International Civil Aviation Organization

DGP-WG/25-WP/16
12/3/25

WORKING PAPER

DANGEROUS GOODS PANEL (DGP) WORKING GROUP MEETING (DGP-WG/25)

Delhi, India, 21 to 25 April 2025

Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods (REC-A-DGS-2027)

1.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2027-2028 Edition

DRAFT AMENDMENTS TO PART 6 OF THE TECHNICAL INSTRUCTIONS TO ALIGN WITH THE UN RECOMMENDATIONS

(Presented by the Secretary)

SUMMARY

This working paper contains draft amendments to Part 6 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 twelfth session (Geneva, 6 December 2024).

Action by the DGP-WG: The DGP-WG is invited to agree to the draft amendments in this working paper.

Part 6

PACKAGING NOMENCLATURE, MARKING, REQUIREMENTS AND TESTS

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Chapter 3

REQUIREMENTS FOR PACKAGINGS

3.1 REQUIREMENTS FOR PACKAGINGS OTHER THAN INNER PACKAGINGS

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UN Model Regulations, Chapter 6.1, 6.1.4.12.1 (see ST/SG/AC.10/52/Add.1)

3.1.11 Fibreboard boxes (including corrugated fibreboard boxes) 4G

3.1.11.1 Strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) must be used, appropriate to the capacity of the box and to its intended use. The water resistance of the outer surface must be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m2 – see ~~ISO 535:2014~~ ISO 535:2023. It must have proper bending qualities. Fibreboard must be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting of corrugated fibreboard must be firmly glued to the facings.

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Chapter 4

PACKAGING PERFORMANCE TESTS

4.1 PERFORMANCE AND FREQUENCY OF TESTS

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UN Model Regulations, Chapter 6.1, 6.1.5.1.3 (see ST/SG/AC.10/52/Add.1)

4.1.3 Appropriate ~~T~~tests must be repeated on production samples at intervals established by the appropriate national authority. For such tests on paper or fibreboard packagings, preparation at ambient conditions is considered equivalent to the provisions of 4.2.3.

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Chapter 5

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES, AEROSOL DISPENSERS AND SMALL RECEPTACLES CONTAINING GAS (GAS CARTRIDGES) AND FUEL CELL CARTRIDGES CONTAINING LIQUEFIED FLAMMABLE GAS

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5.1 GENERAL REQUIREMENTS

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5.1.5 Initial inspection and testing

5.1.5.1 New cylinders, other than closed cryogenic receptacles and metal hydride storage systems, must be subjected to inspection and testing during and after manufacture in accordance with the applicable design standards or recognized technical codes including the following:

On an adequate sample of cylinder shells:

a) testing of the mechanical characteristics of the material of construction;

b) verification of the minimum wall thickness;

c) verification of the homogeneity of the material for each manufacturing batch;

d) inspection of the external and internal conditions;

e) inspection of the threads used to fit closures;

f) verification of the conformance with the design standard;

For all cylinder shells:

UN Model Regulations, Chapter 6.2, 6.2.1.5.1 (see ST/SG/AC.10/52/Add.1)

g) a hydraulic pressure test. Cylinder shells must meet the acceptance criteria specified in the design and construction technical standard or recognized technical code;

Note.— With the agreement of the appropriate national authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

h) inspection and assessment of manufacturing defects and either repairing them or rendering the cylinder shells unserviceable. In the case of welded cylinder shells, particular attention must be paid to the quality of the welds;

i) an inspection of the marks on the cylinder shells;

j) in addition, cylinder shells intended for the transport of UN 1001 – Acetylene, dissolved, and UN 3374 – Acetylene, solvent free, must be inspected to ensure proper installation and condition of the porous material and, if applicable, the quantity of solvent.

On an adequate sample of closures:

k) verification of materials;

l) verification of dimensions;

m) verification of cleanliness;

n) inspection of completed assembly;

o) verification of the presence of marks;

For all closures:

p) testing for leakproofness;

UN Model Regulations, Chapter 6.2, 6.2.1.5.2 (see ST/SG/AC.10/52/Add.1)

5.1.5.2 Closed cryogenic receptacles must be subjected to testing and inspection during and after manufacture in accordance with the applicable design standards or recognized technical codes, including the following:

On an adequate sample of inner vessels:

a) testing of the mechanical characteristics of the material of construction;

b) verification of the minimum wall thickness;

c) inspection of the external and internal conditions;

d) verification of the conformance with the design standard or recognized technical code;

e) inspection of welds by radiographic, ultrasonic or other suitable non-destructive test method according to the applicable design and construction standard or recognized technical code;

For all inner vessels:

f) a hydraulic pressure test. The inner vessel must meet the acceptance criteria specified in the design and construction technical standard or recognized technical code;

Note.— With the agreement of the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

g) inspection and assessment of manufacturing defects and either repairing them or rendering the inner vessel unserviceable;

h) an inspection of the marks;

On an adequate sample of closures:

i) verification of materials;

j) verification of dimensions;

k) verification of cleanliness;

l) inspection of completed assembly;

m) verification of the presence of marks.

For all closures:

n) testing for leakproofness.

On an adequate sample of completed closed cryogenic receptacles:

o) testing the satisfactory operation of service equipment;

p) verification of the conformance with the design standard or recognized technical code.

For all completed closed cryogenic receptacles:

q) testing for leakproofness.

Note.— Closed cryogenic receptacles, which were constructed in accordance with the initial inspection and test requirements of 5.1.5.2 applicable in the 2021–2022 edition of these Instructions, but which do not conform to the requirements of 5.1.5.2 relating to the initial inspection and test applicable in the 2023–2024 edition of these Instructions, may continue to be used.

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UN Model Regulations, Chapter 6.2, 6.2.1.6.1 (see ST/SG/AC.10/52/Add.1)

5.1.6 Periodic inspection and testing

5.1.6.1 Refillable cylinders other than cryogenic receptacles must be subjected to periodic inspections and tests by a body authorized by the appropriate national authority, in accordance with the following:

a) check of the external conditions of the cylinder and verification of the equipment and the external marks;

b) check of the internal conditions of the cylinder (such as internal inspection, verification of minimum wall thickness);

c) check of the threads either:

i) if there is evidence of corrosion; or

ii) if the closures or other service equipment are removed;

d) a hydraulic pressure test of the cylinder shell and, if necessary, verification of the characteristics of the material by suitable tests;

Note 1.— With the agreement of the appropriate national authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

Note 2.— For seamless steel cylinder shells the check of 5.1.6.1 b) and hydraulic pressure test of 5.1.6.1 d) may be replaced by a procedure conforming to ISO 16148:2016 + Amd 1:2020 "Gas cylinders – Refillable seamless steel gas cylinders and tubes – Acoustic emission examination (AT) and follow-up ultrasonic examination (UT) for periodic inspection and testing".

Note 3.— The check of internal conditions of 5.1.6.1 b) and the hydraulic pressure test of 5.1.6.1.d) may be replaced by ultrasonic examination carried out in accordance with ISO 18119:2018 + Amd 1:2021 + Amd 2:2024 for seamless steel and seamless aluminium alloy cylinder shells. For a transitional period until 31 December 2026, the standard ISO 18119:2018 may be used for this same purpose. For a transitional period until 31 December 2028 the standard ISO 18119:2018 + Amd 1:2021 may be used for this same purpose. For a transitional period until 31 December 2024, the standard ISO 10461:2005 + Amd 1:2006 may be used for seamless aluminium alloy cylinders and ISO 6406:2005 may be used for seamless steel cylinder shells for this same purpose.

e) check of service equipment if to be reintroduced into service. This check may be carried out separately from the inspection of the cylinder shell.

Note.— For the periodic inspection and test frequencies, see Packing Instruction 200 or, for a chemical under pressure, Packing Instruction 218.

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5.2 REQUIREMENTS FOR UN CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES

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UN Model Regulations, Chapter 6.2, 6.2.2.1.1 (see ST/SG/AC.10/52/Add.1)

5.2.1 Design, construction and initial inspection and testing

5.2.1.1 The following standards apply for the design, construction and initial inspection and test of refillable UN cylinder shells, except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5:

Reference	*Title*	*Applicable for manufacture*
. . .		
ISO 4706:2008	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below.	~~Until further notice~~Until 31 December 2030
ISO 4706:2023	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below	Until further notice
. . .		

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UN Model Regulations, Chapter 6.2, 6.2.1.3 (see ST/SG/AC.10/52/Add.1)

5.2.1.3 The following standards apply for the design, construction and initial inspection and test of UN acetylene cylinders except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5.

Note.— The maximum of 1 000 L volume as mentioned in the ISO standard ISO 21029-1:2004 Cryogenic vessels, does not apply for refrigerated liquefied gases in closed cryogenic receptacles installed in apparatus (such as MRI or cooling machines).

For the cylinder shell:

Reference	*Title*	*Applicable for manufacture*
. . .		
ISO 4706:2008	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below	~~Until further notice~~Until 31 December 2030
ISO 4706:2023	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below	Until further notice
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UN Model Regulations, Chapter 6.2, 6.2.2.2 (see ST/SG/AC.10/52/Add.1)

5.2.2 Materials

In addition to the material requirements specified in the design and construction standards, and any restrictions specified in the applicable Packing Instruction for the gas(es) to be transported (such as Packing Instruction 200, Packing Instruction 202 or Packing Instruction 214), the following standards apply to material compatibility:

Reference	*Title*	*Applicable for manufacture*
ISO 11114-1:2020 + Amd 1:2023	Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 1: Metallic materials.	Until further notice
. . .		

UN Model Regulations, Chapter 6.2, 6.2.2.3 (see ST/SG/AC.10/52/Add.1)

5.2.3 Closures and their protection

The following standards apply to the design, construction, and initial inspection and test of closures and their protection:

Reference	*Title*	*Applicable for manufacture*
. . .		
ISO 10297:2014 + Amd 1:2017	Gas cylinders – Cylinder valves – Specification and type testing	~~Until further notice~~ Until 31 December 2028
ISO 10297:2024	Gas cylinders – Cylinder valves – Specification and type testing	Until further notice
. . .		
ISO 14246:2014 + Amd 1:2017	Gas cylinders – Cylinder valves – Manufacturing tests and examination	~~Until further notice~~ Until 31 December 2030
ISO 14246:2022	Gas cylinders – Cylinder valves – Manufacturing tests and examinations	Until further notice
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UN Model Regulations, Chapter 6.2, 6.2.2.4 (see ST/SG/AC.10/52/Add.1)

5.2.4 Periodic inspection and test

5.2.4.1 The following standards apply to the periodic inspection and testing of UN cylinders:

Reference	*Title*	*Applicable for manufacture*
. . .		
ISO 18119:2018 + Amd 1:2021	Gas cylinders – Seamless steel and seamless aluminium-alloy gas cylinders and tubes – Periodic inspection and testing.	~~Until further notice~~Until 31 December 2028
ISO 18119:2018 + Amd 1:2021 + Amd 2:2024	Gas cylinders – Seamless steel and seamless aluminium-alloy gas cylinders and tubes – Periodic inspection and testing	Until further notice
. . .		
ISO 11623:2015	Gas cylinders – Composite construction – Periodic inspection and testing	~~Until further notice~~ Until 31 December 2028
ISO 11623:2023	Gas cylinders – Composite cylinders and tubes – Periodic inspection and testing *Note.— The pressure test must not be replaced by a non-destructive examination (NDE) technique, though such techniques can be used for monitoring purposes.*	Until further notice
ISO 22434:2006	Transportable gas cylinders – Inspection and maintenance of cylinder valves *Note.— These requirements may be met at times other than at the periodic inspection and test of UN cylinders.*	~~Until further notice~~ Until 31 December 2028
ISO 22434:2022	Gas cylinders – Inspection and maintenance of valves *Note.— These requirements may be met at times other than at the periodic inspection and test of UN cylinders.*	Until further notice

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UN Model Regulations, Chapter 6.2, 6.2.2.7.3 (see ST/SG/AC.10/52/Add.1)

5.2.7 Marking of UN refillable cylinders and closed cryogenic receptacles

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5.2.7.3 The following operational marks must be applied:

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k) In the case of cylinders for UN 1001 **Acetylene, dissolved:**

i) the tare in kilograms consisting of the total of the mass of the empty cylinder shell, the service equipment (including porous material) not removed during filling, any coating, the solvent and the saturation gas expressed to three significant figures rounded down to the last digit followed by the letters “KG”. At least one decimal must be shown after the decimal point. For cylinders of less than 1 kg, the mass must be expressed to two significant figures rounded down to the last digit;

ii) the identity of the porous material (such as name or trademark); and

iii) the total mass of the filled acetylene cylinder in kilograms followed by the letters “KG”;

Acetylene cylinders constructed in accordance with the 2021-2022 Edition of the Technical Instructions may continue to be used without the application of the marks detailed in ii) and iii) when the marking can neither be applied on the cylinder shoulder nor applied on any neck ring.

l) In the case of cylinders for UN 3374 **Acetylene, solvent free:**

i) the tare in kilograms consisting of the total of the mass of the empty cylinder shell, the service equipment (including porous material) not removed during filling and any coating expressed to three significant figures rounded down

to the last digit followed by the letters “KG”. At least one decimal must be shown after the decimal point. For cylinders of less than 1 kg, the mass must be expressed to two significant figures rounded down to the last digit;

ii) the identity of the porous material (such as name or trademark); and

iii) the total mass of the filled acetylene cylinder in kilograms followed by the letters “KG”.

Acetylene cylinders constructed in accordance with the 2021-2022 Edition of the Technical Instructions may continue to be used without the application of the marks detailed in ii) and iii) when the marking can neither be applied on the cylinder shoulder nor applied on any neck ring.

~~*Note.— Acetylene cylinders constructed in accordance with the 2021–2022 edition of these Instructions, which are not marked in accordance with 6;5.2.7.3 k) or l) applicable in the 2023–2024 edition of these Instructions, may continue to be used until the next periodic inspection and test two years after the coming into force of this edition of these Instructions, where they must be marked according to the provisions above or be taken out of operation.*~~

UN Model Regulations, Chapter 6.2, 6.2.2.7.4 (see ST/SG/AC.10/52/Add.1)

5.2.7.4 The following manufacturing marks must be applied:

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p) In the case of steel cylinders and closed cryogenic receptacles and composite cylinders and closed cryogenic receptacles with steel liner intended for the transport of gases with a risk of hydrogen embrittlement, the letter “H” showing compatibility of the steel (see ISO 11114-1:2020 + Amd 1:2023);

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UN Model Regulations, Chapter 6.2, 6.2.2.8.1 (see ST/SG/AC.10/52/Add.1)

5.2.8 Marking of non-refillable UN cylinders

5.2.8.1 Non-refillable UN cylinders must be marked clearly and legibly with certification and gas or cylinder specific marks. These marks must be permanently affixed (such as stencilled, stamped, engraved or etched) on the cylinder. Except when stencilled, the marks must be on the shoulder, top end or neck of the cylinder shell or on a permanently affixed component of the cylinder (such as welded collar). Except for the “UN” mark and the “DO NOT REFILL” mark, the minimum size of the marks must be 5 mm for cylinders with a diameter greater than or equal to 140 mm and 2.5 mm and for cylinders with a diameter less than 140 mm. The minimum size of the “UN” mark must be 10 mm for cylinders with a diameter greater than or equal to 140 mm and 5 mm for cylinders with a diameter less than 140 mm. The minimum size of the “DO NOT REFILL” mark must be 5 mm.

5.2.8.2 Non-refillable UN cylinders of seamless construction with a diameter of 40 mm or less may instead be permanently marked (e.g. stencilled, stamped, engraved or etched) on their side walls provided no harmful stress concentration is created, and the minimum cylindrical shell wall thickness is maintained. The minimum size of the marks must be 1.5 mm. The minimum size of the UN packaging symbol must be 3 mm. The minimum size of the “DO NOT REFILL” mark must be 3 mm.

5.2.8.~~2~~3 The marks listed in 5.2.7.2 to 5.2.7.4 must be applied with the exception of g), h) and m). The serial number o) may be replaced by the batch number. In addition, the words “DO NOT REFILL” in letters of at least 5 mm in height are required.

5.2.8.~~3~~4 The requirements of 5.2.7.5 must apply.

Note.— Non-refillable cylinders may, on account of their size, substitute a label for these permanent marks.

5.2.8.~~4~~5 Other marks are allowed provided they are made in low stress areas other than the side wall and are not of a size and depth that will create harmful stress concentrations. Such marks must not conflict with required marks.

UN Model Regulations, Chapter 6.2, 6.2.2.9.2 (see ST/SG/AC.10/52/Add.1)

5.2.9 Marking of UN metal hydride storage systems

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5.2.9.2 The following marks must be applied:

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j) In the case of steel cylinders and composite cylinders with steel liner, the letter “H” showing compatibility of the steel (see 1SO 11114-1:2020 + Amd 1:2023); and

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Chapter 6

PACKAGINGS FOR INFECTIOUS SUBSTANCES OF CATEGORY A (UN 2814 AND UN 2900)

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6.5 TEST REQUIREMENTS FOR PACKAGINGS

6.5.1 PERFORMANCE AND FREQUENCY OF TESTS

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UN Model Regulations, Chapter 6.3, 6.3.5.1.3 (see ST/SG/AC.10/52/Add.1)

6.5.1.3 Appropriate ~~T~~tests must be repeated on production samples at intervals established by the competent authority.

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Chapter 7

REQUIREMENTS FOR THE CONSTRUCTION, TESTING AND APPROVAL OF PACKAGES FOR RADIOACTIVE MATERIAL AND FOR THE APPROVAL OF SUCH MATERIAL

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7.10 REQUIREMENTS FOR PACKAGES CONTAINING FISSILE MATERIAL

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UN Model Regulations, Chapter 6.3, 6.4.11.2 (see ST/SG/AC.10/52/Add.1)

7.10.2 Packages containing fissile material that meet the provisions of subparagraph d) and one of the provisions of a) to c) below are excepted from the requirements of 7.10.4 to 7.10.14.

. . .

d) the total mass of beryllium, hydrogenous material enriched in deuterium, graphite and other allotropic forms of carbon in an individual package must not be greater than the mass of fissile nuclides in the package except where the total concentration of these materials does not exceed 1 g in any 1 000 g of material. Beryllium incorporated in copper alloys up to 4 per cent in ~~weight~~ mass of the alloy does not need to be considered.

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Chapter 8

REQUIREMENTS FOR INTERMEDIATE BULK CONTAINERS

8.1 MARKING OF PACKAGING FOR INTERMEDIATE BULK CONTAINERS

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UN Model Regulations, Chapter 6.5, 6.5.2.1.1 (see ST/SG/AC.10/52/Add.1)

8.1.2 The packaging mark consists of:

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g) the ~~stacking test load~~ superimposed stacking test mass in kg. For IBCs not designed for stacking, the figure “0” must be shown;

. . .

UN Model Regulations, Chapter 6.5, 6.5.2.2.2 (see ST/SG/AC.10/52/Add.1)

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

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