



International Civil Aviation Organization

**WORKING PAPER**

DGP/24-WP/14

5/7/13

**Revised**

10/9/13

## **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)

| <b>Packing Instruction 131</b>   |                                |   |
|--|--------------------------------|---|
| <i>Inner packagings</i>  | <i>Intermediate packagings</i> | <i>Outer packagings</i>   |
| Bags<br>paper<br>plastics<br>Receptacles<br>fibreboard<br>metal<br>plastics<br>wood<br>Reels   | Not necessary                  | Boxes<br>aluminium (4B)<br>fibreboard (4G)<br>natural wood, ordinary (4C1)<br>natural wood, with siftproof walls (4C2)<br>other metal (4N)<br><u>plastics, solid (4H2)</u><br>plywood (4D)<br>reconstituted wood (4F)<br>steel (4A)<br>Drums<br>≠ aluminium (1B1, 1B2)<br>fibre (1G)<br>≠ plastics (1H1, 1H2)<br>+ other metal (1N1, 1N2)<br>plywood (1D)<br>≠ steel (1A1, 1A2) |
| <p><b>PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:</b></p> <p>— For UN 0029, 0267 and 0455, bags and reels must not be used as inner packagings.</p> |                                |   |

...

UN Model Regulations, P137, ST/SG/AC.10/40/Add.1  
DGP/24-WP/3 (see paragraph 3.2.29)

| <b>Packing Instruction 137</b>   |                                |   |
|--|--------------------------------|---|
| <i>Inner packagings</i>  | <i>Intermediate packagings</i> | <i>Outer packagings</i>   |
| Bags<br>plastics<br>Boxes<br>fibreboard<br>wood<br>Tubes<br>fibreboard<br>metal<br>plastics<br>Dividing partitions in the<br>outer packagings  | Not necessary                  | Boxes<br>aluminium (4B)<br>fibreboard (4G)<br>natural wood, ordinary (4C1)<br>natural wood, with siftproof walls (4C2)<br>other metal (4N)<br><u>plastics, solid (4H2)</u><br>plywood (4D)<br>reconstituted wood (4F)<br>steel (4A) |
| <p><b>PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:</b></p> <p>— 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.</p> |                                |   |

## 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 11114-1:4997~~2012~~ 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.

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 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:

Cylinders specified in 6:5 and in accordance with ISO 11513:2011 or ISO 9809-1:2010.

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 LC<sub>50</sub> less than or equal to 200 ml/m<sup>3</sup> (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.

11) The filling procedure must be in accordance with Annex A of ISO 11513:2011.

12) The maximum period for periodic inspections is five years.

13) Special packing provisions that are specific to a substance (see Table 1):

*Material compatibility*

a: Aluminium alloy cylinders must not be used.  
D: When steel cylinders are used, only those bearing the "H" mark in accordance with 6.5.2.7.4 p) are permitted.

*Gas specific provisions*

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.

*Material compatibility for n.o.s adsorbed gas entries*

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.

**Table 1. ADSORBED GASES**

| UN No. | Name and description                               | Class or Division | Subsidiary risk | LC <sub>50</sub> ml/m <sup>3</sup> | Special packing provisions* |
|--------|--|-------------------|-----------------|------------------------------------|-----------------------------|
| 1      | 2  | 3                 | 4               | 5                                  | 6                           |
| 3510   | Adsorbed gas, flammable, n.o.s.                    | 2.1               |                 |                                    | Z                           |
| 3511   | Adsorbed gas, n.o.s.*                              | 2.2               |                 |                                    | Z                           |
| 3512   | Adsorbed gas, toxic, n.o.s.*                       | 2.3               |                 | ≤ 5000                             | IN                          |
| 3513   | Adsorbed gas, oxidizing, n.o.s.*                   | 2.2               | 5.1             |                                    | Z                           |
| 3514   | Adsorbed gas, toxic, flammable, n.o.s.*            | 2.3               | 2.1             | ≤ 5000                             | IN                          |
| 3515   | Adsorbed gas, toxic, oxidizing, n.o.s.*            | 2.3               | 5.1             | ≤ 5000                             | IN                          |
| 3516   | Adsorbed gas, toxic, corrosive, n.o.s.*            | 2.3               | 8               | ≤ 5000                             | IN                          |
| 3517   | Adsorbed gas, toxic, flammable, corrosive, n.o.s.* | 2.3               | 2.1<br>8        | ≤ 5000                             | IN                          |
| 3518   | Adsorbed gas, toxic, oxidizing, corrosive, n.o.s.* | 2.3               | 5.1<br>8        | ≤ 5000                             | IN                          |
| 3519   | Boron trifluoride, adsorbed                        | 2.3               | 8               | 387                                | ⊕                           |
| 3520   | Chlorine, adsorbed                                 | 2.3               | 5.1<br>8        | 293                                | ⊕                           |
| 3521   | Silicon tetrafluoride, adsorbed                    | 2.3               | 8               | 450                                | ⊕                           |
| 3522   | Arsine, adsorbed                                   | 2.3               | 2.1             | 20                                 | ⊕                           |
| 3523   | Germane, adsorbed                                  | 2.3               | 2.1             | 620                                | d, f                        |
| 3524   | Phosphorus pentafluoride, adsorbed                 | 2.3               | 8               | 190                                |                             |
| 3525   | Phosphine, adsorbed                                | 2.3               | 2.1             | 20                                 | ⊕                           |
| 3526   | Hydrogen selenide, adsorbed                        | 2.3               | 2.1             | 2                                  |                             |

...



**Chapter 5**

**CLASS 3 — FLAMMABLE LIQUIDS**

...

---

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 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

— 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.

##### SINGLE PACKAGINGS FOR PACKING GROUP III ONLY

Cylinders

*Drums*

*Jerricans*

See 4:2.7

Steel (1A1, 1A2)

Steel (3A1, 3A2)

...

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 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).

---

#### Packing Instruction 570

Passenger and cargo aircraft

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

| <i>Boxes</i>                  | <i>Drums</i>          | <i>Jerricans</i>      |
|-------------------------------|-----------------------|-----------------------|
| Fibreboard (4G)               | Fibre (1G)            | ≠ Plastics (3H1, 3H2) |
| Natural wood (4C1, 4C2)       | ≠ Plastics (1H1, 1H2) |                       |
| <del>≠ Other metal (4N)</del> | Plywood (1D)          |                       |
| Plastics (4H1, 4H2)           |                       |                       |
| Plywood (4D)                  |                       |                       |
| Reconstituted wood (4F)       |                       |                       |

...

## 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/cm<sup>2</sup> for beta and gamma emitters and low toxicity alpha emitters; and
- b) 0.4 Bq/cm<sup>2</sup> for all other alpha emitters.

These limits are applicable when averaged over any area of 300 cm<sup>2</sup> 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.

---

UN Model Regulations, paragraphs 4.1.9.1.6 to 4.1.9.1.11, ST/SG/AC.10/40/Add.1  
DGP/24-WP/3 (see paragraph 3.2.29 (see paragraph 3.2.29 e) for 9.1.7 below))

---

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 package ing 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 package ing 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 ing 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.

9.1.7~~8~~ 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;~~
- ~~b) 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;~~
- ~~c) 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, 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;7.10.4~~5~~ b) and the tests to demonstrate closure of each package as specified in 6;7.10.7~~8~~ 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~~9~~ 9 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~~10~~ 10 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~~11~~ 11 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.

9.1.44.12 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 ~~is~~ are or contains 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.

9.2.34 LSA material and SCO in groups LSA-I and SCO-I must not be transported unpackaged.

9.2.45 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**

| <i>Radioactive contents</i>       | <i>Industrial package type</i> |                                |
|-----------------------------------|--------------------------------|--------------------------------|
|                                   | <i>Exclusive use</i>           | <i>Not under exclusive use</i> |
| LSA-I<br>Solid<br>Liquid          | Type IP-1<br>Type IP-1         | Type IP-1<br>Type IP-2         |
| LSA-II<br>Solid<br>Liquid and gas | Type IP-2<br>Type IP-2         | Type IP-2<br>Type IP-3         |
| LSA-III                           | Type IP-2                      | Type IP-3                      |
| SCO-I                             | Type IP-1                      | Type IP-1                      |
| SCO-II                            | Type IP-2                      | Type IP-2                      |



## 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.

...

UN Model Regulations, P805, ST/SG/AC.10/40/Add.1  
See also paragraph 3.2.29.1 f) of DGP/24-WP/3.

#### 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.

| <u>UN number and name</u>  | <u>Quantity per package</u> |                         |
|--|-----------------------------|-------------------------|
|  | <u>Passenger</u>            | <u>Cargo</u>            |
| <u>UN 3507 Uranium hexafluoride, radioactive material, excepted package, non-fissile or fissile-excepted</u> | <u>Less than 0.1 kg</u>     | <u>Less than 0.1 kg</u> |



**ADDITIONAL PACKING REQUIREMENTS FOR COMBINATION PACKAGINGS**

- Substances must be packed in a metal or plastics primary receptacle in a leakproof rigid secondary packaging in a rigid outer packaging.
- Primary inner receptacles must be packed in secondary packagings in a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packagings must be secured in outer packagings with suitable cushioning material to prevent movement. If multiple primary receptacles are placed in a single secondary packaging, they must be either individually wrapped or separated so as to prevent contact between them;
- The contents must comply with the provisions of 2;7.2.4.5.2.
- The provisions of 6;7.3 must be met.
- In the case of fissile-excepted material, limits specified in 2;7.2.3.5 and 6;7.10.2

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

Boxes

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

Drums

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

Jerricans

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

---

DGP/24-WP/2 (see paragraph 3.5.2)

---

...

## 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

...

##### *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))

---

| <i>UN number and proper shipping name</i>   | <i>Quantity —<br/>passenger</i> | <i>Quantity — cargo</i> | <b>SINGLE<br/>PACKAGINGS</b> |
|---|---------------------------------|-------------------------|------------------------------|
| UN 2071 <b>Ammonium nitrate fertilizers</b><br>UN 2590 <del>White a</del> <b>Asbestos, chrysotile</b> | 200 kg                          | 200 kg                  | Yes                          |

...

### 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:

---



...

---

DGP/24-WP/2 (see paragraph 3.2.20)

---

### 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~~ 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).

...

...

DGP/24-WP/3 (see paragraph 3.5.3):

## 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 **meet all the provisions of [2;9.3.]**:

- ~~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.

## Packing Instruction 965

**Table 965-IA**

| <i>UN number<br/>and proper shipping name</i> | <i>Net quantity per package</i> |              |
|---|---------------------------------|--------------|
|   | <i>Passenger</i>                | <i>Cargo</i> |
| UN 3480 <b>Lithium ion batteries</b>          | 5 kg                            | 35 kg        |

### IA.2 Additional requirements

- Lithium ion cells and batteries must be protected against short circuits.
- Lithium ion cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
- Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
- Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

### IA.3 Outer packagings

*Boxes*

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

*Drums*

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

*Jerricans*

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

### IB. SECTION IB

~~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 2.9.3.1 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).~~

#### 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

| Contents                        | Net quantity per P package quantity |         |
|---------------------------------|-------------------------------------|---------|
|                                 | Passenger                           | Cargo   |
| Lithium ion cells and batteries | 10 kg-G                             | 10 kg-G |

#### 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

Boxes

Drums

Jerricans

Strong outer packagings

## Packing Instruction 965

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 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 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 965-II**

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

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

## Packing Instruction 965

### 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

*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”.

## 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.:]**

- ~~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).~~

#### I.1 General requirements

Part 4;1 requirements must be met.

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

## Packing Instruction 966

### I.2 Additional requirements

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

#### Boxes

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

#### Drums

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

#### Jerricans

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

## II. SECTION II

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).~~

## Packing Instruction 966

### II.1 General requirements

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

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

### II.2 Additional requirements

- Lithium ion cells and batteries must:
  - be placed in inner packagings that completely enclose the cell or battery, then placed in a strong 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

*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".

## 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) ~~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).~~

#### 1.1 General requirements

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

| UN number and proper shipping name                          | Package quantity (Section I)           |   |
|---|--|---|
|   | Passenger                              | Cargo                                   |
| UN 3481 <b>Lithium ion batteries contained in equipment</b> | 5 kg of lithium ion cells or batteries | 35 kg of lithium ion cells or batteries |

#### 1.2 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.

## Packing Instruction 967

### I.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

## 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).

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

### II.2 Additional requirements

- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- The equipment must be packed in strong 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

*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”.

## 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.**

- 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**

| UN number<br>and proper shipping name  | Net quantity per package |       |
|--|--------------------------|-------|
|  | Passenger                | Cargo |
| UN 3090 <b>Lithium metal batteries</b> | 2.5 kg                   | 35 kg |

### Packing Instruction 968

#### 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

*Boxes*

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

*Drums*

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

*Jerricans*

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

#### IB. SECTION IB

~~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;

---

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.

---

DGP/24-WP/3 (see paragraph 3.5.3):

---

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 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~~

## Packing Instruction 968

~~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).

DGP/24-WP/3 (see paragraph 3.5.4):

**Table 968-IB**

| Contents                          | <i>Net quantity per Ppackage quantity</i> |              |
|-----------------------------------|---|--------------|
|                                   | <i>Passenger</i>                          | <i>Cargo</i> |
| Lithium metal cells and batteries | 2.5 kg-G                                  | 2.5 kg-G     |

### 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

*Boxes*

*Drums*

*Jerricans*

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 968-II**

| Contents  | <i>Lithium metal cells and/or batteries with a lithium content not more than 0.3 g</i> | <i>Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g</i> | <i>Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g</i> |
|---|--|---|---|
| 1   | 2  | 3   | 4   |
| Maximum number of cells / batteries per package | No limit   | 8 cells   | 2 batteries   |
| Maximum net quantity (mass) per package         | 2.5 kg   | n/a   | n/a   |

The limits specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

### 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”.

## 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.:**

- ~~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.

| UN number and proper shipping name                           | Package quantity (Section I)             |   |
|--|--|---|
|  | Passenger                                | Cargo                                     |
| UN 3091 <b>Lithium metal batteries packed with equipment</b> | 5 kg of lithium metal cells or batteries | 35 kg of lithium metal cells or batteries |

## Packing Instruction 969

### I.2 Additional requirements

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

### I.3 Outer packagings

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

## II. SECTION II

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, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

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

### II.2 Additional requirements

- Lithium metal cells 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

*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”.



## 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:]**

- 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).~~

#### 1.1 General requirements

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

| UN number and proper shipping name                            | Package quantity (Section I)             |   |
|---|--|---|
|   | Passenger                                | Cargo                                     |
| UN 3091 <b>Lithium metal batteries contained in equipment</b> | 5 kg of lithium metal cells or batteries | 35 kg of lithium metal cells or batteries |

#### 1.2 Additional requirements

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

## Packing Instruction 970

### I.3 Outer packagings

*Boxes*

*Drums*

*Jerricans*

Strong outer packagings

### 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).

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

**Packing Instruction 970**

**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**

*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".

---

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 —