<th>Categories of staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>General philosophy</td>
<td>13 14 15 16 17</td>
</tr>
<tr>
<td>Limitations</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>Labelling and marking</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>Dangerous goods transport document and other relevant documentation</td>
<td>X</td>
</tr>
<tr>
<td>Recognition of undeclared dangerous goods</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>Provisions for passengers and crew</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>Emergency procedures</td>
<td>X  X  X  X  X</td>
</tr>
</tbody>
</table>

**CATEGORY**

13—Operator's and ground handling agent's staff accepting cargo or mail (other than dangerous goods)
14—Operator's and ground handling agent's staff involved in the handling, storage and loading of cargo or mail (other than dangerous goods) and baggage
15—Passenger handling staff
16—Flight crew members, loadmasters and load planners
17—Crew members (other than flight crew members)

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

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

4.2.8 Staff of designated postal operators must be trained commensurate with their responsibilities. The subject matter to which their various categories of staff should be familiar with is indicated in Table 1-6.
Table 1-6. Content of training courses for staff of designated postal operators

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

**CATEGORY**

A — Staff of designated postal operators involved in accepting mail containing dangerous goods

B — Staff of designated postal operators involved in processing mail (other than dangerous goods)

C — Staff of designated postal operators involved in the handling, storage and loading of mail

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

... Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

... Chapter 4

DANGEROUS GOODS IN LIMITED QUANTITIES

... 4.1 APPLICABILITY

4.1.1 Limited quantities of dangerous goods may only be carried in accordance with the limitations and provisions of this chapter and must meet all the applicable requirements of the Technical Instructions unless otherwise provided for below.
4.1.2 Only dangerous goods which are permitted on passenger aircraft and which meet the criteria of the following classes, divisions and packing groups (if appropriate) may be carried under these provisions for dangerous goods in limited quantities:

DGP-WG/12-WP/10:

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

Class 3
- Packing Groups II and III and UN 3473 (Fuel cell cartridges, containing flammable liquids)

Division 4.1
- Packing Groups II and III but excluding all self-reactive substances irrespective of packing group

Division 4.3
- Packing Groups II and III, solids only and UN 3476 (Fuel cell cartridges, containing water-reactive substances)

Division 5.1
- Packing Groups II and III

Division 5.2
- Only when contained in a chemical kit or a first-aid kit

Division 6.1
- Packing Groups II and III

Class 8
- Packing Groups II and III and UN 3477 (Fuel cell cartridges, containing corrosive substances) but excluding UN 2794, UN 2795, UN 2803, UN 2809, UN 3028 and UN 3506.

Class 9
- Only UN 1941, UN 1990, UN 2071, UN 3077, UN 3082, UN 3316, UN 3334, UN 3335 and ID 8000

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

a) those permitted only on cargo aircraft;

b) those in Packing Group I;

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

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

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

Chapter 5

DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

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

5.1 EXCEPTED QUANTITIES

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

a) the prohibition in post in 1.2.3;

b) the definitions in 1.3;

c) the training requirements in 1.4;

d) the classification procedures and packing group criteria in Part 2;
DGP-WG/12-WP/13 and its Addendum:

**Packing Instruction 216**

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

---

**ADDITIONAL PACKING REQUIREMENTS**

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

...
Chapter 5

CLASS 3 — FLAMMABLE LIQUIDS

Packing Instruction 375
Passenger and cargo aircraft for UN 3473 (contained in equipment) only

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

Chapter 6

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

Packing Instruction 473
Passenger and cargo aircraft for UN 1378 and UN 2881 only

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

1) Compatibility requirements
   - Substances must be compatible with their packagings as required by 4.1.3.
2) Closure requirements
   - Closures must meet the requirements of 4.1.4.

SINGLE PACKAGINGS FOR PACKING GROUP III ONLY

<table>
<thead>
<tr>
<th>Cylinders</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>See 4.2.7</td>
<td>Steel (1A1, 1A2)</td>
<td>Steel (3A1, 3A2)</td>
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</tbody>
</table>
DGP-WG/12-WP/13 and its Addendum:

### Packing Instruction 496

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

...  

**ADDITIONAL PACKING REQUIREMENTS**

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

...  

### Chapter 10

**CLASS 8 — CORROSIVE SUBSTANCES**

...  

DGP-WG/12-WP/13 and its Addendum:

### Packing Instruction 874

**Passenger and cargo aircraft for UN 3477 (contained in equipment) only**

...  

**ADDITIONAL PACKING REQUIREMENTS**

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

...
Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

Parts of this Chapter are affected by State Variation US 2; see Table A-1

<table>
<thead>
<tr>
<th>Packing Instruction 950</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger and cargo aircraft for UN 3166 only</td>
</tr>
<tr>
<td>(See Packing Instruction 951 for flammable gas-powered vehicles and engines or Packing Instruction 952 for battery-powered equipment and vehicles)</td>
</tr>
</tbody>
</table>

ADDITIONAL PACKING REQUIREMENTS

Batteries

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

1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;

2) if lithium batteries are installed, they must meet the provisions of Part 2.9.3.1, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and

3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.
Packing Instruction 951
Cargo aircraft only for UN 3166 only
(See Packing Instruction 950 for flammable liquid-powered vehicles and engines or
Packing Instruction 952 for battery-powered equipment and vehicles)

ADDITIONAL PACKING REQUIREMENTS

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

1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in
such a way that batteries would not remain in their intended orientation, they must be removed and packed
according to Packing Instruction 492 or 870 as applicable;

2) if lithium batteries are installed, they must meet the provisions of Part 2;9.3.1, unless otherwise approved by
the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or
equipment and must be protected in such a manner so as to prevent damage and short circuits; and

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

Packing Instruction 952
Passenger and cargo aircraft for UN 3171 only
(See Packing Instruction 950 for flammable liquid-powered vehicles and engines or
Packing Instruction 951 for flammable gas-powered vehicles and engines)

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

1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in
such a way that batteries would not remain in their intended orientation, they must be removed and packed
according to Packing Instruction 492 or 870 as applicable;

2) if lithium batteries are installed in a vehicle, they must meet the provisions of Part 2;9.3.1, unless otherwise
approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle and
must be protected in such a manner so as to prevent damage and short circuits; and

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

Packing Instruction Y963
Passenger and cargo aircraft for ID 8000 only
Consumer commodities are materials that are packaged and distributed in a form intended or suitable for retail sale for
the purposes of personal care or household use. These include items administered or sold to patients by doctors or medical administrations. Except as otherwise provided below, dangerous goods packed in accordance with this packing instruction do not need to comply with 4.1 or Part 6 of these Instructions; they must, however, comply with all other applicable requirements.

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

b) Inner packagings that are breakable (such as earthenware, glass or brittle plastic) must be packed to prevent breakage and leakage under conditions normally incident to transport. Each package offered for transport must be capable of withstanding a 1.2 m drop on solid concrete in the position most likely to cause damage. The criteria for passing the test is that the outer packaging must not exhibit any damage liable to affect safety during transport and there must be no leakage from the inner packaging(s). Each package offered for transport must be capable of withstanding, without breakage or leakage of any inner packaging and without significant reduction of effectiveness, a force applied to the top surface for a duration of 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 m (including the test sample).

...
— the absorbent material requirements in the packing instructions when applicable; and
— the pressure differential requirement in 4.1.1.6.

d) the dangerous goods transport document has been properly executed and the declaration signed;

e) the overpack does not contain packages of dangerous goods which require segregation according to Table 7-1;

f) when an overpack is used, packages must be secured within the overpack;

g) the dangerous goods are not included in any freight container/unit load device except for radioactive material as specified in 7.2.9 (subject to the approval of the operator, this does not apply to a unit load device containing consumer commodities prepared according to Packing Instruction Y963 or dry ice used as a refrigerant for other than dangerous goods when prepared according to Packing Instruction 954 or magnetized material when prepared according to Packing Instruction 953);

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

i) each package contained within an overpack is properly packed, marked, labelled and is free of any indication that its integrity has been compromised and in all respects is properly prepared as required in these Instructions. The “overpack” marking described in 2.4.10 is an indication of compliance with this requirement. The intended function of each package must not be impaired by the overpack; and

j) packages and overpacks containing dangerous goods are offered to the operator separately from cargo which is not subject to these Instructions. The “overpack” marking described in 2.4.10 is an indication of compliance with this requirement.

Note 1.— Packages and overpacks containing dangerous goods may be included on the same air waybill as cargo which is not subject to these Instructions.

Note 2.— The requirement in 1.1 k) also applies to consolidated shipments offered to the operator.

Note 3.— For cooling purposes, an overpack may contain dry ice, provided that the overpack meets the requirements of Packing Instruction 954.

Chapter 3

LABELLING

3.5 LABEL SPECIFICATIONS

3.5.2 Handling labels

3.5.2.1 Handling label specifications

An illustration of each of the handling labels showing the approved design and colour is given in Figures 5-24 to 5-26 and Figures 5-28 to 5-31. The minimum label dimensions are shown in the figures. Where dimensions or features are not specified, these must be in approximate proportion to those shown; however:

a) labels having dimensions not smaller than half of those indicated may be used on packages containing infectious substances when the packages are of dimensions such that they can only bear smaller labels; and

b) orientation labels may meet the specification of either Figure 5-26 or ISO Standard 780:1997.

3.5.2.2 Lithium battery handling label

Packages containing lithium batteries that meet the requirements of Section II of Packing Instructions 965 to 970 must bear a “Lithium battery” handling label shown in Figure 5-31, as required by the applicable packing instruction. The label must be a minimum dimension of 120 mm wide × 110 mm high except labels of 105 mm wide × 74 mm high may be used on
packages containing lithium batteries where the packages are of dimensions such that they can only bear smaller labels. When the reduced size label is used, the label features must be in approximate proportion to those shown on the full-size label (Figure 5-31). The label must show “Lithium metal batteries” or “Lithium ion batteries”, as applicable. Where the package contains both types of batteries, the label must show “Lithium metal and lithium ion batteries”. Packages containing lithium batteries that meet the requirements of Section 1B of Packing Instructions 965 and 968 must bear both a “Lithium battery” handling label shown in Figure 5-31 and a Class 9 hazard label (Figure 5-23).
Figure 5-24. Magnetized material
Colour: black on orange

Figure 5-25. Cargo aircraft only
Note.— The words “Caution — may cause cold burn injuries if spilled or leaked” are optional and may be included.

Figure 5-28. Cryogenic liquid label
Colour: red or black on a white background

Figure 5-29. Keep away from heat
Radioactive Material, Excepted Package

This package contains radioactive material, excepted package and is in all respects in compliance with the applicable international and national governmental regulations.

UN

Minimum dimension 105 mm

Minimum dimension 74 mm

Colour: red or black on a contrasting background

Note.— The words “The information for this package need not appear on the Notification to Captain (NOTOC)” are optional and may be included.

Figure 5-30. Radioactive material, excepted package
Colour: red on a contrasting background

* Place for "Lithium ion battery" and/or "Lithium metal battery"

** 105 mm wide × 74 mm high may be used in accordance with 5.3.5.2.2

Figure 5-31. Lithium battery handling label
Chapter 1

ACCEPTANCE PROCEDURES

1.3  THE ACCEPTANCE CHECK

1.3.1  Before a consignment consisting of a package or overpack containing dangerous goods, a freight container containing radioactive material or a unit load device or other type of pallet containing dangerous goods as described in 1.4 is first accepted for carriage by air the operator must, by use of a checklist verify the following:

Note 1.— Minor discrepancies, such as the omission of dots and commas in the proper shipping name appearing on the transport document or on package markings, or minor variations in hazard labels which do not affect the obvious meaning of the label, are not considered as errors if they do not compromise safety and should not be considered as reason for rejecting a consignment.

Note 2.— Where packages are contained in an overpack or freight container, as permitted by 1.4, the checklist should establish the correct marking and labelling of such an overpack or other type of pallet or freight container and not the individual packages contained in them. Where packages are contained in a unit load device, as permitted by 1.4.1, the checklist should not require the checking of packages individually for the correct marking and labelling.

Note 3.— An acceptance check is not required for dangerous goods in excepted quantities and radioactive material in excepted packages.

Note 4.— Although the acceptance check required in 1.3.1 is only required to be conducted when a consignment of dangerous goods is first accepted for carriage by air, the operator of any subsequent aircraft used as part of the same journey should verify that packages, overpacks, freight containers and unit load devices continue to meet the requirements of these Instructions in respect of marking, labelling and inspection for damage.

Chapter 4

PROVISION OF INFORMATION
4.1 INFORMATION TO THE PILOT-IN-COMMAND

4.1.1 As early as practicable before departure of the aircraft, but in no case later than when the aircraft moves under its own power, the operator of an aircraft in which dangerous goods are to be carried must:

a) provide the pilot-in-command with accurate and legible written or printed information concerning dangerous goods that are to be carried as cargo; and

b) from 1 January 2014, provide personnel with responsibilities for operational control of the aircraft (e.g. the flight operations officer, flight dispatcher, or designated ground personnel responsible for flight operations) with the same information that is required to be provided to the pilot-in-command (e.g. a copy of the written information provided to the pilot-in-command). Each operator must specify the personnel (job title or function) to be provided this information in their operations manual and/or other appropriate manuals.

... except as otherwise provided, this information must include the following:

a) the air waybill number (when issued);

b) the proper shipping name (the technical name(s) shown on the dangerous goods transport document is not required) (see 3.1) and UN Number or ID number as listed in these Instructions. When chemical oxygen generators contained in protective breathing equipment (PBE) are being transported under Special Provision A144, the proper shipping name of “oxygen generator, chemical” must be supplemented with the statement “Aircrew protective breathing equipment (smoke hood) in accordance with Special Provision A144”.

...
## TABLE 8-1. PROVISIONS FOR DANGEROUS GOODS CARRIED BY PASSENGERS OR CREW

<table>
<thead>
<tr>
<th>Items or articles</th>
<th>Location</th>
<th>Approval of the operator(s) is required</th>
<th>The pilot-in-command must be informed</th>
<th>Restrictions</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Checked baggage</td>
<td>Carry-on baggage</td>
<td>On the person</td>
<td></td>
</tr>
<tr>
<td>Checked baggage</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Carry-on baggage</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>On the person</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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DGP-WG/12-WP/33:
DGP-WG/12-WP/13 and its Addendum:

<table>
<thead>
<tr>
<th>20) Fuel cells used to power portable electronic devices (for example, cameras, cellular phones, laptop computers and camcorders)</th>
<th>No</th>
<th>Yes</th>
<th>Yes</th>
<th>No</th>
<th>No</th>
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<tbody>
<tr>
<td>Spare fuel cell cartridges</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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</table>

- d) each fuel cell and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, including Amendment 1, and must be marked with a manufacturer’s certification that it conforms to the specification. In addition, each fuel cell cartridge must be marked with the maximum quantity and type of fuel in the cartridge;

- h) interaction between fuel cells and integrated batteries in a device must conform to IEC 62282-6-100 Ed. 1, including Amendment 1. Fuel cells whose sole function is to charge a battery in the device are not permitted;

— END —
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 6: Other business

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

(Presented by the Secretary)

SUMMARY

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

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

1. INTRODUCTION

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

2. ATTENDANCE

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

<table>
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<th>Members</th>
<th>Advisers/Observers</th>
<th>State/International Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M. Böhm</td>
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<tr>
<td>A. Tusek</td>
<td>T. Farquharson</td>
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<th>State/International Organization</th>
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<td>P. H. Leite Paludo</td>
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3. REVIEW OF THE REPORT

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

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

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

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

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

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

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

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

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

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

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

Part 1 — General

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

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

a) It was questioned whether text in paragraph 1.1.1.6 of the UN Model Regulations related to radioactive material being subject to the excepted package requirements of
1.5.1.5 (1;6.1.5 of the Instructions) when transported by mail should be included in Part 1;2.3.2 c) of the Instructions. It was suggested that adding the text would introduce a conflict for transport by air (e.g. an air waybill or similar document was required for excepted packages but not provided by the post). This issue would be brought to the attention of the UPU.

b) It was anticipated that an editorial amendment to the note under paragraph 1.1.1.9 of the UN Model Regulations would be made in order to include a reference to the exception for light bulbs containing Division 2.2 gases in 2.2.2.4 (2;2.2.3 d) of the Instructions). The note under new paragraph 1;2.6 of the Instructions would be amended accordingly.

c) Revised references in Part 1;6.1.5.1 a) (provisions for the transport of excepted packages or radioactive material) would be reviewed. It was suggested some of the deleted references should be retained in the Technical Instructions. Whether or not a certificate issued by the competent authority was ever applicable to excepted packages of radioactive material was questioned and, if not, whether the addition of a reference to 5;1.2.2.2 was needed. The Secretariat would consult with the IAEA.

d) A new definition for large salvage packagings was added to the UN Model Regulations. The definition was not included in the Technical Instructions because they are not permitted in air transport. A cross reference to the UN Model Regulations was instead provided next to the term in Part 1;3. It was suggested that the definition should be added so that “large” could be quantified. The definition was added in square brackets pending a review of all definitions not currently included in the Technical Instructions.

e) Revisions in Part 6;6.2.2 in addition to those introduced in the 18th Revised Edition of the Model Regulations were made for the sake of alignment with the UN text and the IAEA Regulations.

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

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

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

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

3.2.2.3 The working group had sympathy for the issues raised, but believed the scope of the problem went beyond Annex 18 and the Technical Instructions. Some felt that it would need to be
addressed in Annex 6, although it was pointed out that the approval in Annex 6 referred to the carriage of dangerous goods as cargo and cargo did not include mail. The Secretary reported that the Air Navigation Commission (ANC) would be reviewing the amendments proposed to Annex 6 that incorporate a new chapter for dangerous goods. Following the ANC’s review, the amendments would be sent to States for comment. The Secretary suggested members to raise the issue through this process if they felt it necessary. She also reminded the group that coordination with the Universal Postal Union (UPU) was needed if any revisions were made to provisions related to the mail.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART 2 — Classification

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

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

a) It was suggested to add a reference in 2;5.2.3 to Test O.2 (test for oxidizing liquids) of the Manual of Tests and Criteria since Tests O.1 and O.3 were referred to in 2;5.2.2.

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

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

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

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

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

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

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

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

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

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

3.2.16.1 Delays in transporting empty Type B(U) and Type B(M) containers were reported. It was suggested that while there is a specific provision for these empty packages to be transported as UN 2908 — Radioactive material, excepted package — empty packaging, this can rarely be done because the radiation level at the external surface regularly exceeds the 5 µSv/h permitted for classification as an excepted package due to the presence of depleted uranium in the shielding material.
These packages are therefore subject to full regulation and are typically classified as either low specific material (LSA-1) or as Type B(U) or Type B(M). There is often confusion at acceptance, however, for the following reasons:

a) If classified as Type B(U) or Type B(M), the radionuclide required on the transport document (e.g. U-dep, solid, metal oxide) would differ from the radionuclide authorized for the package design and indicated on the design certificate. This leads to confusion with acceptance staff.

b) If classified as LSA-1, the container may be shipped as an industrial package (IP-1), in which case the shipment no longer requires a Type B package design approval. But this often leads to confusion when acceptance staff see the Type B(U) or Type B(M) specification markings on the package.

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

a) A note under Part 2;7.2.4.1.1.5 explaining the need to classify the empty package as either LSA-1 or Type B(U) or Type B(M);

b) A note under Part 5;4.1.5.7.1 to address confusion outlined in 3.2.16.1 b) by explaining that the radionuclide indicated on the transport document might differ from the radionuclide(s) authorized on the package design certificate.

c) A note under 5;2.4.5.1 c) to address confusion outlined in 3.2.16.1 a) by explaining that the specification mark should be obliterated;

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

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

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

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

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

a) It was noted that references to special provisions proposed for inclusion in the Supplement were included with the proposed amendments to Table 3-1 for discussion purposes only and would be removed (but maintained in the Supplement).
b) A standalone entry for “Refrigerant gas R 113” was needed for UN 1082.

c) New entries for adsorbed gases were introduced (UN 3510 — UN 3518). It was agreed that additional requirements would be considered for these substances and that the entries classified as Division 2.3 gases should be forbidden from transport. A typographical error was noted whereby Packing Instructions 218 was assigned to some entries instead of Packing Instruction 219.

d) The entries for columns 10 to 11 and 12 to 13 for UN 3507 — *Uranium hexafluoride, radioactive material, excepted package* should be replaced with “see 877”.

e) A new entry for UN 3509 — *Packaging discarded, empty, uncleaned* assigned to Class 9 was introduced in the UN Model Regulations along with a new special provision permitting their use under certain conditions when they have contained dangerous goods other than radioactive material. The entry was marked as forbidden on both passenger and cargo aircraft in DGP-WG/13 on the basis that Part 4.1.1.15 required empty packagings which previously contained dangerous substances to be subject to the same requirements of the Technical Instructions as they would if the package was filled with that substance unless the hazard was nullified. The special provision added to the Model Regulations was proposed for inclusion in the Supplement to the Technical Instructions as A227 (see DGP-WP/43) to allow for the possibility of transporting UN 3509 under an exemption. Some members questioned whether Special Provision A2 should be assigned to the entry to allow for the possibility of an approval, while others questioned whether any provisions were necessary since there was little likelihood the packagings would be shipped by air. It was agreed to place the new entry in DGP-WG/13-WP/13 and new Special Provision A227 in DGP-WG/13-WP/43 in square brackets and a decision would be taken at DGP/24.

f) It was agreed new provisions for large extinguishers should be included in Special Provision A19, subject to an editorial amendment.

g) Editorial revisions were made to Special Provision A190 including an amendment to clarify that transport was subject to the requirements in the Technical Instructions in addition to the conditions set out in the special provision.

h) A missing reference was added to Special Provision A194.

i) Editorial revisions were made to Special Provision A195.

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

3.2.18 **UN 3242 — Azodicarbonamide (DGP-WG/13-WP/9)**

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

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

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

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

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

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

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

3.2.19.1 The potential for a substance forbidden for transport by air to be classified as one of the new entries for chemicals under pressure (UN Nos. 3500, 3501, 3502, 3503, 3504 and 3505) and transported by air was raised. An amendment to Special Provision A187 was therefore proposed to prohibit chemicals under pressure from being classified as chemicals under pressure if they contained liquid or solid components that were forbidden for transport by air.

3.2.19.2 There was support for the proposal but it was felt that the wording could be clearer. A revised proposal was agreed.
3.2.20  **Life-Saving Appliances, not Self-Inflating**
(DGP-WG/13-WP/20) and Dangerous Goods List — UN 3072 Life-Saving Appliances, not Self-Inflating
(DGP-WG/13-WP/53)

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

a) assigning Special Provision A182 to UN 3072 so that equipment containing only lithium batteries would be classified as UN 3091 or UN 3481; and

b) adding an additional packing requirement to Packing Instruction 955.

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

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

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

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

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

3.2.21.3  There was sympathy for the proposal, but a number of concerns were raised, including:
a) The proposal was written as a special provision, but there were a number of packing requirements in the text. It was suggested it be added to the packing instruction.

b) Limiting the packaging to a fibreboard box was questioned. It was noted that metal packaging would not be appropriate based on the venting needs. Fibreboard boxes were currently being used and had been authorized in State exemptions.

c) The amount of venting permitted was not quantified. Confirmation that the amount of venting allowed would not have any negative effects on safety was needed. The proposer questioned the need for a formal dispersion analysis on the basis that in his opinion the amount of gases released would be so inconsequential.

d) There was no justification provided for the inner and outer limits proposed.

e) Some of the requirements that States required when granting exemptions listed in the body of the working paper were not included with the proposed provision, including the requirement for orientation arrows.

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

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

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

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

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

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

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

3.2.23.2 It was agreed that having a larger excepted quantity limit than the limits provided in Columns 11 and 13 was anomalous, but it was noted that the quantity limits for passenger and cargo aircraft were extremely restrictive and that the other modal regulations did not have such restrictive limits. It was suggested that before making any changes to the excepted quantity code, which was currently in alignment with the Model Regulations, an investigation into whether there was any justification for the low quantity limits should be done. If it was determined there was none, consideration could be given to increasing them.
3.2.23.3 The issue would be revisited at DGP/24.

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

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

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

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

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

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

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

3.2.25.3 The meeting was also asked to confirm whether the requirement for placement of labels in 5;3.2.8 applied to the limited quantity mark or if this requirement applied only to hazard labels. It was agreed that there were no specific requirements for the placement of the limited quantity mark and it did not have to appear on the same side as the hazard label(s).
3.2.26  **Dangerous Goods List — ID 8000 Consumer Commodity**  
(DGP-WG/13-WP/54)

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

a) some outer package limits for consumer commodities far exceeded the outer package limit for the item when assigned to the UN number assigned to the specific substance;

b) the Class 9 hazard label and emergency response code which apply for consumer commodities in most cases was different to the code applied when the item was assigned to the UN number assigned to the specific substance;

c) The quantity limitations for dangerous goods in limited quantities, including limits which applied when different dangerous goods were contained in one outer packaging (3;4.3) did not apply to consumer commodities.

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

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

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

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

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

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

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

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

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

Part 4 — Packing Instructions

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

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

a) Provisions for large fire extinguishers in Packing Instruction 213 would be retained in square brackets subject to a review in conjunction with Special Provision A19. Additional packing requirements would be considered.

b) Editorial amendments were needed in Packing Instructions 219 and the wording of paragraph 2) would be aligned with similar wording in Part 2; 2.1.2 e), i.e. “must be less than 300 kPa at 50°C” instead of “must not exceed 300 kPa at 50°C”. It was noted that this slightly altered the intent by excluding “300 kPa” but that consistency should be maintained.

c) Adsorbed gases forbidden for transport would be moved from Packing Instruction 219 to the Supplement.

d) The notes under the mark for UN 3373 in Packing Instruction 650 and the mark for UN 3245 in Packing Instruction 959 were redundant and would be deleted.

e) It was suggested that text in 4.9.1.7, which was formed in the negative, should be revised for the sake of clarity. Although it was agreed that the wording was confusing, some believed it should not be altered since it was developed by the IAEA and would be incorporated in all the modal regulations. A representative from the IAEA reported on a project to improve the language in the safety standards and that amendment proposals could be submitted until 17 May 2013. Accordingly, a revision to the text in 4.9.1.7 would be proposed by the Secretariat. A minor revision would be made to the Technical Instructions for incorporation in the 2015-2016 Edition.

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

3.2.29.2 It was agreed that DGP-WG/13-WP/14 would be further reviewed by panel members, and any discrepancies would be incorporated in the DGP/23 working paper.
3.2.30 **Packing Instruction 570 (DGP-WG/13-WP/59)**

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

**Part 5 — Shipper’s Responsibilities**

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

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

a) A reference to provisions for applications and approvals for radioactive material transport was added to paragraph 5.1.5.1.4 c) of the UN Model Regulations (5.1.2.1.4 c) of the Technical Instructions). These provisions (paragraph 6.4.23.2 of the Model Regulations) were not in the Technical Instructions, and it was suggested that at least some of them should be added. The provisions would be reproduced in square brackets in the working paper on UN harmonization for DGP/24 and the panel would determine whether to include any of them in the Instructions (see Appendix A, Part 6;7.22).

b) Revised provisions for excepted packages of radioactive material would need further review.

c) New text in 5.2.4.5.1 (special marking requirement for radioactive material) was considered redundant as it was a general requirement for all dangerous goods. It would not be adopted.

d) The paragraph numbering in Part 5.3.5.1 was aligned more closely with the Model Regulations but it was suggested this made the provisions less readable due to the length of the paragraph numbers and references to them. The paragraph numbering system used in the current edition would be retained.

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

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

3.2.32.1 It was noted that references to labels in the UN Model Recommendations described hazard labels, while references to labels in the Technical Instructions described handling labels in addition to hazard labels. The requirements for affixing labels in Part 5.3.2.8 were identical to the ones in the Model Regulations. It was suggested that these requirements applied solely to hazard labels and an amendment to 5.3.2.8 was proposed to specify this.

3.2.32.2 There was initial support for the proposal until it was realized that some of the provisions in 5.3.2.8 should also be applied to handling labels.
3.2.32.3 A revised proposal would be prepared for DGP/24.

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

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

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

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

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

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

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

3.2.34.1 Draft amendments to Part 6 were proposed to reflect the decisions taken by the UN. Whether or not to include provisions for applications and approvals for radioactive material transport in Part 6 would be considered at DGP/24 (see paragraph 3.2.31.1 a) of this report and Appendix A, Part 6;7.22). The only other issue raised was in relation to new Part 6;7.23.4 which applied to consignments of fissile material only permitted for transport under exclusive use. These provisions would need further review on the basis that transport under exclusive use was much more complicated by air.

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

**Part 7 — Operator’s Responsibilities**

3.2.35 **Draft Amendments to the Technical Instructions to Align with the UN Recommendations — Part 7 (DGP-WG/13-WP/17)**
3.2.35.1 Draft amendments to Part 7 were proposed to reflect the decisions taken by the UN. No issues were raised other than the need for minor editorial revisions.

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

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

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

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

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

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

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

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

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

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

3.2.40 The proposal was withdrawn.

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

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

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

3.2.41.3 The proposal was withdrawn.
3.2.42 Where Tickets are Issued (DGP-WG/13-WP/40)

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

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

3.2.42.3 The proposal was not agreed.

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

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

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

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

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

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

3.2.44.2 The proposal to delete Part 7;2.9 was agreed.
3.2.45 **Information to Pilot in Command (DGP-WG/13-WP/63)**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Attachment 2 — Glossary of Terms**

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

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

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

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

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

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

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

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

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

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

General

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

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

3.5.1.2 The provision would be restricted to one battery per package, and the package would be subject to all requirements in the Instructions in addition to some specific requirements such as Packing Group I performance requirements, fire and flame resistant packaging, and specific marking and documentation requirements. The working group was asked to consider incorporating this special provision in the 2013-2014 Edition of the Technical Instructions by way of an addendum.

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

3.5.1.4 Comments provided included:

a) The provisions would be more appropriate in the packing instructions rather than a special provision.

b) The larger the battery, the larger the risk. These risks needed to be mitigated. It was difficult to mitigate the chemical hazard of lithium batteries, but limiting the state of charge could mitigate the energy density risk.

c) Packaging needed to be considered so that if an incident occurred it could be contained. Research was being done in one State on packaging that could withstand pressure build up if the batteries self-ignited, the results of which were encouraging.

d) Large format batteries were shown to react differently than consumer size batteries. This would need to be taken into consideration.
3.5.1.5 The proposer was grateful for the comments received and hoped that he could work with those who commented on a proposal that could be accepted at DGP/24.

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

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

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

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

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

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

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

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

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

3.5.2.5.3 There was support for raising the issues in the paper to the UN. It was recognized that the Class 9 label did nothing to communicate the risks associated with lithium batteries. It was difficult to justify having the same hazard label for lithium batteries as dry ice. How to communicate the hazard was still open for debate.
Agenda item 5.2: Simplification and clarification of provision

3.5.3 **Proposed Simplification of Provisions for Lithium Batteries**

(DGP-WG/13-WP/6)

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

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

3.5.3.3 The amendment was agreed.

3.5.4 **Lithium Batteries – Section IB – Gross Mass Limitation**

(DGP-WG/13-WP/28) and **Package Mass Limits on Lithium Ion and Lithium Metal Cells and Batteries** (DGP-WG/13-WP/55)

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

3.5.5 **Lithium Battery Packing Instruction Requirements**

(DGP-WG/13-WP/46)

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

a) Section IB of Packing Instructions 965 and 968 and Section II of all packing instructions included a requirement for packages containing lithium batteries to pass a drop test without damage to cells or batteries, shifting of the contents so as to allow battery-to-battery or cell-to-cell contact and release of contents. Although the requirements of Part 6 applied to Section IA of Packing Instructions 965 and 968 and Section I of the remaining lithium battery packing instructions, there were no specific references in Part 6 to damage to cells or batteries or to shifting of contents resulting in battery-to-battery or cell-to-cell contact. It was noted that the same difference was found between Packing Instruction P903 and Special Provision 188 of the UN Model Regulations. The working group was asked to consider whether this requirement should be added to Section I and IA (as applicable) of Packing Instructions 965 to 968.

b) It was questioned whether or not the arrangement of cells or batteries in blister packs commonly used in retail packages for batteries were acceptable. It was suggested that
these retail packagings did not meet the strict interpretation of the requirement to prevent cell-to-cell or battery-to-battery contact. If the working group felt the blister packs were acceptable, amendments to the applicable packing instruction sections should be considered. Amendment to Special Provision 188 in the UN Model Regulations would also be required.

c) Section IA.2 of Packing Instructions 965 and 968 allowed for the transport of lithium batteries with a mass of 12 kg or more to be packed in packagings not meeting the requirements of Part 6 provided they had a strong, impact-resistant outer casing and were packed in strong outer packagings or protective enclosures if approved by the appropriate authority of the State of Origin. The Model Regulations contained the same provision along with an additional one for pallets or other handling devices and a requirement for terminals not to support the weight of other items. The working group was asked to consider whether this text should be added to the Technical Instructions.

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

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

3.5.6.1 The working group was asked to clarify what constitutes “equipment” when referring to UN 3091, Lithium metal batteries contained in equipment and UN 3481, Lithium ion batteries contained in equipment. It was suggested that certain articles containing lithium batteries whose sole purpose was to provide external power source to another piece of electronic equipment should be treated as lithium batteries on their own and classified as UN 3090, Lithium metal batteries or UN 3480, Lithium ion batteries. New text to clarify this was proposed for inclusion in the packing instructions for lithium batteries contained in equipment and in the passenger provisions to differentiate between spare batteries which must be in carry-on luggage and lithium batteries contained in equipment which could be in checked baggage.

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

3.5.6.3 There was support for the intent of the proposal but it was felt the issue, at least in relation to the packing instructions, was a multi-modal one that should be addressed at the UN. Clearly defining what constituted contained in equipment was complicated and would need to be developed carefully.
3.5.6.4 The working group did feel the amendment to the passenger provisions could be considered. This amendment was agreed, subject to some revisions to the wording.

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

No papers were submitted under this agenda item.

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

No papers were submitted under this agenda item.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.6.4 **Joint Task Force of the Dangerous Goods Panel and the AVSEC Panel**

(DGP-WG/13-WP/65 Rev.)

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

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

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

3.6.4.4 Immediate action items for the task force include:

a) a comparison between Annex 17 and Annex 18 in an effort to determine potential overlaps and/or contradictions; and

b) clarification of key terms including high consequence versus high risk.

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

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

No papers were submitted under this agenda item.
3.7  **Agenda Item 7: Other business**

(DGP-WG/12) (DGP-WG/13-WP/1)

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

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

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

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

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

Part 1

GENERAL

Chapter 2

LIMITATION OF DANGEROUS GOODS ON AIRCRAFT

2.3 TRANSPORT OF DANGEROUS GOODS BY POST

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

a) patient specimens as defined in 2.6.3.1.4 provided that they are classified, packed and marked as required by 2.6.3.2.3.6;

b) infectious substances assigned to category B (UN 3373) only, when packed in accordance with the requirements of Packing Instruction 650, and solid carbon dioxide (dry ice) when used as a refrigerant for UN 3373; and

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

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

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

...c) radioactive material, the activity of which does not exceed one-tenth of that listed in Part 2, Chapter 7, Table 2-14, and that does not meet the definitions and criteria of classes, other than Class 7, or divisions, as defined in Part 2;

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

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

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

[2.6 LAMPS CONTAINING DANGEROUS GOODS

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

a) lamps that are collected directly from individuals and households when transported to a collection or recycling facility;

b) lamps each containing not more than 1 g of dangerous goods and packaged so that there is not more than 30 g of dangerous goods per package, provided that:

1) the lamps are certified to a manufacturer’s quality management system; and

Note.— The application of ISO 9001:2008 may be considered acceptable for this purpose.
2) each lamp is either individually packed in inner packagings, separated by dividers, or surrounded with cushioning material to protect the lamps and packed into strong outer packagings meeting the general provisions of 4;1.1 and capable of passing a 1.2 m drop test.

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

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

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

Chapter 3

GENERAL INFORMATION

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

3.1 DEFINITIONS

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

Approval. For the transport of radioactive material:

Multilateral approval. The approval by the relevant competent authority of the country of origin of the design or shipment, as applicable, and also, where the consignment is to be transported through or into any other country, approval by the competent authority of that country.

Unilateral approval. The approval of a design which is required to be given by the competent authority of the country of origin of the design only.

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

Bundle of cylinders. An assembly of cylinders that are fastened together and which are interconnected by a manifold and transported as a unit. Not permitted for air transport.

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

Confinement system. For the transport of radioactive material, the assembly of fissile material and packaging components specified by the designer and agreed to by the competent authority as intended to preserve criticality safety.

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

Criticality safety index (CSI) assigned to a package, overpack or freight container containing fissile material. For the transport of radioactive material, a number which is used to provide control over the accumulation of packages, overpacks or freight containers containing fissile material.
**Design.** For the transport of radioactive material, the description of fissile material excepted under 27.2.5.1f), special form radioactive material, low dispersible radioactive material, package or packaging which enables such items to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory requirements, and other relevant documentation.

... 

**Exclusive use.** For the transport of 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.

... 

The definition for freight container in the case of radioactive material transport is repeated in 27.1.3. It is proposed to replace the definition in this part with a cross reference to 27.1.3 as indicated below.

Freight container in the case of radioactive material transport. See 27.1.3.

... 

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

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

a) is designed for mechanical handling; and

b) exceeds 400 kg net mass or 450 litres capacity but has a volume of not more than 3 m³;

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

...

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

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

... 

**Maximum normal operating pressure.** For the transport of radioactive material, the maximum pressure above atmospheric pressure at mean sea level that would develop in the containment system in a period of one year under the conditions of temperature and solar radiation corresponding to environmental conditions in the absence of venting, external cooling by an ancillary system, or operational controls during transport.

... 

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

Net quantity. Either:

a) the mass or volume of the dangerous goods contained in a package excluding the mass or volume of any packaging material; or

b) the mass of an unpackaged article of dangerous goods (e.g. UN 3166).

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

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

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

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

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

---

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

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

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

Items that meet the classification as dangerous goods and which are transported in accordance with Part 1.2.2.2, Part 1.2.2.3 or Part 1.2.2.4 are considered as “cargo”.

---

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

**Through or into.** For the transport of radioactive material, through or into the countries in which a consignment is transported but specifically excluding countries “over” which a consignment is carried by air, provided that there are no scheduled stops in those countries.
Chapter 4

TRAINING

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

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

a) shippers of dangerous goods, including packers and persons or organizations undertaking the responsibilities of the shipper;

b) operators;

c) ground handling agencies which perform, on behalf of the operator, the act of accepting, handling, loading, unloading, transferring or other processing of cargo, or mail;

d) ground handling agencies located at an airport which perform, on behalf of the operator, the act of processing passengers;

e) agencies, not located at an airport, which perform, on behalf of the operator, the act of checking in passengers;

f) freight forwarders;

g) agencies engaged in the security screening of passengers and crew and their baggage and/or cargo, or mail; and

h) designated postal operators.

...
4.2 TRAINING CURRICULA

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

<table>
<thead>
<tr>
<th align="left">Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum</th>
<th>Shippers and packers</th>
<th>Freight forwarders</th>
<th>Operators and ground handling agents</th>
<th>Security staff</th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">Categories of staff</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td align="left">General philosophy</td>
<td>x x x x x x x x x x x</td>
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<tr>
<td align="left">Limitations</td>
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<tr>
<td align="left">General requirements for shippers</td>
<td>x x x x x x x x x x x</td>
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<td></td>
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<tr>
<td align="left">Classification</td>
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<tr>
<td align="left">List of dangerous goods</td>
<td>x x x x x x x x x x</td>
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<td></td>
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<tr>
<td align="left">Packing requirements</td>
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</tr>
<tr>
<td align="left">Labelling and marking</td>
<td>x x x x x x x x x x</td>
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</tr>
<tr>
<td align="left">Dangerous goods transport document and other relevant documentation</td>
<td>x x x x x x x x x x</td>
<td></td>
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<td></td>
</tr>
<tr>
<td align="left">Acceptance procedures</td>
<td>x x x x x x x x x x</td>
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<td></td>
</tr>
<tr>
<td align="left">Recognition of undeclared dangerous goods</td>
<td>x x x x x x x x x x</td>
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</tr>
<tr>
<td align="left">Storage and loading procedures</td>
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<tr>
<td align="left">Pilots’ notification</td>
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<tr>
<td align="left">Provisions for passengers and crew</td>
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<tr>
<td align="left">Emergency procedures</td>
<td>x x x x x x x x x x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CATEGORY**

1 — Shippers and persons undertaking the responsibilities of shippers
2 — Packers
3 — Staff of freight forwarders involved in processing dangerous goods
4 — Staff of freight forwarders involved in processing cargo or mail (other than dangerous goods)
5 — Staff of freight forwarders involved in the handling, storage and loading of cargo or mail
6 — Operator’s and ground handling agent’s staff accepting dangerous goods
7 — Operator’s and ground handling agent’s staff accepting cargo or mail (other than dangerous goods)
8 — Operator’s and ground handling agent’s staff involved in the handling, storage and loading of cargo or mail and baggage
9 — Passenger handling staff
10 — Flight crew members, loadmasters, load planners and flight operations officer/flight dispatcher
11 — Crew members (other than flight crew members)
12 — Security staff who are involved with the screening of passengers and crew and their baggage and cargo or mail, e.g. security screeners, their supervisors and staff involved in implementing security procedures
### Table 1-5. Content of training courses for operators not carrying dangerous goods as cargo or mail

<table>
<thead>
<tr>
<th>Contents</th>
<th>Categories of staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>General philosophy</td>
<td>13 14 15 16 17</td>
</tr>
<tr>
<td>Limitations</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>Labelling and marking</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>Dangerous goods transport document and other relevant documentation</td>
<td>X</td>
</tr>
<tr>
<td>Recognition of undeclared dangerous goods</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>Provisions for passengers and crew</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>Emergency procedures</td>
<td>X  X  X  X  X</td>
</tr>
</tbody>
</table>

**CATEGORY**

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

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

15— Passenger handling staff

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

17— Crew members (other than flight crew members)

---

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

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

4.2.8 Staff of designated postal operators must be trained commensurate with their responsibilities. The subject matter to which their various categories of staff should be familiar with is indicated in Table 1-6.
Table 1-6. Content of training courses for staff of designated postal operators

<table>
<thead>
<tr>
<th>Aspects of transport of dangerous goods by air with which they should be familiar, as a minimum</th>
<th>Designated postal operators</th>
<th>Categories of staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>General philosophy</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Limitations</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>General requirements for shippers</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Classification</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>List of dangerous goods</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Packing requirements</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Labelling and marking</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Dangerous goods transport document and other relevant documentation</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Acceptance of the dangerous goods listed in 1.2.3.2</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Recognition of undeclared dangerous goods</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Storage and loading procedures</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Provisions for passengers and crew</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Emergency procedures</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

**CATEGORY**

A — Staff of designated postal operators involved in accepting mail containing dangerous goods

B — Staff of designated postal operators involved in processing mail (other than dangerous goods)

C — Staff of designated postal operators involved in the handling, storage and loading of mail

**Note.**— Guidance on the aspects of training to be covered by staff of designated postal operators can be found in S-1.3.

### Chapter 6

**GENERAL PROVISIONS CONCERNING RADIOACTIVE MATERIAL**

#### 6.1 SCOPE AND APPLICATION

6.1.1 These Instructions establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to persons, property and the environment that are associated with the transport of radioactive material. These Instructions are based on the IAEA *Regulations for the Safe Transport of Radioactive Material*, (2012 Edition), IAEA Safety Standards Series No. SSR-6, IAEA, Vienna (2012). Explanatory material can be found in *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material*, IAEA Safety Standard Series No. TS-G-1.1 (Rev. 2), IAEA, Vienna (2012). The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risk.
6.1.2  The objective of these Instructions is to establish requirements that must be satisfied to ensure safety and to protect persons, property and the environment from the effects of radiation in the transport of radioactive material. This protection is achieved by requiring:

a) containment of the radioactive contents;

b) control of external radiation levels;

c) prevention of criticality; and

d) prevention of damage caused by heat.

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

6.1.3  These Instructions apply to the transport of radioactive material by air, including transport that is incidental to the use of the radioactive material. Transport comprises all operations and conditions associated with and involved in the movement of radioactive material; these include the design, manufacture, maintenance and repair of packaging, and the preparation, consigning, loading, carriage including in-transit storage, unloading and receipt at the final destination of the radioactive material and packages. A graded approach is applied to the performance standards in these Instructions that are characterized by three general severity levels:

a) routine conditions of transport (incident free);

b) normal conditions of transport (minor mishaps); and

c) accident conditions of transport.

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

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

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

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

# Note.— Guidance material may be found on www.icao.int/safety/DangerousGoods/Pages/Guidance-Material.aspx.

c) radioactive material in consumer products which have received regulatory approval, following their sale to the end user;

d) natural material and ores containing naturally occurring radionuclides (which may have been processed), provided the activity concentration of the material does not exceed 10 times the values specified in Table 2-12 or calculated in accordance with 2.7.2.2.3 to 7.2.2.6. For natural materials and ores containing naturally occurring radionuclides that are not in secular equilibrium, the calculation of the activity concentration must be performed in accordance with 2.7.2.2.4;

e) non-radioactive solid objects with radioactive substances present on any surfaces in quantities not in excess of the limit specified in the definition of contamination in 2.7.1.
6.1.5 Specific provisions for the transport of excepted packages

6.1.5.1 Excepted packages which may contain radioactive material in limited quantities, instruments, manufactured articles and empty packages as specified in 2.7.2.4.1.1 are subject only to the following provisions of Parts 5 to 7:

- the applicable provisions specified in §5.1.1 (as applicable), §5.1.4, §5.1.2.2.2, §5.1.2.4, §5.1.6.3, §5.2.2, §5.2.4.2, §5.3.2.12 e), §5.3.3, §5.4.4, §7.2.5, §7.4.4, §1.13, §7.2.10.3.1, §7.1.6, §7.3.2.1 and §7.3.2.4; and
- the requirements for excepted packages specified in §6.7.3;

except when the radioactive material possesses other hazardous properties and has to be classified in a class other than Class 7 in accordance with Special Provision A130 or A194, where the provisions listed in a) and b) above apply only as relevant and in addition to those relating to the main class or division.

6.1.5.2 Excepted packages must be subject to the relevant provisions of all other parts of these Instructions. If the excepted package contains fissile material, one of the fissile exceptions provided by §2.7.2.3.5 must apply and the requirements of §7.2.10.4.3 must be met.

6.2 Radiation Protection Programme

6.2.1 The transport of radioactive material must be subject to a radiation protection programme, which must consist of systematic arrangements aimed at providing adequate consideration of radiation protection measures.

6.2.2 Doses to persons must be below the relevant dose limits. Protection and safety must be optimized in order that the magnitude of individual doses, the number of persons exposed and the likelihood of incurring exposure must be kept as low as reasonably achievable, economic and social factors being taken into account, within the restriction that the doses to individuals are subject to dose constraints. A structured and systematic approach must be adopted and must include consideration of the interfaces between transport and other activities.

6.2.3 The nature and extent of the measures to be employed in the programme must be related to the magnitude and likelihood of radiation exposure. The programme must incorporate the requirements in 6.2.2 and 6.2.4 to 6.2.7, 7.2.9.1.1 and 7.2.9.1.2. Programme documents must be available, on request, for inspection by the relevant competent authority.

6.2.4 For occupational exposure arising from transport activities, where it is assessed that the effective dose either:

   a) is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring must be conducted; or
   b) is likely to exceed 6 mSv in a year, individual monitoring must be conducted.

When individual monitoring or workplace monitoring is conducted, appropriate records must be kept.

Note — For occupational exposure arising from transport activities, where it is assessed that the effective dose is most unlikely to exceed 1 mSv in a year, no special work patterns, detailed monitoring, dose assessment programmes or individual record-keeping need be required.

6.2.5 In the event of accidents or incidents during the transport of radioactive material, emergency provisions, as established by relevant national and/or international organizations, must be observed to protect persons, property and the environment. Appropriate guidelines for such provisions are contained in "Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material", IAEA Safety Standard Series No. TS-G-1.2 (ST-3), IAEA, Vienna (2002).

6.2.6 Emergency procedures must take into account the formation of other dangerous substances that may result from the reaction between the contents of a consignment and the environment in the event of an accident.
6.2.7 Personnel must be appropriately trained in the radiation hazards involved and the precautions to be observed in order to ensure restriction of their exposure and that of other persons who might be affected by their actions.

6.3 MANAGEMENT SYSTEM

A management system based on international, national or other standards acceptable to the competent authority must be established and implemented for all activities within the scope of the Instructions, as identified in 1.6.1.3, to ensure compliance with the relevant provisions of these Instructions. Certification that the design specification has been fully implemented must be available to the competent authority. The manufacturer, shipper or user must be prepared to:

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

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

6.4 SPECIAL ARRANGEMENT

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

6.4.2 Consignments for which conformity with any provision applicable to radioactive material is impracticable must not be transported except under special arrangement. Provided the competent authority is satisfied that conformity with the radioactive material provisions of these Instructions is impracticable and that the requisite standards of safety established by these Instructions have been demonstrated through alternative means, the competent authority may approve special arrangement transport operations for a single consignment or a planned series of multiple consignments. The overall level of safety in transport must be at least equivalent to that which would be provided if all the applicable requirements had been met. For international consignments of this type, multilateral approval must be required.

6.5 RADIOACTIVE MATERIAL POSSESSING OTHER DANGEROUS PROPERTIES

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

6.6 NON-COMPLIANCE

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

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

b) the operator, shipper or consignee, as appropriate, must:
   i) take immediate steps to mitigate the consequences of the non-compliance;
   ii) investigate the non-compliance and its causes, circumstances and consequences;
   iii) take appropriate action to remedy the causes and circumstances that led to the non-compliance and to prevent a recurrence of similar circumstances that led to the non-compliance; and
   iv) communicate to the relevant competent authority(ies) the causes of the non-compliance and corrective or preventative actions taken or to be taken;

c) the communication of the non-compliance to the shipper and relevant competent authority(ies), respectively, must be made as soon as practicable and it must be immediate whenever an emergency exposure situation has developed or is developing.
Part 2

CLASSIFICATION OF DANGEROUS GOODS

INTRODUCTORY CHAPTER

2. CLASSES, DIVISIONS, PACKING GROUPS — DEFINITIONS

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

Packing Group I: Substances presenting high danger
Packing Group II: Substances presenting medium danger
Packing Group III: Substances presenting low danger

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

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

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

4. PRECEDENCE OF HAZARD CHARACTERISTICS

UN Model Regulations, paragraph 2.0.3.2, ST/SG/AC.10/40/Add.1
DGP-WG/13-WP/12 (see paragraph 3.2.13 of this report)

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

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

Chapter 2

CLASS 2 — GASES

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

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

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

*High pressure liquefied gas:* a gas with a critical temperature between –50°C and +65°C, and

*Low pressure liquefied gas:* a gas with a critical temperature above +65°C;

c) refrigerated liquefied gas — a gas which when packaged for transport is made partially liquid because of its low temperature; or

d) dissolved gas — a gas which when packaged under pressure for transport is dissolved in a liquid phase solvent.

e) adsorbed gas — a gas which when packaged for transport is adsorbed onto a solid porous material resulting in an internal receptacle pressure of less than 101.3 kPa at 20°C and less than 300 kPa at 50°C.

\[\ldots\]

**Chapter 3**

**CLASS 3 — FLAMMABLE LIQUIDS**

\[\ldots\]

**3.2 ASSIGNMENT OF PACKING GROUPS**

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

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

b) less than 3 per cent of the clear solvent layer separates in the solvent separation test;

c) the mixture or any separated solvent does not meet the criteria for Division 6.1 or Class 8;

a) the viscosity expressed as the flowtime in seconds and flash point are in accordance with Table 2-5;

d) the net quantity per package does not exceed 30 L for passenger aircraft or 100 L for cargo aircraft.

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

\[\ldots\]

**Chapter 5**

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

\[\ldots\]

5.2 OXIDIZING SUBSTANCES (DIVISION 5.1)

5.2.1 Classification in Division 5.1

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

*Note.* Where substances of this division are listed in the Dangerous Goods List in 3.2, reclassification of those substances in accordance with these criteria need only be undertaken when this is necessary for safety.
5.2.2 Oxidizing solids

5.2.2.1 Criteria for classification in Division 5.1

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

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

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

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

a) the comparison of the mean burning time (for the test O.1) or burning rate (for the test O.3) with those of the reference mixtures; and

b) whether the mixture of substance and cellulose ignites and burns.

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

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:
5.1: Review of provisions for the transport of lithium batteries

LITHIUM METAL BATTERIES

(Presented by the Secretary)

SUMMARY

This working paper proposes forbidding lithium metal batteries on passenger and cargo aircraft. It suggests that reports of counterfeit batteries and non-compliant shipments being transported, the fire risk these batteries present and the fact that current fire suppression systems and procedures for fire suppression controls in cargo holds have no effect on lithium metal fires make the risk in transporting them unacceptable and difficult to justify.

Action by the DGP: In the absence of mitigation measures which can contain a lithium metal fire and the absence of an effective fire suppressant system for such batteries, the DGP is invited to consider forbidding UN 3090 — Lithium metal batteries from passenger and cargo aircraft as presented in the appendix to this working paper.

1. INTRODUCTION

1.1 The risks related to lithium batteries have been well documented by the Dangerous Goods Panel (DGP). Much has been done to improve measures to address these risks, including the changes to the 2013-2014 Edition of the Technical Instructions which eliminated exceptions for bulk shipments of lithium batteries. At that time the panel recognized that although the changes enhanced safety, regulations could not, on their own, eliminate all risks related to transporting lithium batteries. It was acknowledged that inadvertent errors in applying the regulations were possible, and intentional violations were a reality. It was believed that non-compliance had been a factor in a number of reported incidents. The panel also recommended ways to address these risks, including increased outreach, training, oversight and appropriate enforcement activities.
1.2 A basic foundation of safety management systems is that layered defenses against safety risks are necessary. A multi-layered system helps ensure that single-point failures are rarely consequential. In the context of safely transporting dangerous goods, these could include properly identifying dangerous goods, properly packaging them and preparing them for transport, ensuring that they are not damaged upon acceptance, and safely loading/unloading/storing them on the aircraft. Although these layers of defense may be adequate for batteries manufactured, classified and prepared for shipment in compliance with the regulations, they are less effective for batteries not manufactured to standard or for batteries which are not prepared for transport in compliance with the Technical Instructions. If an incident does occur because of non-compliant batteries, the last layers of defense would be the packaging and fire suppression capabilities. Tests suggest, however, that required packaging for lithium metal batteries do not sufficiently contain the effects of a lithium metal battery ignition and are not designed to withstand a lithium metal cell fire. Tests have also shown that Halon is ineffective as a fire suppressant on a lithium metal fire, leaving no other layer of defense.

1.3 The panel has acknowledged that non-compliant battery shipments, including those which contain counterfeit batteries not manufactured and tested in compliance with the Instructions, are a reality. The panel has also acknowledged that many if not all reported incidents related to lithium batteries have involved non-compliant shipments. The substantial increase of batteries being transported, the increase in energy densities, and the expected future upward trend for both makes non-compliant shipments an even greater threat to safety. While increased outreach, training, oversight and appropriate enforcement activities can help reduce the number of non-compliant consignments in the transport chain, the fact remains that these activities cannot eliminate non-compliance. Effectively regulating compliance is also difficult since it is impossible to distinguish between counterfeit lithium metal batteries and those which have been manufactured to standard. If transport risk was based solely on compliant shipments, many other dangerous goods currently forbidden for transport — such as explosives and toxic gases — would arguably be permitted.

1.4 The risks involved with transporting lithium batteries, reports of counterfeit batteries and non-compliant shipments being transported coupled with the fact that current fire suppression systems in cargo holds have no effect on lithium metal fires make it difficult to justify allowing them as cargo. It is noted that one State and several airlines already forbid lithium metal on their passenger aircraft through State and operator variations. It is further noted that the lithium battery industry have indicated an increasing amount of lithium metal batteries are transported by sea.

2. ACTION BY THE DGP

2.1 In the absence of packaging which can contain a lithium metal fire or an effective fire suppressant system, the panel is invited to consider forbidding the transport of UN 3090 — Lithium metal batteries on both passenger and cargo aircraft.
APPENDIX

PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND
LIMITED AND EXCEPTED QUANTITIES

Chapter 2

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

Table 3-1. Dangerous Goods List

<table>
<thead>
<tr>
<th>Name</th>
<th>UN No.</th>
<th>Class or division</th>
<th>Subsidiary risk</th>
<th>State variations</th>
<th>Special provisions</th>
<th>UN packing group</th>
<th>Excepted quantity</th>
<th>Passenger aircraft</th>
<th>Cargo aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium metal batteries (including lithium alloy batteries)†</td>
<td>3090</td>
<td>9</td>
<td>US 2</td>
<td>US 3</td>
<td>A88</td>
<td>A154</td>
<td>A164</td>
<td>A183</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium metal batteries contained in equipment (including lithium alloy batteries) †</td>
<td>3091</td>
<td>9</td>
<td>US 2</td>
<td>US 3</td>
<td>A48</td>
<td>A99</td>
<td>A154</td>
<td>A164</td>
<td>A181</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A185</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium metal batteries packed with equipment (including lithium alloy batteries) †</td>
<td>3091</td>
<td>9</td>
<td>US 2</td>
<td>US 3</td>
<td>A99</td>
<td>A154</td>
<td>A164</td>
<td>A181</td>
<td>A185</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part 4

PACKING INSTRUCTIONS

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS
Packing Instruction 968
Passenger and cargo aircraft for UN 3090

1. Introduction

This entry applies to lithium metal or lithium alloy batteries. This packing instruction is structured as follows:

— Section IA applies to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, which must be assigned to Class 9 and are subject to all of the applicable requirements of these instructions;
— Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and
— Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.

2. Lithium batteries forbidden from transport

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g., those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

IA. SECTION IA

Section IA requirements apply to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g that have been determined to meet the criteria for assignment to Class 9.

Each cell or battery must:

1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

3) be manufactured under a quality management programme as described in 2.9.3.1 a).

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g., diodes, fuses).

IA.1 General requirements

Part 4.1 requirements must be met.

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Net quantity per package</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
</tr>
<tr>
<td>UN 3090—Lithium metal batteries</td>
<td>2.5 kg</td>
</tr>
</tbody>
</table>
### IA.2 Additional requirements

- Lithium metal cells and batteries must be protected against short circuits.
- Lithium metal cells and batteries must be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- Lithium metal batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
- For lithium metal cells and batteries prepared for transport on passenger aircraft as Class 9:
  - cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging, and
  - cells and batteries must be surrounded by cushioning material that is non-combustible and non-conductive, and placed inside an outer packaging.

### IA.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium (4B)</td>
<td>Aluminium (1B2)</td>
<td>Aluminium (3B2)</td>
</tr>
<tr>
<td>Fibreboard (4G)</td>
<td>Fibre (1G)</td>
<td>Plastics (3H2)</td>
</tr>
<tr>
<td>Natural wood (4C1, 4C2)</td>
<td>Other metal (1N2)</td>
<td>Steel (3A2)</td>
</tr>
<tr>
<td>Other metal (4NI)</td>
<td>Plastics (1H2)</td>
<td></td>
</tr>
<tr>
<td>Plastics (1H1, 1H2)</td>
<td>Plywood (1D)</td>
<td></td>
</tr>
<tr>
<td>Plywood (4D)</td>
<td>Reconstituted wood (4E)</td>
<td></td>
</tr>
<tr>
<td>Steel (4A)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### IB. SECTION IB

Section IB requirements apply to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II.

Quantities of lithium metal cells or batteries that exceed the allowance permitted in Section II, Table 968-II, must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the following:

- the provisions of Part 6; and
- the dangerous goods transport document requirements of 5.4. provided alternative written documentation is provided by the shipper describing the contents of the consignment. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:
  1) the name and address of the shipper and consignee;
  2) UN 3090;
  3) Lithium metal batteries PI 968 IB;
  4) the number of packages and the gross mass of each package.

Lithium metal or lithium alloy cells and batteries may be offered for transport if they meet all of the following:

1) for lithium metal cells, the lithium content is not more than 1 g;
2) for lithium metal or lithium alloy batteries, the aggregate lithium content is not more than 2 g;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

Note 1 — Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1.4;
Packing Instruction 968

IB.1 General requirements

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

Table 968-IB

<table>
<thead>
<tr>
<th>Contents</th>
<th>Package quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium metal cells and batteries</td>
<td>2.5 kg G 2.5 kg G</td>
</tr>
</tbody>
</table>

IB.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents;
- Each package must be labelled with a lithium battery handling label (Figure 5-31) in addition to the Class 9 hazard label.
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.

IB.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 ( Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal or lithium alloy cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium metal or lithium alloy cells and batteries may be offered for transport if they meet all of the following:

1) for a lithium metal cell, the lithium content is not more than 1 g;
2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

**Note 1** — Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1.e).

II.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).
# Packing Instruction 968

## Table 968-II

<table>
<thead>
<tr>
<th>Contents</th>
<th>Lithium metal cells and/or batteries with a lithium content not more than 0.3 g</th>
<th>Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g</th>
<th>Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No limit</td>
<td>8 cells</td>
<td>2 batteries</td>
</tr>
<tr>
<td>Maximum number of cells / batteries per package</td>
<td>2.5 kg</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Maximum net quantity (mass) per package</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The limits specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

### II.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery-to-battery (or cell-to-cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words “lithium metal batteries, in compliance with Section II of PI968” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

### II.3 Outer packagings

- **Boxes**
- **Drums**
- **Jerricans**

**Strong outer packagings**

### II.4 Overpacks

- When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack.”
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

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

DRAFT AMENDMENTS TO THE TECHNICAL INSTRUCTIONS TO ALIGN WITH THE UN RECOMMENDATIONS — PART 4

(Presented by the Secretary)

REVISED

SUMMARY

This working paper contains draft amendments to Part 4 of the Technical Instructions to reflect the decisions taken by the UN Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals at its sixth session (Geneva, 14 December 2012). It also reflects amendments agreed by DGP-WG13 (Montreal, 15 to 19 April 2013).

The DGP is invited to agree to the draft amendments in this working paper.
Part 4

PACKING INSTRUCTIONS

Chapter 1

GENERAL PACKING REQUIREMENTS

1.1 GENERAL REQUIREMENTS APPLICABLE TO ALL CLASSES EXCEPT CLASS 7

1.1.10 Inner packagings must be so packed, secured or cushioned in an outer packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the outer packaging. Inner packagings containing liquids must be packaged with their closures upward and placed within outer packagings consistent with the orientation markings prescribed in 5;3.2.12 b) of these Instructions. Inner packagings that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastic material, must be secured in outer packagings with suitable cushioning material. Any leakage of the contents must not substantially impair the protective properties of the cushioning material or of the outer packaging.

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

a) inner packagings of equivalent or smaller size may be used provided:

1) the inner packagings are of similar design to the tested inner packagings (e.g. shape — round, rectangular);

2) the material of construction of the inner packagings (glass, plastics, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested inner packaging;

3) the inner packagings have the same or smaller openings and the closure is of similar design (screw cap, friction lid, etc.);

4) sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings; and

5) inner packagings are oriented within the outer packaging in the same manner as in the tested package; and

b) a lesser number of the tested inner packagings, or of the alternative types of inner packagings identified in a) above, may be used provided sufficient cushioning is added to fill the void space(s) and to prevent significant movement of the inner packagings.

UN Model Regulations, 4.1.1.5.2, ST/SG/AC.10/40/Add.1
DGP/24-WP/3 (see paragraph 3.2.29)

1.1.10.2 Use of supplementary packagings within an outer packaging (e.g. an intermediate packaging or a receptacle inside a required inner packaging) additional to what is required by the packing instructions is permitted provided all relevant requirements are met, including those of 4.1.1.2, and, if appropriate, suitable cushioning is used to prevent movement within the packaging.
Chapter 3

CLASS 1 — EXPLOSIVES

UN Model Regulations, P131, ST/SG/AC.10/40/Add.1
DGP/24-WP/3 (see paragraph 3.2.29)

Packing Instruction 131

<table>
<thead>
<tr>
<th>Inner packagings</th>
<th>Intermediate packagings</th>
<th>Outer packagings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bags</td>
<td></td>
<td>Boxes</td>
</tr>
<tr>
<td>paper</td>
<td></td>
<td>aluminium (4B)</td>
</tr>
<tr>
<td>plastics</td>
<td></td>
<td>fibreboard (4G)</td>
</tr>
<tr>
<td>Receptacles</td>
<td></td>
<td>natural wood, ordinary (4C1)</td>
</tr>
<tr>
<td>fibreboard</td>
<td></td>
<td>natural wood, with siftproof walls (4C2)</td>
</tr>
<tr>
<td>metal</td>
<td></td>
<td>other metal (4N)</td>
</tr>
<tr>
<td>plastics</td>
<td></td>
<td>plastics, solid (4H2)</td>
</tr>
<tr>
<td>wood</td>
<td></td>
<td>plywood (4D)</td>
</tr>
<tr>
<td>Reels</td>
<td></td>
<td>reconstituted wood (4F)</td>
</tr>
</tbody>
</table>

PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:

— For UN 0029, 0267 and 0455, bags and reels must not be used as inner packagings.

UN Model Regulations, P137, ST/SG/AC.10/40/Add.1
DGP/24-WP/3 (see paragraph 3.2.29)

Packing Instruction 137

<table>
<thead>
<tr>
<th>Inner packagings</th>
<th>Intermediate packagings</th>
<th>Outer packagings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bags</td>
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<td>Boxes</td>
</tr>
<tr>
<td>plastics</td>
<td></td>
<td>aluminium (4B)</td>
</tr>
<tr>
<td>Boxes</td>
<td></td>
<td>fibreboard (4G)</td>
</tr>
<tr>
<td>fibreboard</td>
<td></td>
<td>natural wood, ordinary (4C1)</td>
</tr>
<tr>
<td>wood</td>
<td></td>
<td>natural wood, with siftproof walls (4C2)</td>
</tr>
<tr>
<td>Tubes</td>
<td></td>
<td>other metal (4N)</td>
</tr>
<tr>
<td>fibreboard</td>
<td></td>
<td>plastics, solid (4H2)</td>
</tr>
<tr>
<td>metal</td>
<td></td>
<td>plywood (4D)</td>
</tr>
<tr>
<td>plastics</td>
<td></td>
<td>reconstituted wood (4F)</td>
</tr>
<tr>
<td>Dividing partitions in the outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:

— For UN 0059, 0439, 0440 and 0441, when the shaped charges are packed singly, the conical cavity must face downwards and the package marked “THIS SIDE UP”. When the shaped charges are packed in pairs, the conical cavities must face inwards to minimize the jetting effect in the event of accidental initiation.
Chapter 4

CLASS 2 — GASES

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 Model Regulations, paragraph 4.1.6.1.2, ST/SG/AC.10/40/Add.1
DGP/24-WP/3 (see paragraph 3.2.29)

4.1.1.2 Parts of cylinders and closed cryogenic receptacles that are in direct contact with dangerous goods must not be affected or weakened by those dangerous goods and must not cause a dangerous effect (e.g. catalysing a reaction or reacting with the dangerous goods). In addition to the requirements specified in the relevant packing instruction, which take precedence, the applicable provisions of ISO 11114-1:1997 and ISO 11114-2:2000 must be met.

UN Model Regulations, P003, PP91 for UN 1044, ST/SG/AC.10/40/Add.1
See also DGP/24-WP/3 (paragraph 3.2.29.1 a))

Packing Instruction 213

The general packing requirements of 4.1 must be met.

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

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

Large fire extinguishers may also be transported unpackaged provided that the requirements of S-4.3.1.2 a) to e) are met, the valves are protected by one of the methods in accordance with 4.4.1.1.8 a) to c) and other equipment mounted on the fire extinguisher is protected to prevent accidental activation. For the purpose of this packing instruction, "large fire extinguishers" means fire extinguishers as described in sub-paragraphs c) to e) of Special Provision A19.
Packing Instruction 216

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

ADDITIONAL PACKING REQUIREMENTS

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

UN Model Regulations, P208, ST/SG/AC.10/40/Add.1
DGP/24-WP/3 (see paragraphs 3.2.29.1 b) and c))

Packing Instruction 219

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

This Instruction applies to Class 2 adsorbed gases.

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

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

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

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

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

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

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

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

9) Requirements for cylinders and closures containing toxic gases with an LC₅₀ less than or equal to 200 ml/m³ (ppm) (see Table 1) must be as follows:
   a) Valve outlets must be fitted with pressure retaining gas-tight plugs or caps having threads matching those of the valve outlets.
   b) Each valve must either be of the packless type with non-perforated diaphragm, or be of a type which prevents leakage through or past the packing.
   c) Each cylinder and closure must be tested for leakage after filling.
d) Each valve must be capable of withstanding the test pressure of the cylinder and be directly connected to the cylinder by either a taper-thread or other means which meets the requirements of ISO 10692-2:2001.
e) Cylinders and valves must not be fitted with a pressure relief device.

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


12) The maximum period for periodic inspections is five years.

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

<table>
<thead>
<tr>
<th>Material compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>a: Aluminium alloy cylinders must not be used.</td>
</tr>
<tr>
<td>b: When steel cylinders are used, only those bearing the &quot;H&quot; mark in accordance with 6.5.2.7.4 p) are permitted.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gas specific provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>r: The filling of this gas must be limited such that, if complete decomposition occurs, the pressure does not exceed two thirds of the test pressure of the cylinder.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material compatibility for n.o.s adsorbed gas entries</th>
</tr>
</thead>
<tbody>
<tr>
<td>z: The construction materials of the cylinders and their accessories must be compatible with the contents and must not react to form harmful or dangerous compounds therewith.</td>
</tr>
</tbody>
</table>

Table 1. ADSORBED GASES

<table>
<thead>
<tr>
<th>UN No.</th>
<th>Name and description</th>
<th>Class or Division</th>
<th>Subsidiary risk</th>
<th>LC50 ml/m³</th>
<th>Special packing provisions∗</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3510 Adsorbed gas, flammable, n.o.s.</td>
<td>2.1</td>
<td>4</td>
<td>5</td>
<td>z</td>
</tr>
<tr>
<td>3511</td>
<td>Adsorbed gas, n.o.s.*</td>
<td>2.2</td>
<td>z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3512</td>
<td>Adsorbed gas, toxic, n.o.s.*</td>
<td>2.3</td>
<td>5.1</td>
<td>≤ 5000</td>
<td>z</td>
</tr>
<tr>
<td>3513</td>
<td>Adsorbed gas, oxidizing, n.o.s.*</td>
<td>2.2</td>
<td>5.1</td>
<td>≤ 5000</td>
<td>z</td>
</tr>
<tr>
<td>3514</td>
<td>Adsorbed gas, toxic, flammable, n.o.s.*</td>
<td>2.3</td>
<td>2.1</td>
<td>≤ 5000</td>
<td>z</td>
</tr>
<tr>
<td>3515</td>
<td>Adsorbed gas, toxic, oxidizing, n.o.s.*</td>
<td>2.3</td>
<td>5.1</td>
<td>≤ 5000</td>
<td>z</td>
</tr>
<tr>
<td>3516</td>
<td>Adsorbed gas, toxic, corrosive, n.o.s.*</td>
<td>2.3</td>
<td>8</td>
<td>≤ 5000</td>
<td>z</td>
</tr>
<tr>
<td>3517</td>
<td>Adsorbed gas, toxic, flammable, corrosive, n.o.s.*</td>
<td>2.3</td>
<td>2.1</td>
<td>≤ 5000</td>
<td>z</td>
</tr>
<tr>
<td>3518</td>
<td>Adsorbed gas, toxic, oxidizing, corrosive, n.o.s.*</td>
<td>2.3</td>
<td>5.1</td>
<td>≤ 5000</td>
<td>z</td>
</tr>
<tr>
<td>3519</td>
<td>Boron trifluoride, adsorbed</td>
<td>2.3</td>
<td>8</td>
<td>287</td>
<td>a</td>
</tr>
<tr>
<td>3520</td>
<td>Chlorine, adsorbed</td>
<td>2.3</td>
<td>5.1</td>
<td>283</td>
<td>a</td>
</tr>
<tr>
<td>3521</td>
<td>Silicon tetrafluoride, adsorbed</td>
<td>2.3</td>
<td>8</td>
<td>450</td>
<td>a</td>
</tr>
<tr>
<td>3522</td>
<td>Arsenic, adsorbed</td>
<td>2.3</td>
<td>8</td>
<td>29</td>
<td>a</td>
</tr>
<tr>
<td>3523</td>
<td>Germane, adsorbed</td>
<td>2.3</td>
<td>2.1</td>
<td>620</td>
<td>a</td>
</tr>
<tr>
<td>3524</td>
<td>Phosphorus pentafluoride, adsorbed</td>
<td>2.3</td>
<td>8</td>
<td>190</td>
<td>a</td>
</tr>
<tr>
<td>3525</td>
<td>Phosphine, adsorbed</td>
<td>2.3</td>
<td>2.1</td>
<td>20</td>
<td>d</td>
</tr>
<tr>
<td>3526</td>
<td>Hydrogen selenide, adsorbed</td>
<td>2.3</td>
<td>2.1</td>
<td>2</td>
<td>d</td>
</tr>
</tbody>
</table>

...
Chapter 5

CLASS 3 — FLAMMABLE LIQUIDS

Packing Instruction 375
Passenger and cargo aircraft for UN 3473 (contained in equipment) only

ADDITIONAL PACKING REQUIREMENTS

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

...
Chapter 6

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

... DGP/24-WP/2 (see paragraph 3.2.18)

### Packing Instruction 473

**Passenger and cargo aircraft for UN 1378 and UN 2881 only**

**General requirements**

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

... 1) Compatibility requirements

<table>
<thead>
<tr>
<th>Cylinders</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel (1A1, 1A2)</td>
<td>Steel (3A1, 3A2)</td>
<td></td>
</tr>
</tbody>
</table>

... 2) Closure requirements

... SINGLE PACKAGINGS FOR PACKING GROUP III ONLY

Note.— This amendment was approved and published by decision of the Council of ICAO in Addendum No. 3 to the 2013-2014 Edition of the Technical Instructions.

### Packing Instruction 496

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

**ADDITIONAL PACKING REQUIREMENTS**

... Fuel cell cartridges that are contained in equipment must be protected against short circuit and the equipment must be protected against inadvertent operation.

... Equipment must be securely cushioned in the outer packagings.

... The mass of each fuel cell cartridge must not exceed 1 kg.

... Fuel cell systems must not charge batteries during transport.

... On passenger aircraft, each fuel cell system and each fuel cell cartridge must conform to IEC 62282-6-100 Ed. 1, including Amendment 1, or a standard approved by the appropriate authority of the State of Origin.

...
Chapter 7

CLASS 5 — OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

DGP/24-WP/3 (see paragraphs 3.2.30).

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### Packing Instruction 570

**Passenger and cargo aircraft**

<table>
<thead>
<tr>
<th>OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6.3.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boxes</strong></td>
</tr>
<tr>
<td>Fibreboard (4G)</td>
</tr>
<tr>
<td>Natural wood (4C1, 4C2)</td>
</tr>
<tr>
<td>Other metal (4N)</td>
</tr>
<tr>
<td>Plastics (4H1, 4H2)</td>
</tr>
<tr>
<td>Plywood (4D)</td>
</tr>
<tr>
<td>Reconstituted wood (4F)</td>
</tr>
</tbody>
</table>

---

...
Chapter 8

CLASS 6 — TOXIC AND INFECTIOUS SUBSTANCES

Packing Instruction 650

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

UN Model Regulations, P650, ST/SG/AC.10/40/Add.1
See also paragraph 3.2.29.1 d) of DGP/24-WP/3

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

---

...
Chapter 9

CLASS 7 — RADIOACTIVE MATERIAL

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

9.1   GENERAL

9.1.1   Radioactive material, packagings and packages must meet the requirements of 6;7. The quantity of radioactive material in a package must not exceed the limits specified in 2;7.2.4. The types of packages for radioactive materials covered by these Instructions are:

a) Excepted package (see 1;6.1.5);
b) Industrial package Type 1 (Type IP-1 package);
c) Industrial package Type 2 (Type IP-2 package);
d) Industrial package Type 3 (Type IP-3 package);
e) Type A package;
f) Type B(U) package;
g) Type B(M) package;
h) Type C package.

Packages containing fissile material or uranium hexafluoride are subject to additional requirements.

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

a) 4 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters; and
b) 0.4 Bq/cm² for all other alpha emitters.

These limits are applicable when averaged over any area of 300 cm² of any part of the surface.

UN Model Regulations, paragraph 4.1.9.1.3, ST/SG/AC.10/40/Add.1
DGP/24-WP/3 (see paragraph 3.2.29)

9.1.3   A package, other than an excepted package, must not contain any other items except such articles and documents as are necessary for the use of the radioactive material. This requirement must not preclude the transport of low specific activity material or surface contaminated objects with other items. The transport of such articles and documents in a package, or of low specific activity material or surface contaminated objects with other items may be permitted provided that there is no interaction between them and the packaging or its radioactive contents that would reduce the safety of the package.

9.1.4   Except as provided in 7;3.2.5, the level of non-fixed contamination on the external and internal surfaces of overpacks and freight containers, must not exceed the limits specified in 9.1.2.

9.1.5   Radioactive material meeting the criteria of other Classes or Divisions as defined in Part 2 must be allocated to Packing Group I, II or III, as appropriate, by the application of the grouping criteria provided in Part 2 corresponding to the nature of the predominant subsidiary risk. It must also be capable of meeting the appropriate packaging performance criteria for the subsidiary risk.
9.1.6 Before the first shipment of any package, the following requirements must be fulfilled. Before a packaging is first used to transport radioactive material, it must be confirmed that it has been manufactured in conformity with the design specifications to ensure compliance with the relevant provisions of these Instructions and any applicable certificate of approval. The following requirements must also be fulfilled, if applicable:

a) If the design pressure of the containment system exceeds 35 kPa (gauge), it must be ensured that the containment system of each packaging conforms to the approved design requirements relating to the capability of that system to maintain its integrity under that pressure;

b) For each packaging intended for use as a Type B(U), Type B(M) and Type C package and for each packaging intended to containing fissile material, it must be ensured that the effectiveness of its shielding and containment and, where necessary, the heat transfer characteristics and the effectiveness of the confinement system, are within the limits applicable to or specified for the approved design;

c) For each packages intended to containing fissile material, it must be ensured that the effectiveness of the criticality safety features is within the limits applicable to or specified for the design and in particular where, in order to comply with the requirements of 6.7.10.1 neutron poisons are specifically included as components of the package, checks must be performed to confirm the presence and distribution of those neutron poisons.

9.1.7 Before each shipment of any package, it must be ensured that the package does not contain:

a) radionuclides different from those specified for the package design; or

b) contents in a form, or physical or chemical state different from those specified for the package design.

9.1.78 Before each shipment of any package, it must be ensured that all the requirements specified in the relevant provisions of these Instructions and in the applicable certificates of approval have been fulfilled. The following requirements must also be fulfilled, if applicable:

a) For any package it must be ensured that all the requirements specified in the relevant provisions of these Instructions have been satisfied;

b) It must be ensured that lifting attachments which do not meet the requirements of 6.7.1.2 have been removed or otherwise rendered incapable of being used for lifting the package, in accordance with 6.7.1.3;

c) For each package requiring competent authority approval, it must be ensured that all the requirements specified in the approval certificates have been satisfied;

d) Each Type B(U), Type B(M) and Type C package must be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the requirements for temperature and pressure unless an exemption from these requirements has received unilateral approval;

e) For each Type B(U), Type B(M) and Type C package, it must be ensured by inspection and/or appropriate tests that all closures, valves, and other openings of the containment system through which the radioactive contents might escape are properly closed and, where appropriate, sealed in the manner for which the demonstrations of compliance with the requirements of 6.7.7.7.8 and 6.7.9.3 were made;

f) For each special form radioactive material, it must be ensured that all the requirements specified in the approval certificate and the relevant provisions of these Instructions have been satisfied;

g) For packages containing fissile material, the measurement specified in 6.7.10.45 b) and the tests to demonstrate closure of each package as specified in 6.7.10.78 must be performed, where applicable;

h) For each low dispersible radioactive material, it must be ensured that all the requirements specified in the approval certificate and the relevant provisions of these Instructions have been satisfied.

9.1.8 The shipper must also have a copy of any instructions with regard to the proper closing of the package and any preparation for shipment before making any shipment under the terms of the certificates.

9.1.9 Except for consignments under exclusive use, the transport index of any package or overpack must not exceed 10, nor must the criticality safety index of any package or overpack exceed 50.

9.1.10 Except for packages or overpacks transported under exclusive use and special arrangement under the conditions specified in 7.2.10.5.3, the maximum radiation level at any point on any external surface of a package or overpack must not exceed 2 mSv/h.
9.1.11.12 The maximum radiation level at any point on any external surface of a package or overpack under exclusive use must not exceed 10 mSv/h.

9.2 REQUIREMENTS AND CONTROLS FOR TRANSPORT OF LSA MATERIAL AND SCO

UN Model Regulations, paragraph 4.1.9.2, ST/SG/AC.10/40/Add.1
DGP/24-WP/3 (see paragraph 3.2.29)

9.2.1 The quantity of LSA material or SCO in a single Industrial package Type 1 (Type IP-1), Industrial package Type 2 (Type IP-2), or Industrial package Type 3 (Type IP-3), must be so restricted that the external radiation level at 3 m from the unshielded material does not exceed 10 mSv/h.

9.2.2 LSA material and SCO which are or contain fissile material, which is not excepted under 2.7.2.3.5, must meet the applicable requirements in 7.2.10.4.1, and 7.2.10.4.2 and 6.7.10.1.

9.2.3 LSA material and SCO which are or contain fissile material must meet the applicable requirements of 6.7.10.1.

9.2.4 LSA material and SCO in groups LSA-I and SCO-I must not be transported unpackaged.

9.2.5 LSA material and SCO must be packaged in accordance with Table 4-2.

9.3 PACKAGES CONTAINING FISSILE MATERIAL

Unless not classified as fissile in accordance with 2.7.2.3.5, The contents of packages containing fissile material must not contain:

- a) a mass of fissile material (or mass of each fissile nuclide for mixtures when appropriate) different from that authorized for the package design;
- b) any radionuclide or fissile material different from those authorized for the package design; or
- c) contents in a form or physical or chemical state, or in a spatial arrangement, different from those authorized for the package design;

be as specified for the package design either directly in these Instructions or in their certificates of approval, where appropriate.

Table 4-2. Industrial package requirements for LSA material and SCO

<table>
<thead>
<tr>
<th>Industrial package type</th>
<th>Radioactive contents</th>
<th>Exclusive use</th>
<th>Not under exclusive use</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSA-I Solid Liquid</td>
<td>Type IP-1</td>
<td>Type IP-1</td>
<td>Type IP-2</td>
</tr>
<tr>
<td>LSA-II Solid Liquid</td>
<td>Type IP-2</td>
<td>Type IP-2</td>
<td>Type IP-3</td>
</tr>
<tr>
<td>LSA-III Liquid and gas</td>
<td>Type IP-2</td>
<td>Type IP-2</td>
<td>Type IP-3</td>
</tr>
<tr>
<td>SCO-I</td>
<td>Type IP-1</td>
<td>Type IP-1</td>
<td>Type IP-2</td>
</tr>
<tr>
<td>SCO-II</td>
<td>Type IP-2</td>
<td>Type IP-2</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 10

CLASS 8 — CORROSIVE SUBSTANCES

DGP/24-WP/2 (see paragraph 3.2.19)

Note.— This amendment was approved and published by decision of the Council of ICAO in Addendum No. 3 to the 2013-2014 Edition of the Technical Instructions.

Packing Instruction 874

Passenger and cargo aircraft for UN 3477 (contained in equipment) only

ADDITIONAL PACKING REQUIREMENTS

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

Packing Instruction 877

Passenger and cargo aircraft for UN 3507 only

General requirements

Part 4, Chapter 1 and Part 4:9.1.2, 9.1.4 and 9.1.7 requirements must be met, including:

1) Compatibility requirements
   — Substances must be compatible with their packagings as required by 4:1.1.3.
   — Metal packagings must be corrosion resistant or be protected against corrosion.
   — Substances of Class 8 are permitted in glass or earthenware inner packagings only if the substance is free from hydrofluoric acid.

2) Closure requirements
   — Closures must meet the requirements of 4:1.1.4.

<table>
<thead>
<tr>
<th>UN number and name</th>
<th>Passenger</th>
<th>Cargo</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 3507 Uranium hexafluoride, radioactive material, excepted package, non-fissile or fissile-excepted</td>
<td>Less than 0.1 kg</td>
<td>Less than 0.1 kg</td>
</tr>
</tbody>
</table>
ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS

— Substances must be packed in a metal or plastics primary receptacle in a leakproof rigid secondary packaging in a rigid outer packaging.

— Primary inner receptacles must be packed in secondary packagings in a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packagings must be secured in outer packagings with suitable cushioning material to prevent movement. If multiple primary receptacles are placed in a single secondary packaging, they must be either individually wrapped or separated so as to prevent contact between them.

— The contents must comply with the provisions of 2.7.2.4.5.2.

— The provisions of 6.7.3 must be met.

— In the case of fissile-excepted material, limits specified in 2.7.2.3.5 and 6.7.10.2

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6.3.1)

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium (4B)</td>
<td>Aluminium (1B2)</td>
<td>Aluminium (3B2)</td>
</tr>
<tr>
<td>Fibreboard (4G)</td>
<td>Fibre (1G)</td>
<td>Plastics (3H2)</td>
</tr>
<tr>
<td>Natural wood (4C1, 4C2)</td>
<td>Other metal (1N2)</td>
<td>Steel (3A2)</td>
</tr>
<tr>
<td>Plastics (4H1, 4H2)</td>
<td>Plastics (1H2)</td>
<td></td>
</tr>
<tr>
<td>Plywood (4D)</td>
<td>Plywood (1D)</td>
<td></td>
</tr>
<tr>
<td>Reconstituted wood (4F)</td>
<td>Steel (1A2)</td>
<td></td>
</tr>
<tr>
<td>Steel (4A)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

*Parts of this Chapter are affected by State Variation US 2; see Table A-1*

---

**Packing Instruction 950**

*Passenger and cargo aircraft for UN 3166 only*

*(See Packing Instruction 951 for flammable gas-powered vehicles and engines or Packing Instruction 952 for battery-powered equipment and vehicles)*

---

**ADDITIONAL PACKING REQUIREMENTS**

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**Batteries**

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

1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;

2) if lithium batteries are installed, they must be of a type that has successfully passed the tests specified in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3 *meet the provisions of Part 2.9.3*, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and

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

---
**Packing Instruction 951**

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

**ADDITIONAL PACKING REQUIREMENTS**

*Batteries*

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

1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;

2) if lithium batteries are installed, they must be of a type that has successfully passed the tests specified in the UN Manual of Tests and Criteria, Part III, subsection 38.3 meet the provisions of Part 2.9.3, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and

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

---

**Packing Instruction 952**

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

*Batteries*

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

1) if spillable batteries are installed, and it is possible for the vehicle, machine or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 492 or 870 as applicable;

2) if lithium batteries are installed in a vehicle, they must be of a type that has successfully passed the tests specified in the UN Manual of Tests and Criteria, Part III, subsection 38.3 meet the provisions of Part 2.9.3, unless otherwise approved by the appropriate authority of the State of Origin, must be securely fastened in the vehicle, machinery or equipment and must be protected in such a manner so as to prevent damage and short circuits; and

3) if sodium batteries are installed they must conform to the requirements of Special Provision A94.
**Packing Instruction 958**

Passenger and cargo aircraft for UN 2071 and UN 2590 only

**General requirements**

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

1) **Compatibility requirements**
   
   — Substances must be compatible with their packagings as required by 4.1.1.3.

2) **Closure requirements**
   
   — Closures must meet the requirements of 4.1.1.4.

---

DGP/24-WP/3 (see paragraph 3.2.13.1 d))

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Quantity — passenger</th>
<th>Quantity — cargo</th>
<th>SINGLE PACKAGINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 2071 Ammonium nitrate fertilizers</td>
<td>200 kg</td>
<td>200 kg</td>
<td>Yes</td>
</tr>
<tr>
<td>UN 2590 White asbestos, chrysotile</td>
<td>200 kg</td>
<td>200 kg</td>
<td></td>
</tr>
</tbody>
</table>

...
Packing Instruction 959
Passenger and cargo aircraft for UN 3245 only

The following packagings are authorized:

2) Packagings, which need not conform to the packaging test requirements of Part 6, but conforming to the following:

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

UN Model Regulations, P904, ST/SG/AC.10/40/Add.1
See also paragraph 3.2.29.1 d) of DGP/24-WP/3

Replace mark for GMO/GMMOs with the following:
Packing Instruction Y963
Passenger and cargo aircraft for ID 8000 only

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

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

b) Inner packagings that are breakable (such as earthenware, glass or brittle plastic) must be packed to prevent breakage and leakage under conditions normally incident to transport. These completed packagings must be capable of withstanding a 1.2 m drop on solid concrete in the position most likely to cause damage. The criteria for passing the test is that the outer packaging must not exhibit any damage liable to affect safety during transport and there must be no leakage from the inner packaging(s). Each package offered for transport must be capable of withstanding, without breakage or leakage of any inner packaging and without significant reduction of effectiveness, a force applied to the top surface for a duration of 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 m (including the test sample).
1. Introduction

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

— Section IA applies to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;

— Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II; and

— Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.

2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

IA. SECTION IA

Section IA requirements apply to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh that have been determined to meet the criteria for assignment to Class 9.

Each cell or battery must meet all the provisions of [2;9.3.1];

1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

3) be manufactured under a quality management programme as described in 2;9.3.1.e).

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

1A.1 General requirements

Part 4;1 requirements must be met.
Table 965-IA

<table>
<thead>
<tr>
<th>UN number</th>
<th>and proper shipping name</th>
<th>Net quantity per package</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 3480</td>
<td>Lithium ion batteries</td>
<td>5 kg 35 kg</td>
</tr>
</tbody>
</table>

IA.2 Additional requirements

— Lithium ion cells and batteries must be protected against short circuits.
— Lithium ion cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
— Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
— Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

IA.3 Outer packagings

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

IB. SECTION IB

Section IB requirements apply to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II.

Quantities of lithium ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the following:

— the provisions of Part 6; and
— the dangerous goods transport document requirements of 5.4, provided alternative written documentation is provided by the shipper describing the contents of the consignment. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:

1) the name and address of the shipper and consignee;
2) UN 3480;
3) Lithium ion batteries PI 965 IB:

DGP/24-WP/3 (see paragraph 3.5.4):

4) the number of packages and the gross mass of net quantity contained in each package.
Packing Instruction 965

DGP/24-WP/3 (see paragraph 3.5.3):

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2.9.3.1a) and e) and if they meet all of the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

Note 2.— Batteries and cells manufactured before 1 January 2009 may continue to be transported;

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).

IB.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4.1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

DGP/24-WP/3 (see paragraph 3.5.4):

Table 965-IB

<table>
<thead>
<tr>
<th>Contents</th>
<th>Net quantity per Package</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
</tr>
<tr>
<td>Lithium ion cells and batteries</td>
<td>10 kg G</td>
</tr>
</tbody>
</table>

IB.2 Additional requirements

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
— damage to cells or batteries contained therein;
— shifting of the contents so as to allow battery to battery (or cell to cell) contact;
— release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31) in addition to the Class 9 hazard label.
— Each consignment must be accompanied with a document with an indication that:
— the package contains lithium ion cells or batteries;
— the package must be handled with care and that a flammability hazard exists if the package is damaged;
— special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
— a telephone number for additional information.

IB.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium ion cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of (2;9.3.1 a) and e) and they meet all of the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   — the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

   Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).

II.1 General requirements

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

Table 965-II

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

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

#### II.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- Where a consignment includes packages bearing the lithium battery handling label, the words “lithium ion batteries, in compliance with Section II of PI965” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

#### II.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### II.4 Overpacks

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack”.
Packing Instruction 966

Passenger and cargo aircraft for UN 3481 (packed with equipment) only

1. Introduction

This entry applies to lithium ion or lithium polymer batteries packed with equipment.

Section I of this packing instruction applies to lithium ion and lithium polymer cells and batteries that are assigned to Class 9. Certain lithium ion and lithium polymer cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

I. SECTION I

Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

Each cell or battery must meet all the provisions of 2.9.3.4:

1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

3) be manufactured under a quality management programme as described in 2.9.3.1 e).

I.1 General requirements

Part 4.1 requirements must be met.

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Package quantity (Section I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 3481 Lithium ion batteries packed with equipment</td>
<td>Passenger: 5 kg of lithium ion cells or batteries, Cargo: 35 kg of lithium ion cells or batteries</td>
</tr>
</tbody>
</table>
Packaging Instruction 966

I.2 Additional requirements

— Lithium ion cells and batteries must be protected against short circuits.
— Lithium ion cells or batteries must:
  — be placed in inner packagings that completely enclose the cell or battery then placed in an outer
  packaging. The completed package for the cells or batteries must meet the Packing Group II
  performance requirements; or
  — be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in
  a package that meets the Packing Group II performance requirements.
— The equipment must be secured against movement within the outer packaging and must be equipped with
an effective means of preventing accidental activation.
— For the purpose of this packing instruction, “equipment” means apparatus requiring the lithium ion batteries
with which it is packed for its operation.
— Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside
case.

I.3 Outer packagings

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

II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods
accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this
packing instruction, lithium ion cells and batteries packed with equipment offered for transport are not subject to
other additional requirements of these Instructions if they meet the requirements of this section.

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the
provisions of [2;9.3.1 a) and e)] and if they meet all of the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than
20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   — the Watt-hour rating must be marked on the outside of the battery case except for those batteries
   manufactured before 1 January 2009;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests
   and Criteria, Part III, subsection 38.3;

Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are
composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in
2;9.3.1 e).
II.1 General requirements

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

<table>
<thead>
<tr>
<th>Contents</th>
<th>Package quantity (Section II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net quantity of lithium ion cells or batteries per package</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>5 kg</td>
</tr>
</tbody>
</table>

II.2 Additional requirements

— Lithium ion cells and batteries must:
  — be placed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging; or
  — be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
— The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares.
— Each package of cells or batteries, or the completed package, must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31).
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium ion cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.
— The words “lithium ion batteries, in compliance with Section II of PI966” must be placed on the air waybill, when an air waybill is used.
— Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II.4 Overpacks

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

Packing Instruction 966
Packing Instruction 967

Passenger and cargo aircraft for UN 3481 (contained in equipment) only

1. Introduction

This entry applies to lithium ion or lithium polymer batteries contained in equipment.

Section I of this packing instruction applies to lithium ion and lithium polymer cells and batteries that are assigned to Class 9. Certain lithium ion and lithium polymer cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

I. SECTION I

Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

Each cell or battery must meet all the provisions of [2;9.3.1] and

1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3; and

Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

3) be manufactured under a quality management programme as described in 2;9.3.1(e).

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

I.1 General requirements

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

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Package quantity (Section I)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
</tr>
<tr>
<td>UN 3481 Lithium ion batteries</td>
<td>5 kg of lithium</td>
</tr>
<tr>
<td>contained in equipment</td>
<td>ion cells or</td>
</tr>
<tr>
<td></td>
<td>batteries</td>
</tr>
</tbody>
</table>

I.2 Additional requirements

— The equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during air transport.
— The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging’s capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
— Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.


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I.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Strong outer packagings</td>
</tr>
</tbody>
</table>

II. SECTION II

With the exception of Part 1.2.3 (Transport of dangerous goods by post), 7.4.4 (Reporting of dangerous goods accidents and incidents), 8.1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium ion cells and batteries contained in equipment offered for transport are not subject to other additional requirements of these instructions if they meet the requirements of this section.

Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2.9.3.1 a) and e) and if they meet all of the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   — the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;
   — Note 1 — Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.
   — Note 2 — Batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN Manual of Tests and Criteria, Part III, subsection 38.3 may continue to be transported.
4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

II.1 General requirements

Equipment must be packed in strong outer packagings that conform to Part 4.1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

<table>
<thead>
<tr>
<th>Contents</th>
<th>Package quantity (Section II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net quantity of lithium ion cells or batteries per package</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>5 kg</td>
</tr>
</tbody>
</table>

II.2 Additional requirements

— The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
— Cells and batteries must be protected so as to prevent short circuits.
— The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging’s capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
— Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-31) (except button cell batteries installed in equipment (including circuit boards)).
— Each consignment with packages bearing the lithium battery handling label must be accompanied with a document with an indication that:
   — the package contains lithium ion cells or batteries;
Packing Instruction 967

— the package must be handled with care and that a flammability hazard exists if the package is damaged;
— special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
— a telephone number for additional information.
— Where a consignment includes packages bearing the lithium battery handling label, the words “lithium ion batteries, in compliance with Section II of PI967” must be placed on the air waybill, when an air waybill is used.
— Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II.4 Overpacks

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

Packing Instruction 968
Passenger and cargo aircraft for UN 3090

1. Introduction

This entry applies to lithium metal or lithium alloy batteries. This packing instruction is structured as follows:

— Section IA applies to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
— Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and
— Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.

2. Lithium batteries forbidden from transport

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

IA. SECTION IA

Section IA requirements apply to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g that have been determined to meet the criteria for assignment to Class 9.

Each cell or battery must meet all the provisions of [2;9.3.4].

1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

— Note 1— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

3) be manufactured under a quality management programme as described in 2;9.3.1.e).

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

IA.1 General requirements

Part 4;1 requirements must be met.

Table 968-IA

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Net quantity per package</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
</tr>
<tr>
<td>UN 3090 Lithium metal batteries</td>
<td>2.5 kg</td>
</tr>
</tbody>
</table>
Packing Instruction 968

II.2. Additional requirements

— Lithium metal cells and batteries must be protected against short circuits.
— Lithium metal cells and batteries must be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
— Lithium metal batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
— For lithium metal cells and batteries prepared for transport on passenger aircraft as Class 9:
  — cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging; and
  — cells and batteries must be surrounded by cushioning material that is non-combustible and non-conductive, and placed inside an outer packaging.

II.3. Outer packagings

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

II. Section IB

Section IB requirements apply to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II.

Quantities of lithium metal cells or batteries that exceed the allowance permitted in Section II, Table 968-II, must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the following:
— the provisions of Part 6; and
— the dangerous goods transport document requirements of 5.4, provided alternative written documentation is provided by the shipper describing the contents of the consignment. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:
  1) the name and address of the shipper and consignee;
  2) UN 3090;
  3) Lithium metal batteries PI 968 IB;
  4) the number of packages and the gross mass of net quantity contained in each package.

DGP/24-WP/3 (see paragraph 3.5.4):

Lithium metal or lithium alloy cells and batteries may be offered for transport provided that each cell and battery meets the provisions of [2;9.3.1 a) and e) and] if they meet all of the following:
— for lithium metal cells, the lithium content is not more than 1 g;
— for lithium metal or lithium alloy batteries, the aggregate lithium content is not more than 2 g;
— each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria Part III, subsection 38.3.

Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are
Packing Instruction 968

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

4) Cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).

IB.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4.1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

DGP/24-WP/3 (see paragraph 3.5.4):

Table 968-IB

<table>
<thead>
<tr>
<th>Contents</th>
<th>Net quantity per package quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
</tr>
<tr>
<td>Lithium metal cells and batteries</td>
<td>2.5 kg G</td>
</tr>
</tbody>
</table>

IB.2 Additional requirements

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31) in addition to the Class 9 hazard label.
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium metal cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.

IB.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Strong outer packagings

DGP/24-WP/3 (see paragraph 3.5.3):

II. SECTION II

With the exception of Part 1:2.3 (Transport of dangerous goods by post), 7:4.4 (Reporting of dangerous goods accidents and incidents), 8:1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal or lithium alloy cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium metal or lithium alloy cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2.9.3.1 a) and e) and if they meet all of the following:

1) for a lithium metal cell, the lithium content is not more than 1 g;
2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3.
Packing Instruction 968

**Note 1.** Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1-e).

II.1 General requirements

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

<table>
<thead>
<tr>
<th>Contents</th>
<th>Lithium metal cells and/or batteries with a lithium content not more than 0.3 g</th>
<th>Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g</th>
<th>Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of cells / batteries per package</td>
<td>No limit</td>
<td>8 cells</td>
<td>2 batteries</td>
</tr>
<tr>
<td>Maximum net quantity (mass) per package</td>
<td>2.5 kg</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

The limits specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

II.2 Additional requirements

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31).
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium metal cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.
— The words “lithium metal batteries, in compliance with Section II of PI968” must be placed on the air waybill, when an air waybill is used.
— Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II.4 Overpacks

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack”.
Packing Instruction 969

Passenger and cargo aircraft for UN 3091 (packed with equipment) only

1. **Introduction**

   This entry applies to lithium metal or lithium alloy batteries packed with equipment.

   Section I of this packing instruction applies to lithium metal and lithium alloy cells and batteries that are assigned to Class 9. Certain lithium metal and lithium alloy cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

2. **Lithium batteries forbidden from transport**

   The following applies to all lithium metal cells and batteries in this packing instruction:

   Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

I. **SECTION I**

   Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

   Each cell or battery must meet all the provisions of 2.9.3.4:

   1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3; and

   Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

   2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

   3) be manufactured under a quality management programme as described in 2.9.3.1 e).

   Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

I.1 **General requirements**

   Part 4.1 requirements must be met.

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Package quantity (Section I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 3091 Lithium metal batteries packed with equipment</td>
<td>Passenger: 5 kg of lithium metal cells or batteries, Cargo: 35 kg of lithium metal cells or batteries</td>
</tr>
</tbody>
</table>
Packing Instruction 969

1.2 Additional requirements

— Lithium metal cells and batteries must be protected against short circuits.
— Lithium metal cells or batteries must:
  — be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements; or
  — be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a package that meets the Packing Group II performance requirements.
— The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
— For the purpose of this packing instruction, “equipment” means apparatus requiring the lithium batteries with which it is packed for its operation.
— For lithium metal cells and batteries prepared for transport on passenger aircraft as Class 9:
  — cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging surrounded by cushioning material that is non-combustible and non-conductive and placed inside an outer packaging.

1.3 Outer packagings

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

II. SECTION II

With the exception of Part 1:2.3 (Transport of dangerous goods by post), 7:4.4 (Reporting of dangerous goods accidents and incidents), 8:1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal cells and batteries packed with equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium metal cells and batteries may be offered for transport provided that each cell and battery meets the provisions of [2:9.3.1 a) and e)] if they meet all of and the following:

1) for a lithium metal cell, the lithium content is not more than 1 g;
2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2:9.3.1 e).
Packing Instruction 969

II.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4.1.1.1, 4.1.3.1 and 4.1.10 (except 4.1.10.1).

<table>
<thead>
<tr>
<th>Contents</th>
<th>Package quantity (Section II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net quantity of lithium metal cells or batteries per package</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>5 kg</td>
</tr>
</tbody>
</table>

II.2 Additional requirements

— Lithium metal cells or batteries must:
  — be placed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging; or
  — be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
— The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares.
— Each package of cells or batteries, or the completed package, must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31).
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium metal cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary, and
  — a telephone number for additional information.
— The words “lithium metal batteries, in compliance with Section II of PI969” must be placed on the air waybill, when an air waybill is used.
— Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Strong outer packagings</td>
</tr>
</tbody>
</table>

II.4 Overpacks

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


**Packing Instruction 970**

Passenger and cargo aircraft for UN 3091 (contained in equipment) only

1. **Introduction**

   This entry applies to lithium metal or lithium alloy batteries contained in equipment.

   Section I of this packing instruction applies to lithium metal and lithium alloy cells and batteries that are assigned to Class 9. Certain lithium metal and lithium alloy cells and batteries offered for transport and meeting the requirements of Section II of this packing instruction, subject to paragraph 2 below, are not subject to other additional requirements of these Instructions.

2. **Lithium batteries forbidden from transport**

   The following applies to all lithium metal cells and batteries in this packing instruction:

   Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

I. **SECTION I**

   Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

   Each cell or battery must meet all the provisions of [2.9.3.3.3; and]

   1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3; and

      Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

   2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

   3) be manufactured under a quality management programme as described in 2.9.3.1 e).

   Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

I.1 **General requirements**

   Equipment must be packed in strong outer packagings that conform to Part 4.1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Package quantity (Section I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 3091 Lithium metal batteries contained in equipment</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>5 kg of lithium metal cells or batteries</td>
</tr>
</tbody>
</table>

I.2 **Additional requirements**

   — The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.

   — The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging’s capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.

   — The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery.
Packing Instruction 970

I.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II. SECTION II

With the exception of Part 1.2.3 (Transport of dangerous goods by post), 7.4.4 (Reporting of dangerous goods accidents and incidents), 8.1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal cells and batteries contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium metal cells and batteries may be offered for transport provided that each cell and battery meets the provisions of [2.9.3.1 a) and e)] and if they meet all of the following:

1) for a lithium metal cell, the lithium content is not more than 1 g;
2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3.

---

Note 1. Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1.e).

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

II.1 General requirements

Equipment containing batteries must be packed in strong outer packagings that conform to Part 4.1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

<table>
<thead>
<tr>
<th>Contents</th>
<th>Package quantity (Section II)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
</tr>
<tr>
<td>Net quantity of lithium metal cells or batteries per package</td>
<td>5 kg</td>
</tr>
</tbody>
</table>
II.2 Additional requirements

— The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
— Cells and batteries must be protected so as to prevent short circuits.
— The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging’s capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
— Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-31) (except button cell batteries installed in equipment (including circuit boards)).
— Each consignment with packages bearing the lithium battery handling label must be accompanied with a document with an indication that:
  — the package contains lithium metal cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.
— Where a consignment includes packages bearing the lithium battery handling label, the words “lithium metal batteries, in compliance with Section II of PI970” must be placed on the air waybill, when an air waybill is used.
— Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Strong outer packagings

II.4 Overpacks

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

See paragraph 3.5.2 of DGP/24-WP/3 for UN Model Regulations, P908 and P909 (in addition to SP 376 and SP377), ST/SG/AC.10/40/Add.1

— END —
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 5.1: Review of provisions for the transport of lithium batteries

TRANSPORT OF DAMAGED OR DEFECTIVE LITHIUM BATTERIES

(Presented by G A Leach)

SUMMARY

This working paper seeks clarification on the degree to which lithium cells and batteries, which have the potential of producing a dangerous evolution of heat, fire or short circuit, are forbidden.

Action by the DGP: The DGP is invited to amend Special Provision A154 and Packing Instruction 965 as presented in the appendices to this working paper.

1. INTRODUCTION

1.1 Packing Instructions 965 to 970 all contain the following introductory text:

“Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).”

It is not clear from this text whether “forbidden” is meant to be forbidden unless exempted or forbidden under any circumstances.
1.2 The above text reflects that in Special Provision A154, which was added by way of an addendum to the 2007-2008 Technical Instructions, following discussion at the 2006 Working Group meeting in Beijing. The relevant extract of the report is as follows:

“4.16.1 The subject of transporting defective lithium batteries was discussed. Although it was recognized that manufacturers have attempted to ensure that such batteries, when subjected to a recall, be transported by ground, it was proposed they be forbidden for air transport unless approved by the appropriate authority.

4.16.2 All members supported the intent of the proposal but suggested clarification was needed regarding the meaning of the word “recall”. It was further agreed the prohibition should apply to those batteries being returned to the manufacturer for safety reasons. It was agreed that the Universal Postal Union should be informed of the safety issue as mail services in many states routinely use aircraft for transport. An expansion of the discussion to include articles other than lithium batteries which had the potential to cause a fire then ensued. It was noted the text of 1;2.1 should be aligned with the equivalent text in the UN Model Regulations so that articles as well as substances would be forbidden.”

1.3 With the reference to Part 1;2.1 it seems the intent was to make damaged lithium batteries, with a potential for a dangerous evolution of heat, forbidden under any circumstances, meaning no exemption from the Technical Instructions is possible. However, there is a subtle difference between the text of Special Provision A154 and Part 1;2.1 in that the latter forbids any article or substance which, as presented for transport, is liable to …..produce a flame or dangerous evolution of heat…..”

1.4 There may be occasions where there is an urgent need for damaged or defective lithium batteries to be transport by air (e.g. in connection with an aircraft accident) and such batteries, whilst they may in themselves be capable of a dangerous evolution of heat, can be transported safely if appropriate precautions are taken (e.g. by packing in sand in a metal drum). It is suggested that aligning the wording of Special Provision A154 and the Packing Instructions with that in Part 1;2.1, coupled with a requirement for approval from the States of origin and of the operator, would provide for an appropriate level of safety and flexibility.

1.5 It is also queried why only such cells and batteries “identified by the manufacturer” as being defective for safety reasons etc. are forbidden i.e. presumably an entity other than the manufacturer e.g. a laboratory following an incident could also determine that cells or batteries may be defective reasons; perhaps the manufacturer should appear as an example of an entity able to make such a determination rather than the only one.
APPENDIX A

PROPOSED AMENDMENT TO PART 3 OF THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND
LIMITED AND EXCEPTED QUANTITIES

Chapter 3

SPECIAL PROVISIONS

Table 3-2. Special provisions

Lithium cells and batteries, identified by the manufacturer as being defective for safety reasons, (e.g. those being returned to the manufacturer for safety reasons), or that have been damaged that, as presented for transport, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport by air under any circumstance (e.g. those being returned to the manufacturer for safety reasons).
2. **Lithium batteries forbidden from transport**

   The following applies to all lithium ion cells and batteries in this packing instruction:

   Cells and batteries, identified by the manufacturer as being defective for safety reasons (e.g. those being returned to the manufacturer for safety reasons), or that have been damaged, have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport by air under any circumstance (e.g. those being returned to the manufacturer for safety reasons).

   Cells and batteries, identified as being defective for safety reasons (e.g. those being returned to the manufacturer for safety reasons), or that have been damaged that, as presented for transport, have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

   Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.
Packing Instruction 966
Passenger and cargo aircraft for UN 3481 (packed with equipment) only

2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons (e.g., those being returned to the manufacturer for safety reasons), or that have been damaged, that as presented for transport, have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport by air under any circumstance (e.g., those being returned to the manufacturer for safety reasons).

Cells and batteries, identified as being defective for safety reasons (e.g., those being returned to the manufacturer for safety reasons), or that have been damaged that, as presented for transport, do not have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

Packing Instruction 967
Passenger and cargo aircraft for UN 3481 (contained in equipment) only

2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons (e.g., those being returned to the manufacturer for safety reasons), or that have been damaged, that as presented for transport, have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport by air under any circumstance (e.g., those being returned to the manufacturer for safety reasons).

Cells and batteries, identified as being defective for safety reasons (e.g., those being returned to the manufacturer for safety reasons), or that have been damaged that, as presented for transport, do not have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.
2. **Lithium batteries forbidden from transport**

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons (e.g. those being returned to the manufacturer for safety reasons), or that have been damaged that, as presented for transport, have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport by air under any circumstance (e.g. those being returned to the manufacturer for safety reasons).

Cells and batteries, identified as being defective for safety reasons (e.g. those being returned to the manufacturer for safety reasons), or that have been damaged that, as presented for transport do not have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.
2. **Lithium batteries forbidden from transport**

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons (e.g. those being returned to the manufacturer for safety reasons), or that have been damaged that, as presented for transport, have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport by air under any circumstance (e.g. those being returned to the manufacturer for safety reasons).

Cells and batteries, identified as being defective for safety reasons (e.g. those being returned to the manufacturer for safety reasons), or that have been damaged that, as presented for transport do not have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

...
DANGEROUS GOODS PANEL (DGP)
TWENTY-FOURTH MEETING
Montréal, 28 October to 8 November 2013

Agenda Item 5.1: Review of provisions for the transport of lithium batteries

CLARIFICATION OF REQUIREMENTS FOR TRANSPORT OF LITHIUM BATTERIES IN EQUIPMENT

(Presented by D. Mirko)

SUMMARY

This paper proposes to introduce changes to the requirements for the transport of lithium batteries contained in equipment in Packing Instructions 967 and 970 of the Technical Instructions.

Action by the DGP: The DGP is invited to consider amending Section II of Packing Instructions 967 and 970 of the Technical Instructions as shown in the appendix to this working paper.

1. INTRODUCTION

1.1 Section II of Packing Instructions 967 (for UN 3481, Lithium ion batteries contained in equipment) and 970 (for UN 3091, Lithium metal batteries contained in equipment), contain the conditions under which certain types of batteries may be transported without a lithium battery handling label (Figure 5-31), but with the words air waybill "lithium metal batteries, in compliance with Section II of PI970" and "lithium ion batteries, in compliance with Section II of PI967, to appear on the air waybill.

1.2 Section II of these packing instructions indicates that batteries meeting the requirements of Section II are not subject to other additional requirements of the Technical Instructions, including acceptance and the notification to captain requirements. The requirement to have the same words on the air waybill, for batteries which require the handling label and those that do not, complicates their acceptance for transport.
APPENDIX

PROPOSED AMENDMENT TO PART 4 OF THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

Packing Instruction 967
Passenger and cargo aircraft for UN 3481 (contained in equipment) only

II.2 Additional requirements

— The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
— Cells and batteries must be protected so as to prevent short circuits.
— The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging’s capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
— Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-31) (except button cell batteries installed in equipment (including circuit boards)).
— When an air waybill is used for each consignment containing not more than four cells or not more than two batteries, the words “lithium ion batteries, not restricted” must be placed on the air waybill.
— Each consignment with packages bearing the lithium battery handling label must be accompanied with a document with an indication that:
— the package contains lithium ion cells or batteries;
— the package must be handled with care and that a flammability hazard exists if the package is damaged;
— special procedures must be followed in the event the package is damaged, including inspection and repacking if necessary; and
— a telephone number for additional information.
— Where a consignment includes packages bearing the lithium battery handling label, the words “lithium ion batteries, in compliance with Section II of PI967” must be placed on the air waybill, when an air waybill is used, for each consignment with packages bearing the lithium battery handling label.
— Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.
Packing Instruction 970

Passenger and cargo aircraft for UN 3091 (contained in equipment) only

II.2 Additional requirements

— The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
— Cells and batteries must be protected so as to prevent short circuits.
— The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging’s capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
— Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-31) (except button cell batteries installed in equipment (including circuit boards)).
— When an air waybill is used for each consignment containing not more than four cells or not more than two batteries, the words “lithium metal batteries, not restricted” must be placed on the air waybill.
— Each consignment with packages bearing the lithium battery handling label must be accompanied with a document with an indication that:
  — the package contains lithium metal cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.
— Where a consignment includes packages bearing the lithium battery handling label, the words “lithium ion batteries, in compliance with Section II of PI970” must be placed on the air waybill, when an air waybill is used for each consignment with packages bearing the lithium battery handling label.
— Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

— END —
DANGEROUS GOODS PANEL (DGP)
TWENTY-FOURTH MEETING
Montréal, 28 October to 8 November 2013

Agenda Item 5.1: Review of provisions for the transport of lithium batteries

DENIALS OF LITHIUM BATTERIES SHIPMENTS

(Presented by D. Mirko)

SUMMARY
This paper proposes to introduce a new paragraph 2.16 in Chapter 2, Part 7, of the Technical Instructions concerning requirements for handling of lithium batteries.

Action by the DGP: The DGP is invited to consider the amendment to Part 7;2.16 of the Technical Instructions as presented in the appendix to this working paper.

1. INTRODUCTION

1.1 For the transport of lithium batteries prepared in accordance with Section II of Packing Instructions 965 - 970 and to control their loading on the aircraft, a special marking is used and special words are required on the airway bill to indicate that batteries are in compliance with the applicable packaging instructions.

1.2 In the case of transportation of such batteries to airports that do not handle dangerous goods, operators have denied their transportation.

1.3 Lithium batteries which are prepared in accordance with Section II of Packing Instructions 965 - 970 do not pose a greater risk in handling at the airport than other batteries that meet the requirements of Special Provisions A123 and can be handled without their separation from non-dangerous goods.

(3 pages)
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APPENDIX

PROPOSED AMENDMENT TO PART 7 OF THE TECHNICAL INSTRUCTIONS

Part 7

OPERATOR’S RESPONSIBILITIES

Chapter 2

STORAGE AND LOADING

2.15 HANDLING AND LOADING OF INTERMEDIATE BULK CONTAINERS (IBCS)
During handling and loading of intermediate bulk containers (IBCs), account must be taken of the IBC markings specified in 6;2.4.3, if present.

2.16 HANDLING OF CONSIGMENTS CONTAINING LITHIUM BATTERIES
Lithium batteries packed in accordance with Section II of Packing Instructions 965, 966, 967, 968, 969, 970 do not require separation from non-dangerous goods.

— END —
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:
5.1: Review of provisions for the transport of lithium batteries

TRANSPORT OF LITHIUM BATTERIES FOR DISPOSAL OR RECYCLING

(Presented by PRBA — The Rechargeable Battery Association)

SUMMARY

This paper proposes the addition of a new special provision and packing instruction for the Supplement to the Technical Instructions to provide guidance for national authorities who may issue approvals authorizing the transport by air of lithium ion and lithium metal cells and batteries and equipment containing them for disposal or recycling.

Action by the DGP: The DGP is invited to provide guidance to national authorities who may consider issuing approvals authorizing the transport of lithium batteries for disposal or recycling by adopting a special provision and packing instruction for the Supplement to the Technical Instructions.

1. INTRODUCTION

1.1 Special Provision A183 of the Technical Instructions prohibits the transport of waste lithium batteries unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

1.2 At the forty-second session of the UN Sub-Committee of Experts on the Transport of Dangerous Goods, a new special provision and packing instruction were adopted authorizing the transport of lithium batteries for disposal or recycling. The special provision and packing instruction adopted by the Sub-Committee were based on proposals submitted in 2011 and 2012 by PRBA — The Rechargeable Battery Association and the European Association for Advanced Rechargeable Batteries (RECHARGE). The new special provision and packing instruction were incorporated into the UN Recommendations on the Transport of Dangerous Goods Model Regulations, Eighteenth Revised Edition. It is proposed that the Technical Instructions and the Supplement to the Technical Instructions be amended as shown in the appendices to this working paper.

(8 pages)
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APPENDIX A

PROPOSED AMENDMENT TO PART 3 OF THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

Chapter 3

SPECIAL PROVISIONS

Table 3-2. Special provisions

<table>
<thead>
<tr>
<th>TiS</th>
<th>UN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A183</td>
<td>Waste batteries and 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 (see Special Provision A2XX in Part S-3.6 of the Supplement to these Instructions).</td>
</tr>
</tbody>
</table>
### Part S-3

**DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND QUANTITY LIMITATIONS**

### Chapter 4

**SUPPLEMENTARY DANGEROUS GOODS LIST**

#### Classes 3 to 9

<table>
<thead>
<tr>
<th>Name</th>
<th>UN No.</th>
<th>Class or division</th>
<th>Subsidiary risk</th>
<th>Labels</th>
<th>State variations</th>
<th>Special provision group</th>
<th>UN packing group</th>
<th>Excepted quantity</th>
<th>Max. net quantity per package</th>
<th>Packing instruction</th>
<th>Max. net quantity per package</th>
<th>Packing instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium ion batteries (including lithium ion polymer batteries)</td>
<td>3480</td>
<td>9</td>
<td>Miscellaneous</td>
<td>JS 3</td>
<td>A51 A88 A99 A154 A164 A183 A2xx</td>
<td>II E0</td>
<td>See</td>
<td>965</td>
<td>See</td>
<td>965</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium ion batteries contained in equipment (including lithium ion polymer batteries)</td>
<td>3481</td>
<td>9</td>
<td>Miscellaneous</td>
<td>JS 3</td>
<td>A48 A99 A154 A164 A181 A185 A2xx</td>
<td>II E0</td>
<td>967 5 kg</td>
<td>967 35 kg</td>
<td></td>
<td>967</td>
<td>35 kg</td>
<td></td>
</tr>
<tr>
<td>Lithium ion batteries packed with equipment (including lithium ion polymer batteries)</td>
<td>3481</td>
<td>9</td>
<td>Miscellaneous</td>
<td>JS 3</td>
<td>A88 A99 A154 A164 A181 A185 A2xx</td>
<td>II E0</td>
<td>966 5 kg</td>
<td>966 35 kg</td>
<td></td>
<td>966</td>
<td>35 kg</td>
<td></td>
</tr>
<tr>
<td>Lithium metal batteries (including lithium alloy batteries)</td>
<td>3090</td>
<td>9</td>
<td>Miscellaneous</td>
<td>JS 2 US 3</td>
<td>A88 A99 A154 A164 A183 A2xx</td>
<td>II E0</td>
<td>See</td>
<td>968</td>
<td>See</td>
<td>968</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lithium metal batteries contained in equipment (including lithium alloy batteries)  

3091 9 Miscellaneous JS 2 US 3 A48 A99 A154 A164 A181 A185 A2xx IIE0 970 5 kg 970 35 kg

Lithium metal batteries packed with equipment (including lithium alloy batteries)  

3091 9 Miscellaneous JS 2 US 3 A99 A154 A164 A181 A185 A2xx IIE0 969 5 kg 969 35 kg

Chapter 6  
SPECIAL PROVISIONS

A2XX (377) Lithium ion and lithium metal cells and batteries and equipment containing such cells and batteries transported for disposal or recycling, either packed together with or packed without non-lithium batteries, may be packaged in accordance with Packing Instruction 9XX.

Cells and batteries are not subject to the requirements of Part 2.9.3 of the Technical Instructions. Additional exemptions may be provided under the conditions defined by the appropriate national authority. Packages must be marked “LITHIUM BATTERIES FOR DISPOSAL” or “LITHIUM BATTERIES FOR RECYCLING”.

Identified damaged or defective batteries are prohibited from being transported under this special provision and Packing Instruction 9XX.
Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

Packing Instruction 9XX

Passenger and cargo aircraft for UN Nos. 3090, 3091, 3480 and 3481 transported for disposal or recycling

This packing instruction applies to UN Nos. 3090, 3091, 3480 and 3481 transported for disposal or recycling, either packed together with or packed without non-lithium batteries:

General requirements

1) Part 4, Chapter 1 requirements must be met.

2) Cells and batteries must be packed in accordance with the following:
   a) Packagings must conform to the Packing Group II performance level.
   b) Metal packagings must be fitted with a non-conductive lining material (e.g. plastics) of adequate strength for the intended use.

3) However, lithium ion cells with a Watt-hour rating of not more than 20 Wh, lithium ion batteries with a Watt hour rating of not more than 100 Wh, lithium metal cells with a lithium content of not more than 1 g and lithium metal batteries with an aggregate lithium content of not more than 2 g may be packed in accordance with the following:
   a) In strong outer packaging up to 30 kg gross mass, that conform to Part 4:1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1); and
   b) Metal packagings must be fitted with a non-conductive lining material (e.g. plastics) of adequate strength for the intended use.

4) For cells or batteries contained in equipment, strong outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use, may be used. Packagings need not meet the requirements of Part 6 of these Instructions.

5) In addition, for cells or batteries with a gross mass of 12 kg or more employing a strong, impact resistant outer casing, strong outer packagings constructed of suitable material and of adequate strength and design in relation to the packagings capacity and its intended use, may be used. Packagings need not meet the requirements of Part 6 of these Instructions.

OUTER PACKAGINGS

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium (4B)</td>
<td>aluminium (1B2)</td>
<td>Aluminium (3B2)</td>
</tr>
<tr>
<td>Fibreboard (4G)</td>
<td>Fibre (1G)</td>
<td>Plastics (3H2)</td>
</tr>
<tr>
<td>Natural wood (4C1, 4C2)</td>
<td>Other metal (1N2)</td>
<td>Steel (3A2)</td>
</tr>
<tr>
<td>Other metal (4N)</td>
<td>Plastics (1H2)</td>
<td></td>
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<tr>
<td>Plastics (4H2)</td>
<td>Plywood (1D)</td>
<td>Steel (1A2)</td>
</tr>
<tr>
<td>Plywood (4D)</td>
<td></td>
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<tr>
<td>Reconstituted wood (4F)</td>
<td></td>
<td></td>
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<tr>
<td>Steel (4A)</td>
<td></td>
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</tbody>
</table>
**ADDITIONAL PACKING REQUIREMENTS**

1) Cells and batteries must be designed or packed to prevent short circuits and the dangerous evolution of heat.

2) Protection against short circuits and the dangerous evolution of heat includes, but is not limited to:
   - individual protection of the battery terminals,
   - inner packaging to prevent contact between cells and batteries,
   - batteries with recessed terminals designed to protect against short circuits, or
   - the use of a non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.

3) Cells and batteries must be secured within the outer packaging to prevent excessive movement during transport (e.g., by using a non-combustible and non-conductive cushioning material or through the use of a tightly closed plastic bag).

--- END ---
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

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

UPDATE TO PROCEDURES FOR CABIN CREW TO ADDRESS CABIN INCIDENTS INVOLVING LITHIUM BATTERIES

(Presented by D. Brennan)

SUMMARY

This working paper proposes the adoption of some recommendations for cabin crew on the actions to be taken during and following an incident involving lithium batteries in the passenger cabin.

Action by the DGP: The DGP is invited to consider the proposed amendment to the cabin crew provisions in the Emergency Response Guidance (Doc 9481) as shown in the appendix to this working paper.

1. INTRODUCTION

1.1 A paper was presented at the 2013 Meeting of the Dangerous Goods Panel Working Group of the Whole (DGP-WG/13, Montreal, 15 to 19 April 2013) (DGP-WG/13-WP/61) that offered some text developed by the IATA Cabin Safety Task Force (CSTF) to address the post-incident considerations of a lithium battery fire in the aircraft cabin. Although some concerns were expressed on some of the language and text in the CSTF document, there was general support for the concept.

1.2 Based on that discussion paper and the discussions at DGP-WG/13, there has been discussion with a number of interested people and some text has been developed for inclusion into the Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods (Doc 9481) to provide additional guidance to cabin crew on the actions to be taken in the event of an electronic device overheating or catching fire in the cabin.

(10 pages)
DGP.24.WP.038.4.en.docx
1.3 What has been developed for consideration has been to:

a) expand on the current guidance to include a lithium battery overheating or electrical smell emitting from a portable electronic device;

b) expand on the current guidance to include when and how to safely move the device post event involving a fire. Operators have contacted IATA seeking guidance on what to do once the device is extinguished, including when and how to move and store the device until the first point of landing; and

c) include offloading procedures for a device involved in a lithium battery event. These are suggested for the first point of landing of the aircraft. Any incident involving a lithium battery fire should be reported internally to the operator and externally to the appropriate national authority. This is to support the process of a post-incident investigation.

1.4 IATA is suggesting for the appropriate national authority to require the operator to retain the device involved in the event on behalf of the authority until the authority is able to retrieve it.

1.5 The retention of the device also prevents the device from inadvertently travelling onward by air. Removing the device from the aircraft at the first point of landing is important as some battery cells that were damaged may still be charged and affected and could potentially go into thermal runaway. The Technical Instructions in Special Provision A154, state, in part: Lithium batteries identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for air transport.
APPENDIX

ROPOSED AMENDMENT TO EMERGENCY RESPONSE GUIDANCE FOR AIRCRAFT INCIDENTS INVOLVING DANGEROUS GOODS

Section 3

EXAMPLES OF DANGEROUS GOODS INCIDENTS CHECKLISTS

3.3 CABIN CREW CHECKLIST FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT

<table>
<thead>
<tr>
<th>INITIAL ACTION / IMMEDIATE ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Notify pilot-in-command</td>
</tr>
<tr>
<td>• Identify the item</td>
</tr>
</tbody>
</table>

**In case of fire:**
- Use [Apply] standard fire fighting procedure / check use of water

**EVENTS INVOLVING LITHIUM BATTERIES**

**In case of overheat involving portable electronic device or an emitting electrical smell:**
- [Apply] standard fire fighting procedure / check use of water
- Instruct passenger and/or crew member to turn off their device immediately
- If possible, disconnect power supply
- If applicable, turn off in-seat power
- Device must remain off for the duration of the flight
- Keep device visible and monitor closely; unstable batteries may ignite even after device is turned off

**In case of fire involving a portable electronic device:**
- Use standard procedure / obtain and use fire extinguisher
- Remove external electrical power from device (if applicable)
- Move passengers away from the area
- Douse device with water (or other non-flammable liquid) to cool cells and prevent ignition of adjacent cells (thermal runaway)
- Do not touch or move device. (Note: the liquid turns to steam when applied to the hot battery)
Repeat the above steps as required and monitor for any re-ignition. If smoke re-appears, continue using water (or other non-flammable liquid).

- Remove power to remaining electrical outlets until the aircraft’s system can be determined to be free of faults, if the device was previously plugged in

**Warning:**
- Do NOT attempt to remove battery from device
- Do not touch, pick up or attempt to move a burning device that is emitting smoke or a burning electrical smell. Batteries may explode or burst into flames without warning
- Do not insulate the device as it could cause a thermal runaway: Do NOT cover the device and do NOT use ice or dry ice to cool the device

**FOLLOW-UP ACTIONS**

If device is still hot or smoking:
- Do not move the device; repeat procedures above
- If device has cooled:
  - Move the device, using available Personal Protective Equipment only if there is no evidence of smoke or heat, and after a 15 minute monitoring period
  - Completely immerse the device in water
  - Secure selected container to prevent spillage
  - Monitor the device and the surrounding area at 15 minute intervals
  - Complete required documentation

**First Aid:**
- In case of a fire involving a portable electronic device in which a passenger or crew member sustains a burn should be treated as a chemical burn

In case of spillage or leakage:
- Collect emergency response kit or other useful items
- Don rubber gloves and smoke hood or smoke mask — portable oxygen
- Move passengers away from area and distribute wet towels or cloths
- Place dangerous goods item in polyethylene bags
- Stow polyethylene bags
- Treat affected seat cushions / covers in the same manner as dangerous goods item
- Cover spillage on carpet / floor
- Regularly inspect items stowed away / contaminated furnishings

**AFTER LANDING – POST INCIDENT OFFLOADING PROCEDURES**
- Identify to ground personnel dangerous goods item and where stowed. Deliver any portable electronic device involved in a fire or smoke event to ground personnel as per operator procedures
- Make appropriate entry in maintenance log
3.4 AMPLIFIED CABIN CREW CHECKLIST FOR DANGEROUS GOODS INCIDENTS IN THE PASSENGER CABIN DURING FLIGHT

INITIAL ACTION

NOTIFY PILOT-IN-COMMAND

Any incident concerning dangerous goods should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and of their effect. It is essential that the cabin crew and the flight crew coordinate their actions and that each be kept fully informed of the other’s actions and intentions.

Important:
Minimizing the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft, therefore it is important to keep the flight deck door closed at all times. Crew communication and coordination is of utmost importance. The use of the interphone for communication with the flight deck is strongly recommended.

IDENTIFY THE ITEM

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 for the appropriate emergency response drill.

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.

IN CASE OF FIRE

USE APPLY STANDARD FIRE FIGHTING PROCEDURE / CHECK USE OF WATER

Standard emergency procedures must be used to deal with any fire. In general, 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.

EVENTS INVOLVING LITHIUM BATTERIES
IN CASE OF OVERHEAT INVOLVING PORTABLE ELECTRONIC DEVICE OR AN EMITTING ELECTRICAL SMELL
Standard emergency procedures must be used to deal with any fire. Although Halon has been shown to not be effective against lithium metal fires, Halon will be effective in fighting the subsequent fire of surrounding materials, or in fighting a lithium ion battery fire.

Instruct passenger and/or crew member to turn off their device immediately and remove external electrical power from device (if applicable).

It is important to instruct the passenger or crew member to turn off their device immediately and if possible to disconnect the power supply. A battery has a higher likelihood of catching fire through thermal runaway during or immediately following a charging cycle, although the effects of thermal runaway may be delayed for some period of time. By removing external power from the device, it will be assured that additional energy is not being fed to the battery to promote a fire.

Device must remain off for the duration of the flight. Monitor device.

It is important to not remove battery from device and ensure that the device must remain powered off for the duration of the flight and that the device remains visible (not stowed such as in a bag or seat pocket or on a person (pocket)) and to monitor it closely. Unstable batteries may ignite even after device is turned off. Ensure device is stowed for take-off and landing.

In case of fire involving a portable electronic device

Use apply standard fire fighting procedure / obtain and use fire extinguisher.

Standard emergency procedures must be used to deal with any fire. Although Halon has been shown to not be effective against lithium metal fires, Halon will be effective in fighting the subsequent fire of surrounding materials, or in fighting a lithium ion battery fire.

Remove external electrical power from device (if applicable).

A battery has a higher likelihood of catching fire through thermal runaway during or immediately following a charging cycle, although the effects of thermal runaway may be delayed for some period of time. By removing external power from the device, it will be assured that additional energy is not being fed to the battery to promote a fire.
Cabin crew should take prompt action if smoke or fumes develop 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.

If available, a water extinguisher should be used to cool the cells in a battery that have ignited, preventing the spread of heat to adjacent cells. If a water extinguisher is not available, any non-flammable liquid may be used to cool the cells and device. (Note: the liquid turns to steam when applied to the hot battery).

A battery pack involved in a fire has been shown to reignite and emit flames multiple times as heat is transferred to other cells in the pack. It is preferable to cool the device using water (or other non-flammable liquid); injuries may occur if the device reignites while it is being moved.

Important:
- Do not attempt to remove the battery from the device;
- Do not handle device; batteries may explode or burst into flames without warning;
- Do not insulate the device as that may aggravate the build-up of heat;
- Do not cover the device;
- Do not use ice or dry ice to cool the device.

WARNING:
- Do not pick up or attempt to move a burning device or a device that is emitting smoke. 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 device.

By removing power to the remaining electrical outlets, it can be assured that a malfunctioning aircraft system does not contribute to additional failures of the passengers’ portable electronic devices.

**FOLLOW-UP ACTIONS**
- If device is still hot or smoking do not move the device; procedures above should be repeated until crew are satisfied that the device is cool.
The device can be moved, with caution once it has cooled, and if there is no evidence of smoke or heat after a 15 minute monitoring period. It is important to wear available personal protective equipment for moving any portable electronic device involved in a fire event.

**COMPLETELY IMMERSE THE DEVICE IN WATER**

Consider submerging the electronic device in the most appropriate container such as pot, jug, galley unit or container. Then select the most appropriate container and fill with enough water or non-flammable liquid so that it would completely immerse the device. Once it is immersed it is deemed safe.

**SECURE SELECTED CONTAINER TO PREVENT SPILLAGE**

Any receptacle used to contain an affected device must be secured to prevent spillage.

**MONITOR THE DEVICE AND THE SURROUNDING AREA AT 15 MINUTE INTERVALS**

Monitor the device and the surrounding area at 15 minute intervals to ensure that the device remains inert.

**AFTER LANDING**

**IDENTIFY TO GROUND PERSONNEL DANGEROUS GOODS ITEM AND WHERE STOWED**

Upon arrival, take the necessary steps to identify to the ground staff where the item is stowed. Pass on all information about the item. Request that ground staff advise the appropriate national authority of the dangerous good item involved in the event, and any other pertinent information related to the event.

**COMPLETE REQUIRED DOCUMENTATION**

Complete any required document such as company incident report of trip log and ensure device is stowed for landing. If required, make an entry in the aircraft maintenance log so that proper maintenance action is undertaken and that the emergency response kit or any aircraft equipment used is replenished or replaced when appropriate.

**IN CASE OF SPILLAGE OR LEAKAGE**

**COLLECT EMERGENCY RESPONSE KIT OR OTHER USEFUL ITEMS**
Collect emergency response kit, if provided, or collect for use in dealing with the spillage or leakage:

— a supply of paper towels or newspapers or other absorbent paper or absorbent fabric (e.g. seat cushion covers, head rest protectors);

— oven gloves or fire-resistant gloves, if available;

— at least two large polyethylene waste bin bags; and

— at least three smaller polyethylene bags, such as those used for duty-free or bar sales or, if none available, airsickness bags.

**DON RUBBER GLOVES AND SMOKE HOOD OR SMOKE MASK — PORTABLE OXYGEN**

The 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.

Gas-tight breathing equipment should always be worn when attending to an incident involving smoke, fumes or fire.

**MOVE PASSENGERS AWAY FROM AREA**

The use of therapeutic masks with portable 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 necessary, provide wet towels or cloths and give instructions to breathe through them.

**PLACE DANGEROUS GOODS ITEM IN POLYETHYLENE BAGS**

*Note.* In the case of a spill of known or suspected dangerous goods in powder form:

— leave everything undisturbed;

— do not use fire agent or water;

— cover area with polyethylene or other plastic bags and blankets;

— keep area isolated until after landing.

**With emergency response kit**

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. Place the item in a polyethylene bag as follows:

— prepare two bags by rolling up the sides and placing them on the floor;
— place 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;

— take off the rubber gloves while avoiding skin contact with any contamination on them;

— place the rubber gloves in the second bag;

— close the first bag while squeezing out the excess air;

— twist 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;

— place 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.

**With no emergency response kit**

Pick up the item and place it in a polyethylene bag. Ensure the receptacle containing the dangerous goods is kept upright or the area of leakage is at the top. Using paper towels, newspaper, etc., 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. Place the soiled towels, etc., in another polyethylene bag. Place 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, place the towels, gloves, etc., in the same bag as the item. Expel excess air from the bags and close tightly so as to be secure but not so tight that pressure equalization cannot take place.

**STOW POLYETHYLENE BAGS**

If there is a catering or bar box on board, empty any contents and place the box on the floor, with the door upward. Place the bag(s) containing the item and any soiled towels, etc., in the box and close the door. Take 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, consider taking the box or bag(s) there, unless it is close to the flight deck. Use a rear galley or toilet wherever possible, but do 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.

Ensure when moving a box that the opening is kept upward or when moving a bag that either receptacle containing the dangerous goods is kept upright or the area of leakage is kept at the top.

Wherever the box or bag(s) have been located, wedge them firmly in place to prevent them from moving and to keep the item upright. Ensure that the position of the box or bags will not impede disembarkation from the aircraft.

...
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 5.1: Review of provisions for the transport of lithium batteries

VEHICLES VERSUS EQUIPMENT AND THE APPLICATION OF SPECIAL PROVISION A21

(Presented by D. Brennan)

SUMMARY

This working paper proposes a revision to the wording of Special Provision A21 to remove reference to items such as e-bikes and wheelchairs being considered as “vehicles”.

Action by the DGP: The DGP is invited to revise Special Provision A21 as shown in the appendix to this working paper.

1. INTRODUCTION

1.1 Special Provision A21, which applies to UN 3171, Battery-powered equipment and Battery-powered vehicle was revised in the 2013-2014 Edition of the Technical Instructions based on revisions to Special Provision 240 in the UN Model Regulations.

1.2 The basis for the changes to the wording of SP 240 in the UN Model Regulations was to make some differentiation between equipment and vehicles and the assignment to UN 3171 where the equipment is powered by lithium batteries.

1.3 The original proposal to the UN Subcommittee simply proposed to separate vehicles, which would be assigned to UN 3171, even when lithium battery powered and equipment, which when powered by lithium batteries would be assigned to UN 3091 or UN 3481, as applicable.

1.4 Based on an INF paper raising concerns at the proposals in the original paper and the subsequent discussions there was a lunch-time working group that met to develop a compromise position. The end result being the wording in Special Provision A21.
1.5 The issue with the wording in Special Provision A21 is in the examples that are given on what may be considered as a “vehicle” and therefore assigned to UN 3171 and consequently prepared in accordance with Packing Instruction 952; these examples include e-bikes and wheelchairs.

1.6 Based on recent experience and questions being raised by airlines and ground handling agents it is believed that it is inappropriate for such items to be considered as “vehicles” for the purposes of the Technical Instructions.

1.7 While there have been some changes to Packing Instruction 952 to bring in specific reference to Part 2;9.3, Packing Instruction 952 does not contain the net mass limits or the packing requirements that are provided for in Packing Instructions 967 and 970 for lithium batteries contained in equipment. For vehicles such as cars and motor bikes, and if applicable vessels and aircraft, this is probably quite reasonable as there is an expectation that these vehicles, when licenced or approved for use will have undergone some form of crash or certification testing and the lithium battery will be afforded a degree of protection by being installed in the vehicle.

1.8 The same, however cannot be said for items such as e-bikes, wheelchairs, battery powered skateboards and surfboards where the degree of protection for the lithium battery may be non-existent, or at best limited and there is no, or minimal regulatory approval process.

1.9 As such it is proposed to amend Special Provision A21 to limit vehicles containing lithium batteries to those that have received regulatory approval from the appropriate national authority for road, waterway/maritime and aviation. It is also proposed to delete reference to battery-assisted bicycles, wheelchairs and lawn tractors as examples of vehicles and to move them to being examples of equipment.

1.10 The proposal in this paper has also been submitted to the 44th meeting of the UN Subcommittee that meets in late November of this year proposing an equivalent change to Special Provision 240 in the 18th revised edition of the UN Model Regulations. However, as any change for the 19th revised edition UN Model Regulations won’t become effective until 1 January 2017, the panel is requested to consider this proposal for implementation in advance of the UN.

2. ACTION BY THE DGP

2.1 The DGP is invited to revise Special Provision A21 as shown in the appendix to this working paper.
APPENDIX

PROPOSED AMENDMENT TO PART 3 OF THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND
LIMITED AND EXCEPTED QUANTITIES

Chapter 3

SPECIAL PROVISIONS

Table 3-2. Special provisions

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<tr>
<th>TI</th>
<th>UN</th>
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<tr>
<td>A21</td>
<td>This entry only applies to vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries and equipment powered by wet batteries or sodium batteries which are transported with these batteries installed. For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods that have received approval from the appropriate national authority for road, waterway/maritime or aviation. Examples of such vehicles are electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, battery-assisted bicycles, wheelchairs, lawn tractors, boats and aircraft. Examples of equipment are lawnmowers, cleaning machines, e-bikes, battery-powered mobility aids or model boats and model aircraft. Equipment powered by lithium metal batteries or lithium ion batteries must be consigned under the entries UN 3091 Lithium metal batteries contained in equipment or UN 3091 Lithium metal batteries packed with equipment or UN 3481 Lithium ion batteries contained in equipment or UN 3481 Lithium ion batteries packed with equipment, as appropriate. Vehicles or equipment that also contain an internal combustion engine must be consigned under the entries UN 3166 Engine, internal combustion, flammable gas powered or UN 3166 Engine, internal combustion, flammable liquid powered or UN 3166 Vehicle, flammable gas powered or UN 3166 Vehicle, flammable liquid powered, as appropriate. Hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the battery(ies) installed, must be consigned under the entries UN 3166 Vehicle, flammable gas powered or UN 3166 Vehicle, flammable liquid powered, as appropriate. Vehicles or equipment powered by a fuel cell engine must be consigned under the entries UN 3166 Vehicle, fuel cell, flammable gas powered or UN 3166 Vehicle, fuel cell, flammable liquid powered, or UN 3166 Engine, fuel cell, flammable gas powered or UN 3166 Engine, fuel cell, flammable liquid powered, as appropriate.</td>
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DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:
5.1: Review of provisions for the transport of lithium batteries

CLASS 9 – HAZARD COMMUNICATION

(Presented by the Secretary)

SUMMARY

Action by the DGP: Panel members are invited to consider the issue of hazard communication for Class 9 substances and articles, taking into account the following:
— Is classification of some articles to Class 9 appropriate?
— If Class 9 is not the most appropriate classification, should consideration be given to new divisions in that class or a new class?
— Is better hazard communication an issue, given that there is no appropriate class/division available to reflect the intrinsically hazardous properties e.g. potential thermal runaway, short circuit, state of charge, electrical properties, dual electrical and chemical properties?
— Do the current labelling/markings requirements need improvement in order to ensure effective and appropriate hazard communication is given to emergency responders and personnel/organizations involved in the transport/handling of dangerous goods?
— Should the risks take into account the size, quantities and, where appropriate, the energy densities of the particular articles being moved in transport?

1. INTRODUCTION

1.1 At the last UN SCETDG meeting (24 to 28 June 2013), ICAO presented a paper on the need for appropriate hazard communication for electric storage systems (see Appendix A). Although the original intent was to focus on lithium batteries only, it became evident a wider discussion on Class 9 substances and articles was desirable.
1.2 It was noted that within the UN Model Regulations, 59 substances and articles of Class 9 are subdivided into 10 groupings as follows:

a) Substances which, on inhalation as fine dust, may endanger health (2 entries);

b) Substances evolving flammable vapour (2 entries);

c) Lithium batteries (6 entries);

d) Capacitors (2 entries);

e) Live-saving appliances (3 entries);

f) Substances and articles which, in the event of fire, may form dioxins (6 entries);

g) Substances transported or offered for transport at elevated temperatures (2 entries);

h) Environmentally hazardous substances (2 entries);

i) Genetically modified micro-organisms (GMMOs) and genetically modified organisms (GMOs) (2 entries); and

j) Other substances or articles presenting a danger during transport, but not meeting the definitions of another class (32 entries).

1.3 It was suggested some consideration could be given to gathering together some of these groupings to form divisions of class 9 e.g. groupings 1, 6, 8 and 9 (plus some entries from 10 e.g. Dry ice, Benzaldehyde) might represent those harmful to health or the environment. Such groupings could then be used for the creation of divisions within class 9. Alternatively, consideration could be given to the allocation of energy storage devices only to a new class 10. Such energy storage devices could include vehicles and dangerous goods in machinery in addition to lithium batteries and capacitors i.e. the storage of energy, regardless of the form, is the potential hazard in transport.

1.4 An extract from the report of the meeting is presented below.

E. Miscellaneous

4. Appropriate hazard communication for Class 9

Informal document: INF.55 (ICAO)

53. Most delegations recognized that the Class 9 label alone did not make it possible to adequately communicate the hazard or hazards posed by the many different groupings of substances and articles of Class 9, in particular when such articles contained dangerous goods of other classes or posed specific hazards such as electrical shocks or short circuits, as was the case for electric storage systems. However, there was no consensus, and no final conclusion could be drawn on how to improve the hazard communication for Class 9.
54. The communication of hazards was of interest not only to transport workers who handled the packages, but also to emergency responders. It would thus be advisable to determine for each mode of transport which additional hazard communication elements would genuinely be required, bearing in mind the basic principles set out in paragraphs 12, 13 and 15 of the Recommendations.

55. Because of the variety of the hazards posed by the various electric storage systems, it had so far been impossible to foresee uniform treatment of all such systems.

56. All the experts and organizations concerned were asked to give consideration to the issues raised by ICAO so as to find a solution that would avoid having separate approaches for each mode of transport.

*Secretariat note* – The basic principles of the Recommendations referred to in paragraph 54 are reproduced in Appendix B to this working paper.

2. Panel members are invited to consider the issues raised in Appendix A to this working paper and to note the request by the Sub-Committee to give consideration to hazard communication elements which would genuinely be required, especially by emergency responders.
APPENDIX A

PAPER PRESENTED BY ICAO AT THE UN SCETDG MEETING
(24 to 28 June 2013)
Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

Sub-Committee of Experts on the Transport of Dangerous Goods

Forty-third session
Geneva, 24–28 June 2013
Item 4 (e) of the provisional agenda
Electric storage systems: miscellaneous

Electric storage systems – appropriate hazard communication

Transmitted by the International Civil Aviation Organization (ICAO)\(^1\)

Introduction

1. At its forty-first session, the Sub-Committee noted the proposal by ICAO (informal document INF.50) that energy storage devices should constitute a specific group of dangerous goods with specific provisions and agreed that this issue should be considered in the next biennium (ST/SG/AC.10/C.3/82, paragraph 107 refers). It had been noted by ICAO that whilst class 9 includes miscellaneous dangerous substances and articles, only one danger label is assigned to this class and had queried whether this was sufficient to communicate correctly the potential risks posed by these articles e.g. lithium batteries present both electrical and chemical (flammable electrolyte) hazards which are rather different to those posed by substances as diverse as dry ice or environmentally hazardous substances. In addition, it was suggested that, with constantly developing new technology, new articles will be brought to the Sub-Committee, some of which may well be classified as class 9.

2. With regard specifically to lithium batteries in air transport, this has been the subject of extensive discussion by the ICAO Dangerous Goods Panel (DGP).

\(^1\) In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).
Informal document INF.51 at the 41st session contained the report of a special meeting devoted to this subject, in particular for those batteries excepted under special provision 188. Resulting amendments to the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air included requirements for training, documentation, operator acceptance checks and provision of information to the pilot-in-command.

It is obvious that fire on board an aircraft poses one of the most significant threats to safety during flight. Although lithium batteries are allowed as cargo on both passenger and cargo aircraft, it must be noted that aircraft fire suppression systems (Halon 1301) are unable to extinguish lithium metal battery fires. For lithium ion batteries, although Halon 1301 is effective in controlling an open flame and the spread of the fire to adjacent materials, it is not effective in stopping the propagation of thermal runaway within the shipment. Previous decisions by the DGP resulted in the development of a handling label for these excepted batteries in order to convey information to personnel handling them of the risk of fire and that care must be taken to prevent damage to them.

3. In previous biennia, the issue of energy storage systems has been raised (ST/SG/AC.10/C.3/2009/26, informal documents INF.37 and INF.62 at the 35th session) in which discussions focused on the risks posed in transport and how the regulatory requirements addressed the risks. Three categories of hazard posed by electric storage devices were identified:

   (a) Chemical hazard based on the electrolyte or material contained within the article

   (b) Electrical hazard based on electric storage – dependent on the state of charge and

   (c) Both chemical and electrical hazards.

4. Further discussion of the dual chemical and electrical properties of different articles (informal document INF.37, 35th session) led to the Sub-Committee noting “the opinion according to which it was not necessary to deal with electricity storage systems in a special section of the Model Regulations, and also the recommendation that the regulatory scheme currently applicable to them should not be modified.” (ST/SG/AC.10/C.3/72, paragraph 52). However, this did not take into account the conclusion contained in the analysis in which it was stated “Batteries transported in a charge state may present such dual properties when they are subject to short-circuit during transportation.” Nor did it include any discussion on the possibility of defining an order of precedence i.e. the cases in which the electrical hazard take precedence over the chemical hazard, as suggested in informal document INF.62 (35th session), and the possible need for communication of the electrical hazard.

5. The Sub-Committee is reminded that Part 2 of the Guiding Principles for the Development of the United Nations Model Regulations contains explanatory material outlining the rationale behind the development of the nine classes of dangerous goods:

   To accommodate the large number of dangerous goods and the consistent, rapid development of new substances, the unusual chemical names used to describe them and the different emergency response for them, the Sub-Committee devised tests and criteria to be used to determine which substances could be identified as dangerous goods in transport. The Sub-Committee then devised a system of nine classes for substances with the objective of dividing all current and future dangerous goods into these classes. The system of classes was established keeping in mind the type of containment to be used, the chemical and physical characteristics of the substances
and response procedures that would be most appropriate in the event of an accidental release.

Prior to 1989, classification of lithium batteries would have been based on the chemical lithium, resulting in assignment to Division 4.3 “Substances which, in contact with water, emit flammable gases”, packing group I. They were classified as articles in Class 9 in the sixth edition of the United Nations Recommendations on the Transport of Dangerous Goods (1989).

6. Based on the foregoing, it is suggested that the following should be considered:

- Is classification of some articles to Class 9 appropriate? If yes, what is the rationale behind this assignment, keeping in mind the explanatory material in the Guiding Principles given above?
- If Class 9 is not the most appropriate classification, should consideration be given to new divisions in that class or a new class?
- Is better hazard communication an issue, given that there is no appropriate class/division available to reflect the intrinsically hazardous properties e.g. potential thermal runaway, short circuit, state of charge, electrical properties, dual electrical and chemical properties? If yes, what pictograms/colours would be appropriate to communicate the “different” hazard – the standard “electric shock risk” symbol? Could the “electric shock risk” symbol be incorporated into a new hazard label for those articles identified as possessing the hazard? (either for a new class or division or for those entries identified by UN number)
- Do the current labelling/marking requirements need improvement in order to ensure effective and appropriate hazard communication is given to emergency responders and personnel/organizations involved in the transport/handling of dangerous goods?
- Should the risks take into account the size, quantities and, where appropriate, the energy densities of the particular articles being moved in transport?

Proposal

7. The Sub-Committee is invited to consider whether assignment to class 9 with the consequential danger label (No. 9) is sufficient to convey the specific dangers posed by electric storage devices such as lithium batteries. Depending upon the outcome of the discussion, a paper will be submitted to the Sub-Committee of Experts on the Transport of Dangerous Goods or the Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals, if appropriate.
APPENDIX B

RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS
MODEL REGULATIONS
VOLUME I

RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS
NATURE, PURPOSE AND SIGNIFICANCE OF THE RECOMMENDATIONS

1. These Recommendations have been developed by the United Nations Economic and Social Council’s Committee of Experts on the Transport of Dangerous Goods¹ in the light of technical progress, the advent of new substances and materials, the exigencies of modern transport systems and, above all, the requirement to ensure the safety of people, property and the environment. They are addressed to governments and international organizations concerned with the regulation of the transport of dangerous goods. They do not apply to the bulk transport of dangerous goods in sea-going or inland navigation bulk carriers or tank vessels, which is subject to special international or national regulations.

2. The recommendations concerning the transport of dangerous goods are presented in the form of “Model Regulations on the Transport of Dangerous Goods”, which are presented as an annex to this document. The Model Regulations aim at presenting a basic scheme of provisions that will allow uniform development of national and international regulations governing the various modes of transport; yet they remain flexible enough to accommodate any special requirements that might have to be met. It is expected that governments, intergovernmental organizations and other international organizations, when revising or developing regulations for which they are responsible, will conform to the principles laid down in these Model Regulations, thus contributing to worldwide harmonization in this field. Furthermore, the new structure, format and content should be followed to the greatest extent possible in order to create a more user-friendly approach, to facilitate the work of enforcement bodies and to reduce the administrative burden. Although only a recommendation, the Model Regulations have been drafted in the mandatory sense (i.e., the word “shall” is employed throughout the text rather than “should”) in order to facilitate direct use of the Model Regulations as a basis for national and international transport regulations.

3. The scope of the Model Regulations should ensure their value for all who are directly or indirectly concerned with the transport of dangerous goods. Amongst other aspects, the Model Regulations cover principles of classification and definition of classes, listing of the principal dangerous goods, general packing requirements, testing procedures, marking, labelling or placarding, and transport documents. There are, in addition, special requirements related to particular classes of goods. With this system of classification, listing, packing, marking, labelling, placarding and documentation in general use, carriers, consignors and inspecting authorities will benefit from simplified transport, handling and control and from a reduction in time-consuming formalities. In general, their task will be facilitated and obstacles to the international transport of such goods reduced accordingly. At the same time, the advantages will become increasingly evident as trade in goods categorized as “dangerous” steadily grows.

PRINCIPLES UNDERLYING THE REGULATION OF THE TRANSPORT OF DANGEROUS GOODS

4. Transport of dangerous goods is regulated in order to prevent, as far as possible, accidents to persons or property and damage to the environment, the means of transport employed or to other goods. At the same time, regulations should be framed so as not to impede the movement of such goods, other than those too dangerous to be accepted for transport. With this exception, the aim of regulations is to make transport feasible by eliminating risks or reducing them to a minimum. It is a matter therefore of safety no less than one of facilitating transport.

5. The Model Regulations annexed to this document are addressed to all modes of transport. Modal transport regulations may occasionally apply other requirements for operational reasons.

¹ In 2001, the Committee was reconfigured and renamed “Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals” (see resolution 1999/65 of 26 October 1999 of the Economic and Social Council).
CLASSIFICATION AND DEFINITIONS OF
CLASSES OF DANGEROUS GOODS

6. The classification of goods by type of risk involved has been drawn up to meet technical conditions while at the same time minimizing interference with existing regulations. It should be noted that the numerical order of the classes is not that of the degree of danger.

7. The objective of the recommended definitions is to indicate which goods are dangerous and in which class, according to their specific characteristics, they should be included. These definitions have been devised so as to provide a common pattern which it should prove possible to follow in the various national and international regulations. Used with the list of dangerous goods, the definitions should provide guidance to those who have to use such regulations, and they present a notable degree of standardization while retaining flexibility that allows diverse situations to be taken into account. Classifications for substances in the Model Regulations are made on the basis of consideration of data submitted to the Committee by governments, intergovernmental organizations and other international organizations in the form recommended in Figure 1. However the actual data submitted are not formally endorsed by the Committee.

8. The Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.5, Amend.1 and Amend.2) present the United Nations schemes for the classification of certain types of dangerous goods and gives descriptions of the test methods and procedures, considered to be the most useful, for providing competent authorities with the necessary information to arrive at a proper classification of substances and articles for transport. It should be noted that the Manual is not a concise formulation of testing procedures that will unerringly lead to a proper classification of products and it assumes, therefore, competence on the part of the testing authority and leaves responsibility for classification with them. The competent authority has discretion to dispense with certain tests, to vary the details of tests and to require additional tests, when this is justified, to obtain a reliable and realistic assessment of the hazard of a product.

9. Wastes should be transported under the requirements of the appropriate class considering their hazards and the criteria presented in the Model Regulations. Wastes not otherwise subject to these Regulations but covered under the Basel Convention* may be transported under Class 9.

10. Many of the substances listed in Classes 1 to 9 are deemed as being dangerous to the environment. Additional labelling is not always specified except for transport by sea. Criteria for substances and mixtures dangerous to the aquatic environment are given in Chapter 2.9 of the Model Regulations.

11. Many consignments of goods are treated with fumigants that pose a risk during transport, in particular to workers who may be exposed unknowingly when they open cargo transport units. The Model Regulations address fumigated cargo transport units as consignments that are subject to special documentation and warning sign requirements in the consignment procedures of Part 5.

CONSIGNMENT PROCEDURES

12. Whenever dangerous goods are offered for transport certain measures should be taken to ensure that the potential risks of the dangerous goods offered are adequately communicated to all who may come in contact with the goods in the course of transport. This has traditionally been accomplished through special marking and labelling of packages to indicate the hazards of a consignment and through the inclusion of relevant information in the transport documents and by placarding of cargo transport units. Requirements in this regard are provided in the Model Regulations annexed to this document.

13. The labels recommended in 5.2.2.2 of the Model Regulations should be affixed on goods or packages. The labelling system is based on the classification of dangerous goods and was established with the following aims in mind:

---

(a) To make dangerous goods easily recognizable from a distance by the general appearance (symbol, colour and shape) of the labels they bear;

(b) To provide, by means of colours on the labels, a useful first guide for handling, stowage and segregation.

14. In certain cases, where the danger of an item of dangerous goods is considered low, or the goods are packed in a limited quantity, exemptions from labelling may be provided. In such cases, marking of packages with the class or division and the packing group number may be required.

15. One of the primary requirements of the transport document for dangerous goods is to convey the fundamental information relative to the hazard of the goods being offered for transport. To achieve this end, it is considered necessary to include certain basic information in the transport document for the dangerous goods consignment unless otherwise exempted in the Model Regulations. It is recognized that individual national authorities or international organizations may consider it necessary to require additional information. However, the basic items of information considered necessary for each dangerous substance, material or article offered for transport by any mode are identified in the Model Regulations.

— END —
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:

5.1: Review of provisions for the transport of lithium batteries

TRANSPORT OF LARGE LITHIUM ION BATTERIES OVER 35 KG AND EQUIPMENT CONTAINING THEM

(Presented by PRBA – The Rechargeable Battery Association)

SUMMARY

The paper proposes amendments to Special Provision A99 and a new Packing Instruction to provide for the transport of large lithium ion batteries in excess of 35 kg.

Action by the DGP: The DGP is invited to amend Special Provision A99, Table 3-1 and to add a new packaging instruction in the Technical Instructions as presented in appendix to this working paper.

1. INTRODUCTION

1.1 The Dangerous Goods Panel has considered a number of proposals over the last two and half years regarding the transport of large lithium ion batteries and equipment containing them that exceed the 35 kg cargo aircraft limit. The proposals were intended to provide relief from the approval requirement in Special Provision A99 of the Technical Instructions.

1.2 It is important for panel members to recognize that large lithium ion batteries often consist of components that are not dangerous goods. The chart below (the same chart that was presented to the Working Group of the Whole in Auckland in 2009) is a list shipments of large lithium ion batteries by the Rechargeable Battery Association (PRBA) members. The chart shows the net mass of the lithium ion cells, battery components and packaging materials. Taken together, the packaging and components (non-dangerous goods) can average 60 per cent of the gross mass of the shipment. For example, a large lithium ion battery shipment with a mass of 240 kg should not be construed as 240 kg of lithium ion cells. In fact, in the example below, such a shipment may only contain 130 kg of lithium ion cells.
### LIST OF SHIPMENTS OF LARGE LITHIUM ION BATTERIES BY PRBA MEMBERS

<table>
<thead>
<tr>
<th>Chemistry</th>
<th>Mass of Cells</th>
<th>Mass of Battery Components and Packaging</th>
<th>Total Gross Mass of Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium ion</td>
<td>300 kg</td>
<td>270 kg (47% of total gross mass)</td>
<td>570 kg</td>
</tr>
<tr>
<td>Lithium ion</td>
<td>130 kg</td>
<td>110 kg (45% of total gross mass)</td>
<td>240 kg</td>
</tr>
<tr>
<td>Lithium ion</td>
<td>52 kg</td>
<td>123 kg (70% of total gross mass)</td>
<td>175 kg</td>
</tr>
<tr>
<td>Lithium ion</td>
<td>48 kg</td>
<td>170 kg (78% of total gross mass)</td>
<td>218 kg</td>
</tr>
</tbody>
</table>

1.3 Based on comments that were offered by panel members over the past two and half years and after consulting with battery, automobile and packaging industries, PRBA has developed the proposal contained in the appendix to this working paper that includes amendments to Special Provision A99 and a new Packing Instruction XXX. The proposal provides for the safe transport of large lithium ion batteries up to 400 kg without an approval and a number of redundant safety measures in the new packing instruction. These include:

a) Only one battery or piece of equipment may be contained in any outer packaging.

b) Batteries may not exceed 50% state of charge, unless equipped with a service disconnect. The service disconnect must be removed during transit. For batteries with a non-removable service disconnect, the disconnect must be disengaged and locked to prevent accidental engagement during transit.

c) Batteries may not exceed 400 kg net mass.

d) Batteries must be secured against movement within the outer packaging and protected against short circuits.

e) Equipment must be secured against movement within the outer packaging and equipped with an effective means of preventing accidental activation.

f) Batteries, inner packaging or equipment must be completely surrounded by non-combustible and non-conductive cushioning material to provide thermal insulation during transport.

g) The completed package must meet the Packing Group II performance requirements.

h) Batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries or equipment may also be 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.
APPENDIX

PROPOSED AMENDMENT TO PART 3 OF THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

Chapter 2

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

<table>
<thead>
<tr>
<th>Name</th>
<th>UN No.</th>
<th>Class or division</th>
<th>Subsidiary risk</th>
<th>Labels</th>
<th>State variations</th>
<th>Special provisions</th>
<th>UN packing group</th>
<th>Excepted quantity</th>
<th>Passenger aircraft</th>
<th>Cargo aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium ion batteries (including lithium ion polymer batteries)</td>
<td>3480</td>
<td>9</td>
<td>Miscellaneous</td>
<td>US 3</td>
<td>A51, A88, A99, A154, A164, A183</td>
<td>II</td>
<td>E0</td>
<td>See 965</td>
<td>See 965, XXX</td>
<td></td>
</tr>
<tr>
<td>Lithium ion batteries contained in equipment (including lithium ion polymer batteries)</td>
<td>3481</td>
<td>9</td>
<td>Miscellaneous</td>
<td>US 3</td>
<td>A48, A99, A154, A164, A181, A185</td>
<td>II</td>
<td>E0</td>
<td>967 5 kg</td>
<td>967 35 kg, XXX</td>
<td></td>
</tr>
<tr>
<td>Lithium ion batteries packed with equipment (including lithium ion polymer batteries)</td>
<td>3481</td>
<td>9</td>
<td>Miscellaneous</td>
<td>US 3</td>
<td>A88, A99, A154, A164, A181, A185</td>
<td>II</td>
<td>E0</td>
<td>966 5 kg</td>
<td>966 35 kg, XXX</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 3

SPECIAL PROVISIONS

Table 3-2. Special provisions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| A99 | Irrespective of the quantity limits for cargo aircraft specified in column 13 of Table 3-1, and in Section IA of Packing Instructions 965 or 968, or Section I of Packing Instructions, 966, 967, 968, 969 and 970, as appropriate, a lithium battery or battery assembly (i.e. UN 3090 or UN 3480), including when packed with equipment or contained in equipment (i.e. UN 3091 or UN 3481) that meets the other requirements of Section IA or Section I of the applicable packing instruction, may have a net mass exceeding 35 kg, if:

a) approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment; or

b) In the case of lithium ion batteries, lithium ion batteries contained in equipment, and lithium ion batteries packed with equipment (UN 3480 and UN 3481), the batteries or equipment are packed in accordance with Packing Instruction XXX.

Part 4

PACKING INSTRUCTIONS

<table>
<thead>
<tr>
<th>Packing Instruction XXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger and cargo aircraft for UN 3473 (contained in equipment) only</td>
</tr>
<tr>
<td>Cargo aircraft only for UN3480 and UN3481 in excess of 35 Kg (see Special Provision A99)</td>
</tr>
</tbody>
</table>

General requirements

— Each cell or battery must meet all the provisions of 2.9.3.
— Part 4.1 requirements must be met.

OUTER PACKAGINGS

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium (4B)</td>
<td>Aluminium (1B2)</td>
<td>Aluminium (3B2)</td>
</tr>
<tr>
<td>Natural wood (4C1, 4C2)</td>
<td>Fibre (1G)</td>
<td>Fibre (1A2)</td>
</tr>
<tr>
<td>Other metal (4N)</td>
<td>Other metal (1N1)</td>
<td>Other metal (3A)</td>
</tr>
<tr>
<td>Plastics (4H2)</td>
<td>Plastics (1H2)</td>
<td>Plastics (3H2)</td>
</tr>
<tr>
<td>Plywood (4D)</td>
<td>Plywood (1D)</td>
<td>Steel (3A)</td>
</tr>
<tr>
<td>Reconstituted wood (4F)</td>
<td>Steel (1A2)</td>
<td></td>
</tr>
<tr>
<td>Fibreboard (4G)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel (4A)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ADDITIONAL PACKAGING REQUIREMENTS

— Only one battery or piece of equipment may be contained in any outer packaging.
— Batteries may not exceed 50% state of charge, unless equipped with a service disconnect. The service disconnect must be removed during transit. For batteries with a non-removable service disconnect, the disconnect must be disengaged and locked to prevent accidental engagement during transit.
— Batteries may not exceed 400 kg net mass.
— Batteries must be secured against movement within the outer packaging and protected against short circuits.
— Equipment must be secured against movement within the outer packaging and equipped with an effective means of preventing accidental activation.
Batteries, inner packaging or equipment must be completely surrounded by non-combustible and non-conductive cushioning material to provide thermal insulation during transport.

The completed package must meet the Packing Group II performance requirements.

Batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries or equipment may also be 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.

— END —
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

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

SPECIAL PROVISION A123

(Presented by J. McLaughlin)

SUMMARY

This working paper proposes to require an indication of compliance with Special Provision A123 only for those batteries exceeding 9 Volts.

Action by the DGP: The DGP is invited to revise Special Provision A123 to apply the “not restricted” statement and indication of the special provision number A123 only to batteries exceeding 9 Volts.

1. INTRODUCTION

1.1 Shippers must indicate on the air waybill when a substance or article is exempted from the requirements of the Technical Instructions by the prescribed conditions of a special provision. This requirement is intended to serve as an additional check on the shipper to ensure compliance.

1.2 Special Provision A123 applies to “Batteries, electric storage”. Examples of such batteries are alkali-manganese, zinc-carbon, nickel-metal hydride and nickel-cadmium batteries. These batteries are widely available (AAA, AA, C, D, and 9 volt are most common size batteries) and are used in a variety of consumer devices such as flashlights, toys, games and smoke detectors. Prior to transport, these batteries and devices with installed batteries must be protected from short circuit and unintentional activation. The words not-restricted and the special provision number A123 must be provided on an air waybill when an air waybill is used.
1.3 The requirements of Special Provision A123 apply to all batteries and devices, including those that pose little to no risk in transportation (e.g. 1.5 volt alkaline batteries and devices powered by such batteries). Our experience with dry batteries (up to 9 Volts) indicates that undischarged dry batteries pose a hazard in transportation, but that hazard is negligible and can be minimized through short circuit protection, while spent or used dry cell batteries pose virtually no risk of generating a dangerous amount of heat or short circuits. The U.S. Hazardous Materials Regulations includes the provision of A123 (49 CFR §172.102 Special Provision A130), but applies the “not restricted” documentation requirement only to batteries exceeding 9 volts. The 9 volt threshold was based on test data demonstrating the effects of various types, sizes, and configurations of common consumer dry cell batteries when intentionally short circuited. The data represents the maximum temperature observed when undischarged alkaline and carbon zinc batteries; AA, AAA, D (1.5V) were placed randomly into a container, lantern (6V) battery sizes intentionally short circuited; and 12 D cell batteries connected in series (19.4V) and intentionally short circuited:

<table>
<thead>
<tr>
<th>Battery Type</th>
<th>Maximum Temperature (Celsius)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline AA/AAA</td>
<td>28.5</td>
</tr>
<tr>
<td>Carbon Zinc AA/AAA</td>
<td>26.2</td>
</tr>
<tr>
<td>Alkaline Lantern</td>
<td>151.2</td>
</tr>
<tr>
<td>Carbon Zinc Lantern</td>
<td>137.8</td>
</tr>
<tr>
<td>D Cell connected in series (12 batteries)</td>
<td>109.4</td>
</tr>
</tbody>
</table>

1.4 Taking into account the data does not address all dry cell chemistries, and limited configurations and voltage levels, the U.S. DOT adopted a measured approach by applying the “not restricted” statement only to consignments containing batteries exceeding 9 volts. This addressed the practical challenges for additional documentation requirements on common small consumer batteries while maintaining focus on additional safety measures for larger batteries.

1.5 While it is important to ensure all batteries are protected from short circuits and devices protected from unintentional activation, the additional requirement to indicate compliance with Special Provision A123 appears unnecessarily burdensome in the case of low voltage dry cell batteries.

1.6 For dry batteries greater than 9 volts, a notification on an air waybill or other shipping document is appropriate. This threshold would apply the notification requirements to higher voltage batteries that pose a comparatively greater risk in transport if short circuited but would largely exempt individual consumers from this requirement.
PROPOSED AMENDMENT TO PART 3 OF THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND
LIMITED AND EXCEPTED QUANTITIES

Chapter 3

SPECIAL PROVISIONS

Table 3-2. Special provisions

A123 This entry applies to Batteries, electric storage, not otherwise listed in Table 3-1. Examples of such batteries are: alkali-manganese, zinc-carbon, nickel-metal hydride 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.

For a battery whose voltage exceeds 9 volts, the words “not restricted” and the special provision number A123 must be provided on the air waybill when an air waybill is issued.

— END —
DANGEROUS GOODS PANEL (DGP)
TWENTY-FOURTH MEETING
Montréal, 28 October to 8 November 2013

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:
5.1: Review of provisions for the transport of lithium batteries
5.2: Dangerous goods incident and accident data collection

LITHIUM BATTERIES – SECTION IB DOCUMENTATION REQUIREMENTS
(Presented by D. Brennan)

SUMMARY
This working paper proposes that the allowance for lithium batteries shipped under Section IB of Packing Instruction 965 and Packing Instruction 968 to have the required information provided on an air waybill, or other alternative documentation, be removed and these shipments be required to be described on a dangerous goods transport document.

Action by the DGP: The DGP-WG is invited to revise Packing Instruction 965 and Packing Instruction 968 as shown in the appendix to this working paper. Should this proposal be accepted, a consequential amendment (also shown in the appendix to this working paper) would be required in Part 5.4.1.5.8.1 to make specific reference to the addition of the “IB” on the dangerous goods transport document.

1. INTRODUCTION
1.1 At the DGP Working Group Meeting of the Whole on Lithium Batteries that was held in February 2012, the DGP-WG/LB developed new provisions to address “bulk” shipments of lithium ion and lithium metal batteries that were adopted into the Technical Instructions as Section IB in Packing Instructions 965 and 968.

1.2 The development of these new provisions were seen as a balance between making these lithium batteries fully regulated in Class 9 and the provisions existing at the time which allowed for large
accumulations of Section II lithium batteries without any information being provided to the pilot-in-command that these batteries were in the cargo.

1.3 In striking this balance, the provision for non-UN specification packagings for these shipments was retained, as was the exception from the dangerous goods transport document, although there was an increase in the amount of information that was required to be provided by the shipper to describe the consignment, but this information was permitted on alternative documentation to that provided for in Part 5;4, such an air waybill.

1.4 In addition to requiring additional information on the document so that the operators could perform an acceptance check and provide information to the pilot-in-command, it was also seen that this information could assist States in being able to inspect shippers of Section IB lithium battery shipments.

1.5 Since the start of this year when the provisions for Section IB in Packing Instructions 965 and 968 became applicable, it has become apparent that the use of “alternative documentation”, typically the air waybill, is both not suitable for the information that is required to be provided by the shipper, and not meeting the objective of being able to be used by States to identify shippers of Section IB lithium battery shipments.

1.6 The issue here is with the design and purpose of the air waybill. The air waybill is the document which evidences the contract between the shipper and operator(s) for carriage of goods over routes of the operator(s). In almost all cases the air waybill is completed by the freight forwarder on behalf of the shipper(s) and the name and address of the shipper and consignee shown on the air waybill will be that of the forwarder at origin and the forwarder at destination. The name and address of the “true” shipper will not be identified on the air waybill; consequently the documentation retained by the operator at origin will be of no value to States looking to inspect shippers.

1.7 As a commercial transport document, the format of the air waybill is designed to capture information relevant to the customs authorities and rates and charges applicable to the consignment. As such, the air waybill also has limited “real estate” on which to describe the dangerous goods information required by Section IB of Packing Instructions 965 and 968. This is particularly the case with large shipments that may include multiple overpacks.

1.8 For these reasons it is proposed to revise Section IB in Packing Instruction 965 and Packing Instruction 968 to remove reference to the use of alternative documentation and instead to simply require that the applicable provisions of Part 5;4 apply, with the addition of “IB” following the packing instruction number on the dangerous goods transport document. Associated with the changes proposed to the packing instructions, a consequential amendment would be required in Part 5;4.1.5.8.1 to make specific reference to the addition of the “IB” on the dangerous goods transport document.
APPENDIX

PROPOSED AMENDMENT TO PART 4 OF THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS

... Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

...

Packing Instruction 965
Passenger and cargo aircraft for UN 3480

1. Introduction

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

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

2. Lithium batteries forbidden from transport

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

IA. SECTION IA

Section IA requirements apply to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh that have been determined to meet the criteria for assignment to Class 9.

Each cell or battery must:

1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.
DGP/24-WP/55
Appendix A-2

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

2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

3) be manufactured under a quality management programme as described in 2.9.3.1 e).

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

IA.1 General requirements

Part 4.1 requirements must be met.

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Net quantity per package</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
</tr>
<tr>
<td>UN 3480 Lithium ion batteries</td>
<td>5 kg</td>
</tr>
</tbody>
</table>

IA.2 Additional requirements

— Lithium ion cells and batteries must be protected against short circuits.
— Lithium ion cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
— Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
— Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

IA.3 Outer packagings

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

IB. SECTION IB

Section IB requirements apply to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II.

Quantities of lithium ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the following: the provisions of Part 6.

Lithium ion cells or batteries shipped in accordance with the provisions of Section IB must be described on a dangerous goods transport document as set in Part 5.4. The packing instruction number “965” required by 5.4.1.5.8.1.a) must be supplement with “IB”. All other applicable provisions of Part 5.4 apply.

The provisions of Part 6; and

the dangerous goods transport document requirements of 5.4, provided alternative written documentation is provided by the shipper describing the contents of the consignment. Where an agreement exists with the
operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:

1) the name and address of the shipper and consignee;
2) UN 3480;
3) Lithium ion batteries PI 965 IB;
4) the number of packages and the gross mass of each package.

Lithium ion cells and batteries may be offered for transport if they meet all of the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   — the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

   Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).
### IB.1  General requirements

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

<table>
<thead>
<tr>
<th>Contents</th>
<th>Package quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium ion cells and batteries</td>
<td>10 kg G</td>
</tr>
<tr>
<td></td>
<td>10 kg G</td>
</tr>
</tbody>
</table>

### IB.2  Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31) in addition to the Class 9 hazard label.
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.

### IB.3  Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Strong outer packagings</td>
</tr>
</tbody>
</table>

### II.  SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium ion cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium ion cells and batteries may be offered for transport if they meet all of the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   - the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

   **Note 1.** Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).
II.1 General requirements

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

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

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

II.2 Additional requirements

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31).
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium ion cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.
— The words “lithium ion batteries, in compliance with Section II of PI965” must be placed on the air waybill, when an air waybill is used.
— 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

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strong outer packagings</td>
</tr>
</tbody>
</table>

II.4 Overpacks

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

...
Packing Instruction 968
Passenger and cargo aircraft for UN 3090

1. Introduction

This entry applies to lithium metal or lithium alloy batteries. This packing instruction is structured as follows:

— Section IA applies to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;
— Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and
— Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.

2. Lithium batteries forbidden from transport

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

IA. SECTION IA

Section IA requirements apply to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g that have been determined to meet the criteria for assignment to Class 9.

Each cell or battery must:

1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

   Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

3) be manufactured under a quality management programme as described in 2.9.3.1 e).

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

IA.1 General requirements

Part 4.1 requirements must be met.

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Net quantity per package</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
</tr>
<tr>
<td>UN 3090 Lithium metal batteries</td>
<td>2.5 kg</td>
</tr>
</tbody>
</table>
IA.2 Additional requirements

— Lithium metal cells and batteries must be protected against short circuits.
— Lithium metal cells and batteries must be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
— Lithium metal batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
— For lithium metal cells and batteries prepared for transport on passenger aircraft as Class 9:
    — cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging; and
    — cells and batteries must be surrounded by cushioning material that is non-combustible and non-conductive, and placed inside an outer packaging.

IA.3 Outer packagings

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

IB. SECTION IB

Section IB requirements apply to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II.

Quantities of lithium metal cells or batteries that exceed the allowance permitted in Section II, Table 968-II, must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the following:

— the provisions of Part 6; and
— the dangerous goods transport document requirements of 5.4, provided alternative written documentation is provided by the shipper describing the contents of the consignment. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:

1) the name and address of the shipper and consignee;
2) UN 3090;
3) Lithium metal batteries PI 968 IB;
4) the number of packages and the gross mass of each package.

Lithium metal or lithium alloy cells and batteries may be offered for transport if they meet all of the following:

1) for lithium metal cells, the lithium content is not more than 1 g;
2) for lithium metal or lithium alloy batteries, the aggregate lithium content is not more than 2 g;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3:
   
   Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).
IB.1 General requirements

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

<p>| Table 968-IB |</p>
<table>
<thead>
<tr>
<th>Contents</th>
<th>Package quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium metal cells and batteries</td>
<td>2.5 kg G</td>
</tr>
</tbody>
</table>

IB.2 Additional requirements

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31) in addition to the Class 9 hazard label.
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium metal cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.

IB.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal or lithium alloy cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium metal or lithium alloy cells and batteries may be offered for transport if they meet all of the following:

1) for a lithium metal cell, the lithium content is not more than 1 g;
2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

**Note 1.**— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).

II.1 General requirements

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).
### Packing Instruction 968

#### Table 968-II

<table>
<thead>
<tr>
<th>Contents</th>
<th>Lithium metal cells and/or batteries with a lithium content not more than 0.3 g</th>
<th>Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g</th>
<th>Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No limit</td>
<td>8 cells</td>
<td>2 batteries</td>
</tr>
<tr>
<td>2</td>
<td>2.5 kg</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

The limits specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

#### II.2 Additional requirements

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words “lithium metal batteries, in compliance with Section II of PI968” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

#### II.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### II.4 Overpacks

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

...
Part 5

SHIPPER’S RESPONSIBILITIES

... 4.1.5.8  Additional requirements

4.1.5.8.1  The dangerous goods transport document must also contain:

a) except for radioactive material, the packing instruction applied and, for shipments of lithium batteries prepared in accordance with Section IB of Packing Instruction 965 or Packing Instruction 968, the letters “IB” must be added following the packing instruction number;

b) when applicable, reference to Special Provision A1 or A2, except for radioactive material;

c) a statement indicating that the shipment is within the limitations prescribed for either passenger and cargo aircraft or cargo-only aircraft, as appropriate;

Note.— To qualify as acceptable for transport aboard passenger aircraft, passenger aircraft packing instruction number(s) must be used, and the package must not bear the “Cargo aircraft only” label. To qualify as acceptable for transport aboard cargo-only aircraft, cargo aircraft packing instruction number(s) must be used, and the package must bear the “Cargo aircraft only” label; or passenger aircraft instruction number(s) must be shown and no “Cargo aircraft only” label applied. However, where the packing instruction number(s) and the permitted quantity per package are identical for passenger and cargo aircraft, the “Cargo aircraft only” label should not be used.

d) special handling information, when appropriate;

e) an indication that an overpack has been used, when appropriate; and

f) the “Q” value rounded up to the first decimal place, if substances are packed in accordance with 3.4.3.3 or 4.1.1.9 e).

...
DANGEROUS GOODS PANEL (DGP)
TWENTY-FOURTH MEETING
Montréal, 28 October to 8 November 2013

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:
5.1: Review of provisions for the transport of lithium batteries

UN MANUAL OF TEST AND CRITERIA FOR LITHIUM BATTERIES AND CELLS:
CLARIFICATION OF EDITION AND AMENDMENT NUMBER

(Presented by Q. Xu)

SUMMARY
This working paper suggests that the reference to fifth revised edition of the UN Manual of Tests and Criteria in Note 2 of all sections to Packing Instructions 965 to 970 is unclear, and could lead to several different interpretations of which edition/amendment number could be referred to when test. And it seeks to clarify which edition of UN manual of Tests and Criteria could be referred to that lithium batteries or cells manufactured after 1 January 2014 can continue to be transported.

Action by the DGP: The DGP is invited to clarify which edition of the UN Manual of Tests and Criteria is referred to that lithium batteries or cells manufactured after 1 January 2014 can continue to be transported. If the decision is fifth revised edition, Amend. 1 and Amend. 2, the DGP is also invited to consider extending the transition date of 1 January 2014.

1. INTRODUCTION

1.1 The UN Manual of Tests and Criteria has been revised several times. Editions include the third revised edition, fourth revised edition, fifth revised edition, Amend. 1 and Amend. 2. The latest is the fifth revised edition, Amend 1 and Amend. 2.
1.2 The manual is referred to in all sections of Packing Instructions 965 to 970 of the 2013-2014 Edition of the Technical Instructions as follows:

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

1.3 This provision references only the fifth revised edition of the UN Manual of Tests and criteria and does not specifically reference other editions. Consequently, lithium batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of any edition of the UN Manual of Tests and Criteria could, in practice, be offered for transport.

1.4 It is also confused as there is no provision to clarify that according to the requirements of which edition of the UN Manual of Tests and Criteria that lithium batteries or cells manufactured after 1 January 2014 conforming to a design type tested may continue to be transported. So for the lithium batteries and cells manufactured after 1 January 2014, someone think their design types must be tested according to the fifth revised edition Amend. 1 and Amend. 2 before they can be offered for transport, but someone still think their design types tested according to fifth revised edition of the UN manual of Test and Criteria can continue to be transported.

1.5 New design types of lithium batteries and cells have been tested according to Part III, subsection 38.3 of the UN Manual of Tests and Criteria, the fifth revised edition, Amend. 1 and Amend. 2 since it was issued. But compared to all the lithium batteries and cells offered for transport, the number of these newly-designed types is still very small.

1.6 If the DGP confirms that the design type for lithium batteries and cells manufactured after 1 January 2014 must be tested according to the UN Manual of Tests and Criteria, fifth revised edition, Amend. 1 and Amend. 2 before they can be offered for transport, a large number of lithium battery and cell types which were tested according to the previous editions need to be retested. Therefore, a longer transition period should be considered.

1.7 It is suggested that the DGP address the issues raised in this working paper as soon as possible, recognizing that there are only a few months left before 1 January 2014.

— END —
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:

5.1: Review of provisions for the transport of lithium batteries

TRANSPORTING DAMAGED OR DEFECTIVE LITHIUM BATTERIES AND LITHIUM BATTERIES CONTAINED IN EQUIPMENT

(Presented by the PRBA — The Rechargeable Battery Association)

SUMMARY

This working paper contains revisions to Special Provision A154 of the Technical Instructions and a new packing instruction for incorporation into the Supplement to provide for the transport of damaged or defective lithium ion and lithium metal cells and batteries and equipment containing them under approvals issued by the State of Origin. The proposed packing instruction includes a thermal packaging test for lithium batteries.

Action by the DGP: The DGP is invited to amend:

a) amend Special Provision A154 of the Technical Instructions; and

b) add new Packing Instruction XXX to the Supplement to the Technical Instructions that includes the thermal packaging test for lithium batteries

as shown in the appendices to this working paper.

1. INTRODUCTION

1.1 During the 2013 Meeting of the Dangerous Goods Panel Working Group of the Whole (DGP-WG/13, Montreal, 15 to 19 April 2013), the issue of transporting damaged or defective lithium batteries was discussed. It was noted that packing instructions and special provisions were added to the 18th Revised Edition of the Model Regulations for the transport of these batteries.
1.2 Special Provision A154 of the Technical Instructions prohibits the transport of lithium batteries identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit. Currently the transport of damaged or defective lithium batteries can only be carried out under an exemption.

1.3 At DGP-WG/13, DGP members indicated that additional requirements would need to be added to the new packing instructions from the 18th Revised Edition of the Model Regulations in order to transport damaged or defective lithium batteries by air.

1.4 This paper proposes amendments to Special Provision A154 and a new packing instruction for incorporation into the Supplement to the Technical Instructions based on the 18th Revised Edition of the UN Model Regulation which includes a requirement for thermal resistant packaging or overpack and performance criteria and test method for the packaging or overpack that can be used as a basis for the issuance of approvals. The proposed performance criteria and test method — listed in the proposed packing instruction and identified as a thermal packaging test for lithium batteries — will ensure that any packaging used to transport damaged or defective lithium batteries or equipment containing them is capable of containing a potential thermal event.

1.5 The thermal packaging test for lithium batteries would be conducted with the lithium cells, batteries or equipment, or with cells, batteries or equipment that simulate the intended contents to be transported in the packaging or overpack. Cells or batteries would be tested at 100% state of charge. The test requires that no flames or sparks escape from any part of the container throughout the test period although smoke may vent from the container. The container must maintain its integrity until the end of the test. No projectiles may puncture the container and the container must be capable of withstanding a pressure pulse from the thermal event either by being fitted with a venting device or through design of the packaging without loss of integrity or containment functions.
APPENDIX A

PROPOSED AMENDMENT TO PART 3 OF THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND
LIMITED AND EXCEPTED QUANTITIES

Chapter 3

SPECIAL PROVISIONS

<table>
<thead>
<tr>
<th>TI/s</th>
<th>UN</th>
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<tr>
<td>A154</td>
<td>Lithium batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons) unless approved by the State of Origin and transported in packaging that meets the requirements of the thermal packaging test for lithium batteries identified in Packing Instruction 9XX of the Supplement to these Instructions.</td>
</tr>
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— END —
APPENDIX B

PROPOSED AMENDMENT TO PART S-4 OF THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS

Part S-4

PACKING INSTRUCTIONS

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

Packing Instruction 9XX

Cargo aircraft only for UN Nos. 3090, 3091, 3480 and 3481 that are damaged or defective

This packing instruction applies to damaged or defective lithium ion batteries (UN 3480), lithium metal batteries (UN 3090), lithium ion batteries contained in equipment (UN 3481), and lithium metal batteries contained in equipment (UN 3091) (see Special Provision A154 of the Technical Instructions).

1. General requirements

Part 4.1 requirements must be met.

2. Outer Packagings

For cells and batteries and equipment containing cells and batteries:

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
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</thead>
<tbody>
<tr>
<td>Aluminium (4B)</td>
<td>Aluminium (1B2)</td>
<td>Aluminium (3B2)</td>
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<tr>
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<td>Fibre (1G)</td>
<td>Plastics (3H2)</td>
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<td>Other metal (1N2)</td>
<td>Plastics (3A2)</td>
</tr>
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<td>Other metal (4N)</td>
<td>Plastics (1H2)</td>
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<tr>
<td>Plastics (4H1, 4H2)</td>
<td>Plywood (1D)</td>
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<tr>
<td>Plywood (4D)</td>
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<td>Reconstituted wood (4F)</td>
<td>Steel (1A2)</td>
<td></td>
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<tr>
<td>Steel (4A)</td>
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</tbody>
</table>

3. Additional requirements

Packagings must conform to the Packing Group II performance level.

The packaging or overpack, if applicable, must be capable of successfully meeting the thermal packaging test for lithium batteries in Section 4 of this packing instruction.

In addition each cell or battery or equipment containing such cells or batteries:

a) must be individually packed in inner packaging and placed inside of an outer packaging. The inner packaging or outer packaging must be leak-proof to prevent the potential release of electrolyte.

b) each inner packaging must be surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat.
c) sealed packaging must be fitted with a venting device when appropriate.

d) appropriate measures must be taken to minimize the effects of vibrations and shocks, prevent movement of the cells or batteries within the package that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and non-conductive may also be used to meet this requirement.

e) for leaking cells or batteries, sufficient inert absorbent material must be added to the inner or outer packaging to absorb any release of electrolyte.

f) a cell or battery with a net mass of more than 35 kg must be limited to one cell or battery per outer packaging.

4. Thermal packaging test for lithium batteries

a) Scope

This test method evaluates the thermal containment capabilities of a packaging or overpack, if applicable, intended for the transport of damaged or defective lithium cells and batteries and equipment containing them. The test must be conducted with cells, batteries or equipment, or utilize those that simulate the intended contents to be transported in the packaging. A larger number of cells or batteries or cells or batteries contained in equipment with a higher Watt-hour rating may be tested to validate that the packaging or overpack are capable of containing a smaller number of cells or batteries with a lower Watt-hour rating or lithium content, as applicable. Cells and batteries must be tested at 100 per cent state of charge.

b) Apparatus

i) Test Area. The test area must be large enough in size to fully house the testing apparatus and the outer package or overpack with sufficient clearance and provide adequate safety for the test operator(s).

ii) Heating Element(s). Appropriate heater(s) must be used that have the capacity to force cells or batteries into thermal runaway within the outer package or overpack. Various types of heater cartridges or thermal tape may be appropriate for certain applications depending on the lithium chemistries and cell and battery form factors.

iii) Thermal runaway refers to a situation where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result.

iv) Instrumentation (optional). A calibrated recording device or a computerized data acquisition system with an appropriate range may be utilized to measure and record the outputs of the thermocouples. Instrumentation is optional, but can be useful in determining whether the cells have vented or were forced into thermal runaway as well as indicating when it is safe to open the tested outer packaging or overpack.

c) Test specimen

Specimen configuration. Each outer package or overpack material type and design must be tested, including any features such as handles, latches or fastening systems that may compromise the ability of the outer package or overpack to provide thermal protection.

d) Preparation for testing

i) Position the heating element in the package or overpack so that the test cells, batteries or cells or batteries contained in equipment can be positioned directly in contact with or attached to the heating element (e.g. thermal tape).

ii) Insulate the terminals and leads from the heating element from short circuit during the test and configure the leads to exit the package with as little effect on the package closure as possible.

iii) Ensure that the position of loose cells, batteries, or equipment is maintained on or attached to the heating element. This may be accomplished using other packaging, housings, steel banding, etc.

iv) Close the package or overpack per the closure instructions.

v) Position the package or overpack in the test area and connect the heating element leads to a switched power source.

e) Test procedure

i) Prepare data collection equipment (if used) and check for proper reading on thermocouples, as applicable.
ii) Turn on power to heating element(s) and increase temperature until thermal runaway occurs (a forced external short circuit, use of a spark ignitor or similar device may be used to force a thermal runaway event). Thermal runaway can typically be determined by the sounds emitted from the tested package or overpack and by the observation of temperature spikes when thermocouples are used.

iii) Maintain power to the heating element for a minimum of thirty minutes after thermal runaway occurs.

iv) Turn off power to heating element(s).

v) Allow the package or overpack and contents to cool naturally for a minimum of one hour and until a safe inner temperature has been reached before concluding the test.

vi) Once the contents have reached a safe temperature, inspect the outer package or overpack to the requirements listed below.

f) Recordkeeping

i) Record a complete description of the package or overpack and contents being tested.

ii) Record any observations regarding the behaviour of the test specimen during the test, such as smoke production, structural changes, and time of occurrence of each event.

iii) If thermocouples were used, record the temperature and time history. Record the maximum temperatures achieved at all thermocouple locations and the corresponding time.

g) Requirements

No flames or sparks may escape from any part of the outer packaging although smoke may vent from the outer packaging or overpack. The outer packaging or overpack must maintain its integrity until the end of the test. No projectiles may puncture the outer packaging or overpack.
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

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

PACKING INSTRUCTIONS 966 AND 969

(Presented by G A Leach)

### SUMMARY

This working paper proposes an alignment with the UN Model Regulations in respect of lithium batteries which may be packed with equipment.

**Action by the DGP:** The DGP is invited to amend Section II of Packing Instructions 966 and 969 as shown in the appendix of this working paper.

---

## 1. INTRODUCTION

1.1 A question was received in the United Kingdom from a shipper of lithium battery chargers which they wanted to ship with the corresponding lithium batteries. It became apparent that the wording of the applicable packing instruction (Section II, paragraph II.2, fourth bullet of Packing Instructions 966 and 969) is ambiguous in that it suggests only batteries which are to power a piece of equipment are addressed, i.e.:

   "The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares."

There seems no reason why Packing Instruction 966 shouldn’t be the applicable packing instruction, but clearly, batteries do not *power* a charger. However, the same problem does not exist in the Model Regulations where the equivalent text (Packing Instruction 903 (3)) refers to the batteries as being “for its operation”. It is suggested alignment with the Model Regulations would address the issue; this would also require deleting reference to the minimum number of batteries permitted as to retain it would only allow for items such as chargers to have, say, one battery with it when it is capable of charging more.
APPENDIX

PROPOSED AMENDMENT TO PART 4 OF THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

---

### 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 outer packaging; or
  - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- The maximum number of batteries in each package must be the minimum number appropriate for the equipment’s operation required to power the equipment, plus two spares.
- Each package of cells or batteries, or the completed package, must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words “lithium ion batteries, in compliance with Section II of PI966” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

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...
II.2 Additional requirements

- Lithium metal cells or batteries must:
  - be placed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging; or
  - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- The maximum number of batteries in each package must be in the minimum number appropriate for the equipment’s operation required to power the equipment, plus two spares.
- Each package of cells or batteries, or the completed package, must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words “lithium metal batteries, in compliance with Section II of PI969” must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

...
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

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

SECONDARY LITHIUM BATTERIES

(Presented by H. Brockhaus)

SUMMARY
This paper proposes either a new Special Provision Axxx or amendments to Packing Instruction 965 in order to enable the safe transport of lithium batteries larger than 35 kg gross mass. This proposal enhances a previous one made at the 2013 Meeting of the DGP Working Group of the Whole (DGP-WG/13, Montréal, 15 to 19 April 2013 (DGP-WG/13-WP/60). This working paper is presented to provide additional information and an amended proposal in response to the feedback received during and after DG-WG/13 (see paragraph 3.5.1 of the DGP-WG/13 Report (DGP/24-WP/3)).

Action by the DGP: The DGP is invited to consider the implementation of a new Special Provision Axxx as shown in Appendix A to this working paper or to amend Packing Instruction 965 by the addition of a new section IC as shown in Appendix B.

1. INTRODUCTION

1.1 Transport regulations for large lithium ion batteries have been discussed since the last biennium.

1.2 A new special provision to allow for the transport of lithium ion batteries larger than 35 kg on cargo aircraft was proposed at the 2013 Meeting of the DGP Working Group of the Whole (DGP-WG/13, 15 to 19 April 2013) (see paragraph 3.5.1 of the DGP-WG/13 Report (DGP/24-WP/3)). There was general agreement that provisions needed to be developed for these batteries on the basis that they were currently being shipped under approval and there was no guarantee that every approval
provided for sufficient safety features. It was felt, however, that more work was needed before anything could be introduced into the Instructions. The working group felt that:

a) the provisions would be more appropriate in the packing instructions rather than a special provision;

b) the larger the battery, the larger the risk. These risks needed to be mitigated. It was difficult to mitigate the chemical hazard of lithium batteries, but limiting the state of charge could mitigate the energy density risk; and

c) packaging needed to be considered so that if an incident occurred it could be contained. Research was being done in one State on packaging that could withstand pressure build up if the batteries self-ignited, the results of which were encouraging.

1.3 This working paper addresses these issues so as to enable the panel to finally discuss necessary provisions for the transport of single large lithium-ion batteries.

1.4 Based on the discussion at DGP/WG13 and discussions outside that meeting, two alternative proposals are presented in this working paper:

a) a new Special Provision SP Axxx; and

b) enhancements to Packing Instruction 965.

1.5 Terms used in this and previous working papers intended to describe technical parameters of the battery, the packaging or other regulatory details, are already widely used throughout the Technical Instructions and in the lithium battery provisions. These include:

a) **Strong, impact resistant outer casing.** This term is used in Packing Instruction 965 to describe the quality of the battery outer casing when there are provisions for the battery to be shipped in a non-type approved packaging;

b) **Fire and flame resistance.** This term is already widely used to describe packaging material properties in approvals in accordance with Special Provisions A99 and A88. Within these approval documents, no further specification has been added for, e.g. the minimum time material must resist a certain temperature before showing adverse reactions etc. Therefore we feel that there is already a sufficient level of common sense about the meaning;

c) **Non-combustible, non-flammable.** These terms are commonly used within the Technical Instructions and other modal regulations to describe the non-flammable nature of packaging material. Only a few materials used for inner dangerous goods packagings are prone to provide these properties in combination with other features like absorbency for liquids. Flammability is defined in e.g. 2.4.1 of the UN Model Regulations or Part 2;4.2.2.1 of the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) and can serve as classification criteria for non-flammability; and

d) **Non-conductive.** Packaging material must not be electrically conductive and Ohm resistance must be high enough to prevent from currency and voltage. Special Provision A88 already uses that wording.
1.6 Should the panel have persistent objections with the above terms not being precise and clear enough to allow for consistent handling of dangerous goods, it is recommended that appropriate initiatives to define them be taken to the UNECE.

1.7 The guiding principles and requirements of these two proposals are:

a) Packing Group II performance level outer packaging for lithium battery;

b) one single battery per package only;

c) strong outer casing for battery required;

d) inner packaging, leak proof, required; and

e) non-combustible, non-conductive cushioning material.

1.8 Those requirements are usually applied for Special Provision A99 approvals issued by various authorities. Until now no issues, safety concerns or accidents have been reported for consignments in line with Special Provisions A99 or A88 approvals provided. In consequence, it is recommended to accept the special provisions as proposed to be sufficient for lithium ion battery transportation.

1.9 State of Charge (SOC) safety impact during transport of lithium ion batteries and cells is subject to on-going discussions. Types of cells and batteries which were successfully tested according to the UN Manual of Test and Criteria, Part III, subsection 38.3 have shown adequate safety under various transport relevant stress also at 100% SOC (i.e. fully charged). Furthermore, a specific SOC is not generally required when prototype, non-tested batteries are shipped in accordance with Special Provision A88.

1.10 Nevertheless, the last working group of the whole discussions revealed that a state of charge limitation is seen as an appropriate measure to reduce the risk for an adverse reaction of lithium ion batteries as cargo.

1.11 Consequently, a SOC limitation of 60% has been added to the proposals. As this will result in more complex preparation of packagings and, in accordance with opinions given, will establish a higher safety level, other previously-offered safety measures are no longer considered.
APPENDIX A

PROPOSED AMENDMENT TO THE 2015-2016 EDITION OF THE TECHNICAL INSTRUCTIONS

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

Parts of this Chapter are affected by State Variations AU 1, AU 2, CA 7, HR 3, IR 3, JM 1, KP 2, NL 1, US 11, ZA 1; see Table A-1

Table 3-2 lists the special provisions referred to in column 7 of Table 3-1 and the information contained in them is additional to that shown for the relevant entry. Where the wording of the special provision is equivalent to that in the UN Model Regulations, the UN special provision number is shown in parentheses.

<table>
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<th>Ti</th>
<th>UN</th>
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**AXXX**

Irrespective of the quantity limits for cargo aircraft specified in column 13 of Table 3-1 and in Section I of Packing Instruction 965, a lithium ion or lithium polymer battery (UN 3480) with a mass exceeding 35 kg that meets the requirements of this special provision may be offered for transport on cargo aircraft only, if the following requirements are met:

a) Requirements for batteries:

1) Each cell and each battery is of the type proven to meet the requirements of 2.9.3.1 of these Instructions;
2) Each battery must have a strong, impact-resistant outer casing; and
3) Battery state of charge must be not more than 60 per cent.

b) Packing requirements:

1) Lithium ion or lithium polymer batteries must be protected against short circuits;
2) The outer packaging must meet the requirements of Packing Group II;
3) The battery must be individually packed in inner packaging and placed inside an outer packaging. The inner packaging must be leak-proof;
4) The battery must be surrounded by cushioning material that is non-combustible and non-conductive and must be secured to prevent inadvertent movement during transport;
5) In addition to 5.2 of these Instructions, the packaging has to be marked with the words “Single battery per package, transport in accordance with SP Axxx”. Letters and numerals must be at least 12 mm high. This marking must be reproduced on an overpack, if used; and
6) Only one battery per packaging is permitted.
c) Documentation and handling requirements:

The use of SP AXXX must be documented in the shipper's declaration in the field 'Additional Handling Information' with the following sentence: "Single battery per package, transport in accordance with SP Axxx".

All other requirements of these Instructions regarding marking, labelling, documentation and handling must apply.

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

Chapter 2

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

Table 3-1. Dangerous Goods List

<table>
<thead>
<tr>
<th>Name</th>
<th>UN No.</th>
<th>Class or division</th>
<th>Subsidary risk</th>
<th>Labels</th>
<th>State variations</th>
<th>Special provisions</th>
<th>UN packing group</th>
<th>Excepted quantity</th>
<th>Max. net quantity per package</th>
<th>Packing instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium ion batteries</td>
<td>3480</td>
<td>9</td>
<td>Miscellaneous</td>
<td>US 3</td>
<td>A51</td>
<td>A88, A99, A164, A183, AXXX</td>
<td>E0</td>
<td>See</td>
<td>965</td>
<td>See</td>
</tr>
</tbody>
</table>

...
APPENDIX B

PROPOSED AMENDMENT TO THE 2015-2016 EDITION OF
THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS
Packing Instruction 965
Passenger and cargo aircraft for UN 3480

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

— Section IA applies to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;

— Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II; and

— Section IC applies to lithium ion batteries with gross weights not exceeding 400 kg, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions; and

— Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.

2. Lithium batteries forbidden from transport
The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

IA. SECTION IA
Section IA requirements apply to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh that have been determined to meet the criteria for assignment to Class 9.

Each cell or battery must:

1) be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

   Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits; and

3) be manufactured under a quality management programme as described in 2.9.3.1 e).

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

IA.1 General requirements
Part 4.1 requirements must be met.

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Net quantity per package</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 3480 Lithium ion batteries</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>5 kg</td>
</tr>
</tbody>
</table>
Additional requirements

- Lithium ion cells and batteries must be protected against short circuits.
- Lithium ion cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

Outer packagings

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

SECTION IB

Section IB requirements apply to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II.

Quantities of lithium ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the following:

- the provisions of Part 6; and
- the dangerous goods transport document requirements of 5.4, provided alternative written documentation is provided by the shipper describing the contents of the consignment. Where an agreement exists with the operator, the shipper may provide the information by electronic data processing (EDP) or electronic data interchange (EDI) techniques. The information required is as follows and should be shown in the following order:

1) the name and address of the shipper and consignee;
2) UN 3480;
3) Lithium ion batteries PI 965 IB;
4) the number of packages and the gross mass of each package.

Lithium ion cells and batteries may be offered for transport if they meet all of the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   - the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).
Packing Instruction 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).

<table>
<thead>
<tr>
<th>Contents</th>
<th>Package quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger Cargo</td>
</tr>
<tr>
<td>Lithium ion cells and batteries</td>
<td>10 kg G 10 kg G</td>
</tr>
</tbody>
</table>

IB.2 Additional requirements

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31) in addition to the Class 9 hazard label.
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium ion cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.

IB.3 Outer packagings

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IC. SECTION IC

Section IC applies to lithium ion batteries with gross weights not exceeding 400 kg, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions.

Each battery must:
1) Each battery must have a strong, impact-resistant outer casing; and
2) Battery state of charge (SOC) shall be not more than 60%.

IC.1 General requirements

Part 4;1 requirements must be met.

<table>
<thead>
<tr>
<th>UN number and proper shipping name</th>
<th>Net quantity per package</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 3480 Lithium ion batteries</td>
<td>Forbidden 400 kg</td>
</tr>
</tbody>
</table>

IC.2 Additional requirements

- Only one battery per packaging is permitted;
- Lithium ion batteries must be protected against short circuits;
- Lithium ion batteries must be placed in inner packagings that completely enclose the battery then
placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements. The inner packaging shall be leak proof.

- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case;
- The battery must be surrounded by cushioning material that is non-combustible and non-conductive and must be secured to prevent inadvertent movement during transport;
- In addition to 5.2 of these Instructions, the packaging has to be marked with the words “Single battery per package, transport in accordance with PI965 section IC”. Letters and numerals must be at least 12 mm high. This marking must be reproduced on an overpack, if used; and
- The use of PI965, section IC shall be documented in the shipper’s declaration in the field ‘Additional Handling Information’ with the following sentence: “Single battery per package, transport in accordance with PI965, section IC”.

II. SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents), 8;1.1 (Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium ion cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium ion cells and batteries may be offered for transport if they meet all of the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   — the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;

   Note 1.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

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

4) cells and batteries must be manufactured under a quality management programme as described in 2.9.3.1 e).

### Packing Instruction 965

**II.1 General requirements**

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).
Table 965-II

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

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

II.2 Additional requirements

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-31).
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium ion cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.
— The words “lithium ion batteries, in compliance with Section II of PI965” must be placed on the air waybill, when an air waybill is used.
— 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

<table>
<thead>
<tr>
<th>Boxes</th>
<th>Drums</th>
<th>Jerricans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong outer packagings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II.4 Overpacks

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

— END —
DANGEROUS GOODS PANEL (DGP)

TWENTY-FOURTH MEETING

Montréal, 28 October to 8 November 2013

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:

5.1: Review of provisions for the transport of lithium batteries

RESPONSE TO SAFETY RECOMMENDATIONS ARISING FROM AN ACCIDENT INVESTIGATION

(Presented by the Secretary)

SUMMARY

Action by the DGP: A final report by the General Civil Aviation Authority of the United Arab Emirates (GCAA UAE) contains three safety recommendations related to dangerous goods. Noting that the issue of hazard communication of Class 9 articles or substances is the subject of another working paper (DGP/24-WP/41), the panel is invited to consider the recommendations contained in SR 52/2013 and SR 57/2013 and to develop an action plan.

1. INTRODUCTION

1.1 The General Civil Aviation Authority of the United Arab Emirates (GCAA UAE) issued its Final Report following its investigation of an accident involving a Boeing 747-44AF on 3 September 2010 near Dubai, UAE (Final Report is accessible at http://www.gcaa.gov.ae/en/ePublication/admin/iradmin/Lists/Incidents%20Investigation%20Reports/Attachments/40/2010-2010%20-%20Final%20Report%20-%20Boeing%20747-44AF%20-%20N571UP%20-%20Report%20%2013%202010.pdf; an accident synopsis is presented in the appendix to this paper). Of the seven safety recommendations contained in the report, three relate to dangerous goods.

1.2 The GCAA UAE recommends in SR 51/2013 and SR 52/2013, respectively, that ICAO:

a) reviews the hazardous materials classification for Class 9 materials packaging where the reconsideration of lithium batteries and other energy storage devices that are currently classified as a Class 9 hazardous material be subjected to a higher level of
hazardous material classification, as at present time it is not clear that the current Class 9 hazard communication or quantity limits adequately reflect the inherent risks to aviation safety; and

b) develops SARPs for package level protection of batteries being shipped to include protection from thermal degradation and damage to individual cells or cell combinations in thermal runaway, and to retard the propagation of lithium battery initiated fires to other packages in the same cargo stowage location as well as to increase the amount of time it would require for the contents of the package containing lithium batteries to provide an additional source of fuel for on-board fires initiated by other sources.

1.3 Recommendation SR 57/2013 states the following:

a) ICAO Dangerous Goods Panel to amend the ICAO Technical Instructions regarding the safe carriage of lithium batteries;

b) Specifically, the request is to establish a dedicated task force within the DG Panel, including the representation of qualified stakeholders, to study the safe carriage of lithium batteries and other potentially hazardous cargo and develop recommendations to the UN Manual of Tests and Criteria, the Manual of Tests and Criteria Revision 5, Lithium Metal and Lithium Ion Batteries, 38.3.4.3, Test T3-Vibration;

c) Structural-acoustic coupling phenomenon in an aircraft fuselage is a known characteristic. In large Class E cargo compartments, the structural and acoustic modes can be derived for vibration analysis. Structural and acoustic analysis can determine possible occurrence of vibration in the fuselage structure during predetermined phases of flight where the vibro-acoustic signatures can be used to determine the principle sources and transmitting paths of the vibration;

d) Given the active failure modes of lithium batteries, the battery risk factors concerning possible susceptibility to various extraneous forms of mechanical energy, for example vibration, possibly in a harmonic form, could be an initiating action risk; and

  ICAO Dangerous Goods Panel is requested to evaluate data relative to the UN Manual of Tests and Criteria, Lithium Metal and Lithium Ion Batteries, 38.3.4.3, Test T3-Vibration and advise the UNECE Committee of Experts/Working Party on the Transport of Dangerous if additional criteria should be adopted for the carriage of lithium metal and lithium ion batteries by air transport. Refer to SR 4.25.

1.4 An extract from SR 4.25 states:

Currently there is no data for the class E cargo compartments of the B744F. If such data was available through a process of acoustic mapping for structural-acoustic coupling, this data could be used to expand the UN Manual of Tests and Criteria Para. 38.3.4.3 Test T.3: Vibration test and verification data.
2. Noting that the issue of hazard communication of Class 9 articles or substances is the subject of another working paper (DGP/24-WP/41), the panel is invited to consider the recommendations contained in SR 52/2013 and SR 57/2013 and to develop an action plan to respond to the issues raised.
APPENDIX

ACCIDENT SYNOPSIS

On September 3rd 2010, a Boeing 747-44AF departed Dubai International Airport [DXB] on a scheduled international cargo flight [SCAT-IC] to Cologne [CGN], Germany.

Twenty two minutes into the flight, at approximately 32,000 feet, the crew advised Bahrain Area East Air Traffic Control [BAE-C] that there was an indication of an on-board fire on the Forward Main Deck and declared an emergency.

Bahrain Air Traffic Control advised that Doha International Airport [DOH] was at your ten o’clock and one hundred miles, is that close enough?, the Captain elected to return to DXB, configured the aircraft for the return to Dubai and obtained clearance for the turn back and descent.

A cargo on the main cargo deck had ignited at some point after departure, less than three minutes after the first warning to the crew, the fire resulted in severe damage to flight control systems and caused the upper deck and cockpit to fill with continuous smoke.

The crew then advised Bahrain East Area Control [BAE-C] that the cockpit was ‘full of smoke’ and that they ‘could not see the radios’, at around the same time the crew experienced pitch control anomalies during the turn back and descent to ten thousand feet.

The smoke did not abate during the emergency impairing the ability of the crew to safely operate the aircraft for the duration of the flight back to DXB.

On the descent to ten thousand feet the captain’s supplemental oxygen supply abruptly ceased to function without any audible or visual warning to the crew five minutes and thirty seconds after the first audible warning. This resulted in the captain leaving his position. The Captain left his seat and did not return to his position for the duration of the flight due to incapacitation from toxic gases.

The First Officer [FO], now the Pilot Flying [PF] could not view outside of the cockpit, the primary flight displays, or the audio control panel to return to the UAE frequencies.

Due to the consistent and contiguous smoke in the cockpit all communication between the destination [DXB] and the crew was routed through relay aircraft in VHF range of the emergency aircraft and BAE-C.

BAE-C then relayed the information to the Emirates Area Control Center (EACC) in the UAE via landline, who then contacted Dubai ATC via landline.

As the aircraft approached the aerodrome in Dubai, it stepped down in altitude, the aircraft approached DXB runway 12 left (RWY 12L), then overflew the northern perimeter of the airport at 4500 ft at around 340 kts. The PF could not view the Primary Flight Displays [PFD] or the view outside the cockpit.

The PF was advised Shajah International Airport [SHJ] was available at 10 nm. This required a left hand turn, the aircraft overflew DXB heading East, reduced speed, entering a shallow descending right-hand turn to the south of the airport before loss of control in flight and an uncontrolled descent into terrain, nine nautical miles south west of Dubai International Airport.

There were no survivors.

— END —
DANGEROUS GOODS PANEL (DGP)
TWENTY-FOURTH MEETING
Montréal, 28 October to 8 November 2013

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

REQUIREMENT FOR TELEPHONE NUMBER ON LITHIUM BATTERY HANDLING LABEL

(Presented by D. Brennan)

**SUMMARY**

The working paper proposes to address an editorial oversight, which is currently absent, to formally include the requirement for a telephone number on the lithium battery handling label.

**Action by the DGP:** The DGP is invited to revise Part 5;3.5.2.2 as shown in the appendix to this working paper.

1. **INTRODUCTION**

1.1 It has been identified that while the example lithium battery handling label contained in the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) at Figure 5-31 clearly indicates that the label requires a telephone number, there is nothing actually in the body of the Technical Instructions that makes it a requirement for the shipper to provide this telephone number on the label.

1.2 The lithium battery handling label was developed by the panel, and came into effect in the 2009-2010 Edition of the Technical Instructions. The elements contained in the label derived from the requirements set out in subparagraph (f) of Special Provision 188 in the UN Model Regulations. One of the requirements in subparagraph (f) is that a telephone number must be marked on the package.

1.3 It is therefore proposed to correct the oversight by revising the provisions of Part 5;3.5.2.2 to make it clear that the completion of the telephone number on the lithium battery handling label is a mandatory requirement.

(3 pages)
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APPENDIX

PROPOSED AMENDMENT TO PART 5 OF THE TECHNICAL INSTRUCTIONS

Part 5

SHIPPER’S RESPONSIBILITIES

Chapter 3

LABELLING

3.5.2 Handling labels

3.5.2.2 Lithium battery handling label

Packages containing lithium batteries that meet the requirements of Section II of Packing Instructions 965 to 970 must bear a “Lithium battery” handling label shown in Figure 5-31, as required by the applicable packing instruction. The label must be a minimum dimension of 120 mm × 110 mm except labels of 74 mm × 105 mm may be used on packages containing lithium batteries where the packages are of dimensions such that they can only bear smaller labels. The label must show “Lithium metal batteries” or “Lithium ion batteries”, as applicable, and a telephone number for additional information. Where the package contains both types of batteries, the label must show “Lithium metal and lithium ion batteries”. Packages containing lithium batteries that meet the requirements of Section IB of Packing Instructions 965 and 968 must bear both a “Lithium battery” handling label shown in Figure 5-31 and a Class 9 hazard label (Figure 5-23).

— END —