International Civil Aviation Organization

DGP/28-WP/16
14/7/21

WORKING PAPER

DANGEROUS GOODS PANEL (DGP)

TWENTY-EIGHTH MEETING

Virtual, 15 to 19 November 2021

Agenda Item 1: Harmonizing ICAO dangerous goods provisions with UN Recommendations on the Transport of Dangerous Goods *(Ref: REC-A-DGS-2023)*

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 2023-2024 Edition

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

(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 tenth session (Geneva, 11 December 2020).

The DGP 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 1

APPLICABILITY, NOMENCLATURE AND CODES

1.1 APPLICABILITY

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Paragraph 3.1.2.9 of the DGP-WG/21 report:

UN Model Regulations, 6.1.1.2 (see ST/SG/AC.10/48/Add.1)

1.1.2 The requirements for packagings in Chapter 3 are based on packagings currently used. In order to take into account progress in science and technology, there is no objection to the use of packagings having specifications different from those in Chapter 3, provided they are equally effective, acceptable to the appropriate authority and able to successfully ~~to withstand the tests~~ fulfil the requirements described in 4;1.1.18 and Chapter 4. Methods of testing other than those described in these Instructions are acceptable, provided they are equivalent.

Added for sake of alignment with 6.1.1.4 of the UN Model Regulations:

1.1.3 Packagings must be manufactured and tested under a quality assurance programme which satisfies the appropriate national authority in order to ensure that each packaging meets the requirements of Chapters 1 to 4.

UN Model Regulations, 6.3.2.2 (see ST/SG/AC.10/48/Add.1):

The following note was moved from 4;1.1.2 and amended to align with the UN Model Regulations:

Note.— ISO 16106:~~2006~~2020 ~~Packaging —~~ Transport packages for dangerous goods — Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings — Guidelines for the application of ISO 9001 provides acceptable guidance on procedures which may be followed.

~~1.1.3~~1.1.4 Manufacturers and subsequent distributors of packagings must provide information regarding procedures to be followed (including closure instructions for inner packagings and receptacles), a description of the types and dimensions of the closures (including required gaskets) and any other components needed to ensure that packages, as presented for transport, are capable of passing the applicable performance tests of Chapters 4 to 7 and the pressure differential requirements of 4;1.1.6 as applicable.

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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

5.1.1 Design and construction

Paragraph 3.1.2.9 of the DGP-WG/21 report:

UN Model Regulations, 6.2.1.1.1 (see ST/SG/AC.10/48/Add.1)

5.1.1.1 Cylinders and closed cryogenic receptacles ~~and their closures~~ must be designed, manufactured, tested and equipped in such a way as to withstand all conditions, including fatigue, to which they will be subjected during normal conditions of transport and intended use.

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UN Model Regulations, 6.2.1.1.4 (see ST/SG/AC.10/48/Add.1)

5.1.1.4 For welded cylinders and closed cryogenic receptacles, only metals of weldable quality must be ~~used~~ welded.

UN Model Regulations, 6.2.1.1.5 (see ST/SG/AC.10/48/Add.1)

5.1.1.5 The test pressure of cylinder~~s~~ shells must be in accordance with Packing Instruction 200 or, for a chemical under pressure, with Packing Instruction 218. The test pressure for closed cryogenic receptacles must be in accordance with Packing Instruction 202. The test pressure of a metal hydride storage system must be in accordance with Packing Instruction 214. The test pressure of a cylinder shell for an adsorbed gas must be in accordance with Packing Instruction 219.

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UN Model Regulations, 6.2.1.1.8.2 (see ST/SG/AC.10/48/Add.1)

5.1.1.8.2 The closed cryogenic receptacles must be thermally insulated. The thermal insulation must be protected against impact by means of a jacket. If the space between the ~~closed cryogenic receptacle~~ inner vessel and the jacket is evacuated of air (vacuum-insulation), the jacket must be designed to withstand without permanent deformation an external pressure of at least 100 kPa (1 bar) calculated in accordance with a recognized technical code or a calculated critical collapsing pressure of not less than 200 kPa (2 bar) gauge pressure. If the jacket is so closed as to be gas-tight (e.g. in the case of vacuum-insulation), a device must be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the ~~closed cryogenic receptacle~~ inner vessel or its ~~fittings~~ service equipment. The device must prevent moisture from penetrating into the insulation.

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UN Model Regulations, 6.2.1.1.9 (see ST/SG/AC.10/48/Add.1)

5.1.1.9 Additional requirements for the construction of ~~pressure receptacles for~~ acetylene cylinders

Cylinder~~s~~ shells for UN 1001 **— Acetylene, dissolved** and UN 3374 **— Acetylene, solvent free** must be filled with a porous mass, uniformly distributed, of a type that conforms to the requirements and testing specified by a standard or technical code recognized by the appropriate national authority and which:

a) is compatible with the cylinder shell and does not form harmful or dangerous compounds either with the acetylene or with the solvent in the case of UN 1001; and

b) is capable of preventing the spread of decomposition of the acetylene in the porous material.

In the case of UN 1001, the solvent must be compatible with those parts of the cylinder~~s~~ that are in contact with it.

5.1.2 Materials

UN Model Regulations, 6.2.1.2.1 (see ST/SG/AC.10/48/Add.1):

5.1.2.1 Construction materials of cylinders and closed cryogenic receptacles ~~and their closures~~ which are in direct contact with dangerous goods must not be affected or weakened by the dangerous goods intended and must not cause a dangerous effect (e.g. catalysing a reaction or reacting with the dangerous goods).

UN Model Regulations, 6.2.1.2.2 (see ST/SG/AC.10/48/Add.1):

5.1.2.2 Cylinders and closed cryogenic receptacles ~~and their closures~~ must be made of the materials specified in the design and construction technical standards and the applicable packing instruction for the substances intended for transport in the cylinder and closed cryogenic receptacle. The materials must be resistant to brittle fracture and to stress corrosion cracking as indicated in the design and construction technical standards.

5.1.3 Service equipment

UN Model Regulations, 6.2.1.3.1 (see ST/SG/AC.10/48/Add.1):

Broke the sentence up into a list for better readability:

5.1.3.1 ~~Valves, piping and other fittings~~Service equipment subjected to pressure, excluding:

a) porous, absorbent or adsorbent material;

b) pressure relief devices;

c) pressure gauges; or

d) indicators~~,~~;

must be designed and constructed so that the burst pressure is at least 1.5 times the test pressure of the cylinders and closed cryogenic receptacles.

UN Model Regulations, 6.2.1.3.2 (see ST/SG/AC.10/48/Add.1) (did not include last new sentence from UN because manifolds are not permitted in air transport, i.e. “Manifold piping leading to shut-off valves must be sufficiently flexible to protect the shut-off valves and the piping from shearing or releasing the pressure receptacle contents”):

5.1.3.2 Service equipment must be configured or designed to prevent damage and unintended opening that could result in the release of the cylinder and closed cryogenic receptacle contents during normal conditions of handling and transport. ~~The filling and discharge valves and any protective caps must be capable of being secured against unintended opening. Valves must~~ All closures must be protected in the same manner as ~~specified~~ is required for valves in 4;4.1.1.8.

UN Model Regulations, 6.2.1.3.3 (see ST/SG/AC.10/48/Add.1):

5.1.3.3 Cylinders and closed cryogenic receptacles that are not capable of being handled manually or rolled must be fitted with handling devices (skids, rings, straps) ensuring that they can be safely handled by mechanical means and arranged so as not to impair the strength of, nor cause undue stresses in, the cylinder and closed cryogenic receptacle.

5.1.3.4 Individual cylinders and closed cryogenic receptacles must be equipped with pressure relief devices as specified in Packing Instruction 200(1), 202 or 214, or 5.1.3.6.4 and 5.1.3.6.5. Pressure-relief devices must be designed to prevent the entry of foreign matter, the leakage of gas and the development of any dangerous excess pressure.

5.1.3.5 Cylinders and closed cryogenic receptacles whose filling is measured by volume must be provided with a level indicator.

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UN Model Regulations, 6.2.1.4.1 (see ST/SG/AC.10/48/Add.1):

5.1.4 Approval of cylinders and closed cryogenic receptacles

5.1.4.1 The conformity of cylinders and closed cryogenic receptacles must be assessed at the time of manufacture as required by the appropriate national authority. ~~Cylinders and closed cryogenic receptacles must be inspected, tested and approved by an inspection body.~~ The technical documentation must include full specifications on design and construction, and full documentation on the manufacturing and testing.

5.1.4.2 Quality assurance systems must conform to the requirements of the appropriate national authority.

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UN Model Regulations, 6.2.1.4.3 and 6.2.1.4.4 (see ST/SG/AC.10/48/Add.1):

5.1.4.3 Cylinder shells and the inner vessels of closed cryogenic receptacles must be inspected, tested and approved by an inspection body.

5.1.4.4 For refillable cylinders, the conformity assessment of the shell and the closure(s) may be carried out separately. In these cases, an additional assessment of the final assembly is not required.

5.1.4.4.1 For closed cryogenic receptacles, the inner vessels and the closures may be assessed separately, but an additional assessment of the complete assembly is required.

5.1.4.4.2 For acetylene cylinders, conformity assessment must comprise either:

a) one assessment of conformity covering both the cylinder shell and the contained porous material; or

b) a separate assessment of conformity for the empty cylinder shell and an additional assessment of conformity covering the cylinder shell with the contained porous material.

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5.1.5 Initial inspection and testing

UN Model Regulations, 6.2.1.5.1 (see ST/SG/AC.10/48/Add.1):

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~~s~~ 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 ~~of the cylinders~~;

e) inspection of the ~~neck~~ threads used to fit closures;

f) verification of the conformance with the design standard;

For all cylinder~~s~~ shells:

g) a hydraulic pressure test. Cylinder~~s~~ shells must meet the acceptance criteria specified in the design and construction technical standard or 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~~s~~ shells unserviceable. In the case of welded cylinder~~s~~ shells, particular attention must be paid to the quality of the welds;

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

j) in addition, cylinders 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;

5.1.5.2 ~~On an adequate sample of c~~Closed cryogenic receptacles~~, the inspections and tests specified in 5.1.5.1 a), b), d) and f) must be performed. In addition, welds must be inspected by radiographic, ultrasonic or another suitable non-destructive test method on a sample of closed cryogenic receptacles according to the applicable design and construction standard. This weld inspection does not apply to the jacket. Additionally, all closed cryogenic receptacles must undergo the inspections and tests specified in 5.1.5.1 g), h) and i), as well as a leakproofness test and a test of the satisfactory operation of the service equipment after assembly~~ 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 code;

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

For all completed closed cryogenic pressure receptacles:

q) testing for leakproofness.

UN Model Regulations, 6.2.1.5.3 (see ST/SG/AC.10/48/Add.1):

5.1.5.3 For metal hydride storage systems, it must be verified that the inspections and tests specified in 5.1.5.1 a), b), c), d), e) if applicable, f), g), h) and i) have been performed on an adequate sample of the pressure receptacle~~s~~ shells used in the metal hydride storage system. In addition, on an adequate sample of metal hydride storage systems, the inspections and tests specified in 5.1.5.1 c) and f) must be performed, as well as 5.1.5.1 e) if applicable, and inspection of the external conditions of the metal hydride storage system. Additionally, all metal hydride storage systems must undergo the initial inspections and tests specified in 5.1.5.1 h) and i), as well as a leakproofness test and a test of the satisfactory operation of the service equipment.

UN Model Regulations, 6.2.1.5.4 (see ST/SG/AC.10/48/Add.1):

Did not incorporate in Technical Instructions because it applies to bundles of cylinders which are not permitted for air transport.

5.1.6 Periodic inspection and testing

UN Model Regulations, 6.2.1.6.1 (see ST/SG/AC.10/48/Add.1):

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

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

b) check of the internal conditions of the cylinder (e.g. internal inspection, verification of minimum wall thickness);

c) check of the thread~~s~~ either:

i) if there is evidence of corrosion; or

ii) if the ~~fittings~~ 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~~s~~ 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 "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 ~~10461:2005 + A1:2006~~ 18119:2018 for seamless steel and seamless aluminium alloy ~~gas~~ cylinder~~s~~ shells ~~and in accordance with ISO 6406:2005 for seamless steel gas cylinders~~. For a transitional period until 31 December 2024 the standard ISO 10461:2005 +A1:2006 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~~, other accessories and pressure relief devices~~, 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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5.1.7 Requirements for manufacturers

5.1.7.1 The manufacturer must be technically able and must possess all resources required for the satisfactory manufacture of cylinders and closed cryogenic receptacles; this relates in particular to qualified personnel:

a) to supervise the entire manufacturing process;

b) to carry out joining of materials; and

c) to carry out the relevant tests.

UN Model Regulations, 6.2.1.7.2 (see ST/SG/AC.10/48/Add.1):

5.1.7.2 ~~The~~A proficiency test of ~~a~~ the manufacturers of cylinder shells and the inner vessels of closed cryogenic receptacle must in all instances be carried out by an inspection body approved by the ~~appropriate national~~ competent authority of the country of approval. Proficiency testing of manufacturers of closures must be carried out if the competent authority requires it. This test must be carried out either during design type approval or during production inspection and certification.

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5.2 REQUIREMENTS FOR UN CYLINDERS AND CLOSED CRYOGENIC RECEPTACLES

In addition to the general requirements of 5.1, UN cylinders and closed cryogenic receptacles must comply with the requirements of this section, including the standards, as applicable. Manufacture of new UN cylinders and closed cryogenic receptacles or service equipment according to any particular standard in 5.2.1 and 5.2.3 is not permitted after the date shown in the right hand column of the tables.

Note 1.— With the agreement of the appropriate national authority, more recently published versions of the standards, if available, may be used.

UN Model Regulations, 6.2.2 (see ST/SG/AC.10/48/Add.1):

Note 2.— UN cylinders and closed cryogenic receptacles ~~and service equipment~~ constructed according to standards applicable at the date of manufacture may continue in use subject to the periodic inspection provisions of these Instructions.

UN Model Regulations, 6.2.2.1.1 (see ST/SG/AC.10/48/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~~s~~ 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 9809-1:1999	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa. *Note.— The note concerning the F factor in section 7.3 of this standard must not be applied for UN cylinders.*	Until 31 December 2018
ISO 9809-1:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa.	Until ~~further notice~~ 31 December 2026
ISO 9809-1:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa.	Until further notice
ISO 9809-2:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa.	Until 31 December 2018
ISO 9809-2:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa.	Until ~~further notice~~ 31 December 2026
ISO 9809-2:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 2: Quenched and tempered steel	Until further notice

Reference	*Title*	*Applicable for manufacture*
	cylinders and tubes with tensile strength greater than or equal to 1 100 MPa.	
ISO 9809-3:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	Until 31 December 2018
ISO 9809-3:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	Until ~~further notice~~ 31 December 2026
ISO 9809-3:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 3: Normalized steel cylinders and tubes.	Until further notice
ISO 9809-4:2014	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing – Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa	Until further notice
ISO 7866:1999	Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing. *Note.— The note concerning the F factor in section 7.2 of this standard must not be applied for UN cylinders. Aluminium alloy 6351A — T6 or equivalent must not be authorized.*	Until 31 December 2020
ISO 7866: 2012+ Cor 1:2014	Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing *Note.— Aluminium alloy 6351A or equivalent must not be used.*	Until further notice
ISO 4706:2008	Gas cylinders — Refillable welded steel cylinders — Test pressure 60 bar and below.	Until further notice
ISO 18172-1:2007	Gas cylinders — Refillable welded stainless steel cylinders — Part 1: Test pressure 6 MPa and below.	Until further notice
ISO 20703:2006	Gas cylinders — Refillable welded aluminium-alloy cylinders — Design, construction and testing.	Until further notice
~~ISO 11118:1999~~	~~Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.~~	~~Until 31 December 2020~~
~~ISO 11118:2015~~	~~Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.~~	~~Until further notice~~
ISO 11119-1:2002	Gas cylinders of composite construction — Specification and test methods — Part 1: Hoop wrapped composite gas cylinders.	Until 31 December 2020
ISO 11119-1:2012	Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 L	Until further notice
ISO 11119-2:2002	Gas cylinders of composite construction — Specification and test methods — Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners.	Until 31 December 2020
ISO 11119-2:2012 + Amd 1:2014	Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners.	Until further notice
ISO 11119-3:2002	Gas cylinders of composite construction — Specification and test methods — Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners. *Note.— This standard must not be used for linerless cylinders manufactured from two parts joined together.*	Until 31 December 2020
ISO 11119-3:2013	Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with non-load-sharing metallic or non-metallic liners. *Note.— This standard must not be used for linerless cylinders manufactured from two parts joined together.*	Until further notice
ISO 11119-4: 2016	Gas cylinders — Refillable composite gas cylinders — Design, construction and testing — Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 L with load-sharing welded metallic liners.	Until further notice

Note 1.— In the above-referenced standards, composite cylinder~~s~~ shells must be designed for a design life of not less than fifteen years.

Note 2.— Composite cylinder~~s~~ shells with a design life longer than fifteen years must not be filled after fifteen years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme must be part of the initial design type approval and must specify inspections and tests to demonstrate that composite cylinder~~s~~ shells manufactured accordingly remain safe to the end of their design life. The service life test programme and the results must be

approved by the appropriate national authority of the country of approval that is responsible for the initial approval of the cylinder design. The service life of a composite cylinder shell must not be extended beyond its initial approved design life.

5.2.1.2 Not used.

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 (e.g. MRI or cooling machines).

UN Model Regulations, 6.2.2.1.3 (see ST/SG/AC.10/48/Add.1):

For the cylinder shell:

	Reference	*Title*	*Applicable for manufacture*
	ISO 9809-1:1999	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa. *Note.— The note concerning the F factor in section 7.3 of this standard must not be applied for UN cylinders.*	Until 31 December 2018
	ISO 9809-1:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa.	Until ~~further notice~~ 31 December 2026
	ISO 9809-1:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa.	Until further notice
	ISO 9809-3:2000	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	Until 31 December 2018
	ISO 9809-3:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders.	Until ~~— further notice~~ 31 December 2026
	ISO 9809-3:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 3: Normalized steel cylinders and tubes.	Until further notice
+	ISO 4706:2008	Gas cylinders — Refillable welded steel cylinders — Test pressure 60 bar and below	Until further notice
+	ISO 7866:2012 + Cor 1:2014	Gas cylinders — Refillable seamless aluminium alloy gas cylinders — Design, construction and testing *Note.— Aluminium alloy 6351A or equivalent must not be used*	Until further notice

For the acetylene cylinder including the porous mass in the cylinder:

Reference	*Title*	*Applicable for manufacture*
ISO 3807-1:2000	Cylinders for acetylene — Basic requirements — Part 1: Cylinders without fusible plugs.	Until 31 December 2020
ISO 3807-2:2000	Cylinders for acetylene — Basic requirements — Part 2: Cylinders with fusible plugs.	Until 31 December 2020
ISO 3807:2013	Gas cylinders — Acetylene cylinders — Basic requirements and type testing	Until further notice

UN Model Regulations, 6.2.2.1.4 (see ST/SG/AC.10/48/Add.1):

5.2.1.4 The following standard applies for the design, construction and initial inspection and test of UN closed cryogenic receptacles, except that inspection requirements related to the conformity assessment system and approval must be in accordance with 5.2.5:

Reference	*Title*	*Applicable for manufacture*
ISO 21029-1:2004	Cryogenic vessels — Transportable vacuum insulated vessels of not more than 1 000 L volume — Part 1: Design, fabrication, inspection and tests.	Until ~~further notice~~ 31 December 2026
ISO 21029-1:2018 + Amd.1:2019	Cryogenic vessels — Transportable vacuum insulated vessels of not more than 1 000 L volume — Part 1: Design, fabrication, inspection and tests.	Until further notice

UN Model Regulations, 6.2.2.1.5 (see ST/SG/AC.10/48/Add.1):

5.2.1.5 The following standards apply for the design, construction, and initial inspection and test of UN metal hydride storage systems, 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 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	Until ~~further notice~~ 31 December 2026
ISO 16111:2018	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	Until further notice

5.2.1.6 Not used.

UN Model Regulations, 6.2.2.1.7 (see ST/SG/AC.10/48/Add.1):

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

Reference	*Title*	*Applicable for manufacture*
ISO 11513:2011	Gas cylinders — Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) — Design, construction, testing, use and periodic inspection.	Until ~~further notice~~ 31 December 2026
ISO 11513:2019	Gas cylinders — Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) — Design, construction, testing, use and periodic inspection.	Until further notice
ISO 9809-1:2010	Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa.	~~Until further notice~~ 31 December 2026
ISO 9809-1:2019	Gas cylinders — Design, construction and testing of refillable seamless steel gas cylinders and tubes — Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa.	Until further notice

5.2.1.8 Not used.

UN Model Regulations, 6.2.2.1.9 (see ST/SG/AC.10/48/Add.1):

5.2.1.9 The following standards apply for the design, construction and initial inspection and test of non-refillable UN cylinders except that the inspection requirements related to the conformity assessment system and approval must be in accordance with 6;5.2.5.

Reference	*Title*	*Applicable for manufacture*
ISO 11118:1999	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	Until 31 December 2020
ISO 13340:2001	Transportable gas cylinders — Cylinder valves for non-refillable cylinders — Specification and prototype testing.	Until 31 December 2020
ISO 11118:2015	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	Until 31 December 2026
ISO 11118:2015 + Amd.1:2019	Gas cylinders — Non-refillable metallic gas cylinders — Specification and test methods.	Until further notice

5.2.2 Materials

In addition to the material requirements specified in the ~~cylinder and closed cryogenic receptacle~~ design and construction

standards, and any restrictions specified in the applicable Packing Instruction for the gas(es) to be transported (e.g. Packing Instruction 200, Packing Instruction 202 or Packing Instruction 214), the following standards apply to material compatibility:

Reference	*Title*	*Applicable for manufacture*
ISO 11114-1:2012 + A1:2017	Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials.	Until further notice
ISO 11114-2:2013	Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials.	Until further notice

UN Model Regulations, 6.2.2.3 (see ST/SG/AC.10/48/Add.1):

5.2.3 ~~Service equipment~~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 11117:1998	Gas cylinders — Valve protection caps and valve guards for industrial and medical gas cylinders — Design, construction and tests.	Until 31 December 2014
	ISO 11117:2008+ Cor 1:2009	Gas cylinders — Valve protection caps and valve guards — Design, construction and tests.	Until ~~further notice~~ 31 December 2026
	ISO 11117:2019	Gas cylinders — Valve protection caps and guards — Design, construction and tests.	Until further notice
	ISO 10297:1999	Gas cylinders – Refillable gas cylinder valves – Specification and type testing.	Until 31 December 2008
	ISO 10297:2006	Gas cylinders — Refillable gas cylinder valves — Specification and type testing.	Until 31 December 2020
≠	ISO 10297:2014	Gas cylinders — Cylinder valves — Specification and type testing	Until 31 December 2022
+	ISO 10297:2014 + A1:2017	Gas cylinders — Cylinder valves — Specification and type testing	Until further notice
	~~ISO 13340:2001~~	~~Transportable gas cylinders — Cylinder valves for non-refillable cylinders — Specification and prototype testing.~~	~~Until 31 December 2020~~
≠	ISO 14246:2014	Gas cylinders — Cylinder valves — Manufacturing tests and examination	Until 31 December 2024
+	ISO 14246:2014 + A1:2017	Gas cylinders — Cylinder valves — Manufacturing tests and examination	Until further notice
	ISO 17871:2015	Gas cylinders — Quick-release cylinders valves — Specification and type testing *Note.— This standard must not be used for flammable gases.*	Until ~~further notice~~ 31 December 2026
	Paragraph 3.1.2.9.2 of the DGP-WG/21 report:		
	ISO 17871:2020	Gas cylinders — Quick-release cylinder valves — Specification and type testing.	Until further notice
+	ISO 17879:2017	Gas cylinders — Self-closing cylinder valves — Specification and type testing *Note.— This standard must not be applied to self-closing valves in acetylene cylinders.*	Until further notice

Paragraph 3.1.2.9 of the DGP-WG/21 report:

For UN metal hydride storage systems, the requirements specified in the following standard apply to closures and their protection:

Reference	*Title*	*Applicable for manufacture*
ISO 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride	Until ~~further notice~~ 31 December 2026
ISO 16111:2018	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	Until further notice

UN Model Regulations, 6.2.2.4 (see ST/SG/AC.10/48/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 ~~and their closures~~:

Reference	*Title*	*Applicable for manufacture*
ISO 6406:2005	Seamless steel gas cylinders — Periodic inspection and testing.	Until ~~further notice~~ 31 December 2024
ISO 18119:2018	Gas cylinders — Seamless steel and seamless aluminium-alloy gas cylinders and tubes — Periodic inspection and testing.	Until further notice
ISO 10460:2005	Gas cylinders – Welded carbon-steel gas cylinders – Periodic inspection and testing. *Note.— The repair of welds described in clause 12.1 of this standard must not be permitted. Repairs described in clause 12.2 require the approval of the appropriate national authority which approved the periodic inspection and test body in accordance with 5.2.6.*	Until ~~further notice~~ 31 December 2024
ISO 10460:2018	Gas cylinders — Welded aluminium-alloy, carbon and stainless steel gas cylinders — Periodic inspection and testing.	Until further notice
ISO 10461:2005/A1:2006	Seamless aluminium-alloy gas cylinders — Periodic inspection and testing.	Until ~~further notice~~ 31 December 2024
ISO 10462:2013	Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance.	Until ~~further notice~~ 31 December 2024
ISO 10462:2013 + Amd1:2019	Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance.	Until further notice
ISO 11513:2011	Gas cylinders — Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) — Design, construction, testing, use and periodic inspection.	Until ~~further notice~~ 31 December 2024
ISO 11513:2019	Gas cylinders — Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) — Design, construction, testing, use and periodic inspection.	Until further notice
~~ISO 11623:2002~~	~~Transportable gas cylinders — Periodic inspection and testing of composite gas cylinders.~~	~~Until 31 December 2020~~
ISO 11623:2015	Gas cylinders — Composite construction — Periodic inspection and testing	Until further notice
ISO 22434:2006	Transportable gas cylinders — Inspection and maintenance of cylinder valves *Note.— These requirements may be met at times other than at the periodic inspection and test of UN cylinders.*	Until further notice
+ ISO 20475:2018	Gas cylinders — Cylinder bundles — Periodic inspection and testing	Until further notice
ISO 23088:2020	Gas cylinders — Periodic inspection and testing of welded steel pressure drums — Capacities up to 1 000 L.	Until further notice

5.2.4.2 The following standard applies to the periodic inspection and testing of UN metal hydride storage systems.

Reference	*Title*	*Applicable for manufacture*
ISO 16111:2008	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride	Until ~~further notice~~ 31 December 2024
ISO 16111:2018	Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride.	Until further notice

5.2.5 Conformity assessment system and approval for manufacture of cylinders and closed cryogenic receptacles

Paragraph 3.1.2.9.1 c) of the DGP-WG/21 report:

UN Model Regulations, 6.2.2.5 (see ST/SG/AC.10/48/Add.1):

5.2.5.1 General

5.2.5.1.1 *Definitions*

For the purposes of this section:

Conformity assessment system: a system for appropriate national authority approval of a manufacturer, by cylinder and closed cryogenic receptacle design type approval, approval of manufacturer's quality system and approval of inspection bodies.

Design type: a cylinder and closed cryogenic receptacle design as specified by a particular cylinder and closed cryogenic receptacle standard.

Verify: confirm by examination or provision of objective evidence that specified requirements have been fulfilled.

Paragraph 3.1.2.9.1 a) of the DGP-WG/21 report (To be considered: The Technical Instructions refer specifically to cylinder, cylinder shells and inner vessel of closed cryogenic receptacles receptacle. Is the note needed in the Technical Instructions?):

Note.— In this subsection when separate assessment is used the term pressure receptacle must refer to pressure receptacle, pressure receptacle shell, inner vessel of the closed cryogenic receptacle or closure, as appropriate.

5.2.5.1.2 The requirements of 5.2.5 must be used for the conformity assessments of [cylinders and closed cryogenic receptacles]. Paragraph 5.1.4.3 gives details of which parts of [cylinders] may be conformity assessed separately. However, the requirements of 5.2.5 may be replaced by requirements specified by the competent authority in the following cases:

a) conformity assessment of closures;

Paragraph 3.1.2.9.1 b) of the DGP-WG/21 report (Bundles of cylinders are not permitted for air transport. Should following be replaced with "Not used"?)

b) conformity assessment of the complete assembly of bundles of cylinders provided the cylinder shells have been conformity assessed in accordance with the requirements of 5.2.5; and

Paragraph 3.1.2.9 of the DGP-WG/21 report:

c) conformity assessment of the complete assembly of closed cryogenic receptacles provided the inner vessel has been conformity assessed in accordance with the requirements of 5.2.5.

. . .

5.2.5.4.9 *Procedure for design type approval*

5.2.5.4.9.1 The inspection body must:

a) examine the technical documentation to verify that:

i) the design is in accordance with the relevant provisions of the standard; and

ii) the prototype lot has been manufactured in conformity with the technical documentation and is representative of the design;

b) verify that the production inspections have been carried out as required in accordance with 5.2.5.5;

Paragraph 3.1.2.9.1 a) of the DGP-WG/21 report:

UN Model Regulations, 6.2.2.5.4.9 (see ST/SG/AC.10/48/Add.1):

c) ~~select cylinders and closed cryogenic receptacles from a prototype production lot and supervise the tests of these cylinders and closed cryogenic receptacles~~ as required by the cylinder and closed cryogenic receptacle standard or technical code, carry out or supervise the tests of pressure receptacles as required for design type approval;

d) perform or have performed the examinations and tests specified in the cylinder and closed cryogenic receptacle standard to determine that:

i) the standard has been applied and fulfilled; and

ii) the procedures adopted by the manufacturer meet the requirements of the standard; and

e) ensure that the various type approval examinations and tests are correctly and competently carried out.

5.2.5.4.9.2 After prototype testing has been carried out with satisfactory results and all applicable requirements of 5.2.5.4 have been satisfied, a Design Type Approval Certificate must be issued which must include the name and address of the manufacturer, results and conclusions of the examination, and the necessary data for identification of the design type. If it was not possible to evaluate exhaustively the compatibility of the materials of construction with the contents of the cylinder or closed cryogenic receptacle when the certificate was issued, a statement that compatibility assessment was not completed must be included in the design type approval certificate.

. . .

5.2.7 Marking of UN refillable cylinders and closed cryogenic receptacles

Paragraph 3.1.2.9 of the DGP-WG/21 report:

UN Model Regulations, 6.2.2.7 (see ST/SG/AC.10/48/Add.1):

Note.— Marking requirements for UN metal hydride storage systems are given in 5.2.9 and marking requirements for closures are given in 5.2.11.

5.2.7.1 Refillable UN cylinder~~s~~ shells and closed cryogenic receptacles must be marked clearly and legibly with certification, operational and manufacturing marks. These marks must be permanently affixed (e.g. stamped, engraved or etched) ~~on the cylinder~~. The marks must be on the shoulder, top end or neck of the cylinder shell and closed cryogenic receptacle or on a permanently affixed component of the cylinder and closed cryogenic receptacle (e.g. welded collar or corrosion-resistant plate welded to the outer jacket of a closed cryogenic receptacle). Except for the UN packaging symbol, the minimum size of the marks must be 5 mm for cylinders and closed cryogenic receptacles with a diameter greater than or equal to 140 mm and 2.5 mm for cylinders and closed cryogenic receptacles with a diameter less than 140 mm. The minimum size of the UN packaging symbol must be 10 mm for cylinders and closed cryogenic receptacles with a diameter greater than or equal to 140 mm and 5 mm for cylinders and closed cryogenic receptacles with a diameter less than 140 mm.

5.2.7.2 The following certification marks must be applied:

a) The UN packaging symbol (u n)

This symbol must not be used for any purpose other than certifying that a packaging complies with the relevant requirements in Chapters 1 to 6;

Paragraph 3.1.2.9 of the DGP-WG/21 report:

UN Model Regulations, 6.2.2.7.2 b) (see ST/SG/AC.10/48/Add.1):

b) The technical standard (e.g. ISO 9809-1) used for the design, construction and testing and, ~~:~~*for acetylene cylinders, the standard ISO 3807.*

c) The character(s) identifying the country of approval, as indicated by the distinguishing signs used on vehicles in international road traffic;

Note 1.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

Note 2.— For the purpose of this mark the State of approval means the State of the appropriate national authority that authorized the initial inspection and test of the individual receptacle at the time of manufacture.

d) The identity mark or stamp of the inspection body that is registered with the appropriate national authority of the country authorizing the marking;

e) The date of the initial inspection, the year (four digits) followed by the month (two digits) separated by a slash (i.e. “/”).

Paragraph 3.1.2.9 of the DGP-WG/21 report:

UN Model Regulations, 6.2.2.7.2 (see ST/SG/AC.10/48/Add.1):

Note.— When an acetylene cylinder is conformity assessed in accordance with 5.1.4.4.2 b) and the inspection bodies for the cylinder shell and the acetylene cylinder are different, their respective marks (d)) are required. Only the initial inspection date (e)) of the completed acetylene cylinder is required. If the country of approval of the inspection body responsible for the initial inspection and test is different a second mark (c)) must be applied.

5.2.7.3 The following operational marks must be applied:

f) The test pressure in bar, preceded by the letters “PH” and followed by the letters “BAR”;

UN Model Regulations, 6.2.2.7.3 g) (see ST/SG/AC.10/48/Add.1):

g) The mass of the empty cylinder and closed cryogenic receptacle including all permanently attached integral parts (e.g. neck ring, foot ring, etc.) in kilograms, followed by the letters “KG”. This mass must not include the mass of ~~valve, valve cap~~ closure(s), valve protection cap or valve guard, any coating, or porous mass for acetylene. The mass must be expressed to three significant figures rounded up to the last digit. For cylinders and closed cryogenic receptacles of less than 1 kg, the mass must be expressed to two significant figures rounded up to the last digit. In the case of cylinders for UN 1001 **Acetylene, dissolved** and UN 3374 **Acetylene, solvent free**, at least one decimal must be shown after the decimal point and two digits for cylinders of less than 1 kg;

h) The minimum guaranteed wall thickness of the cylinder in millimetres followed by the letters “MM”. This mark is not required for cylinders with a water capacity less than or equal to 1 litre or for composite cylinders or for closed cryogenic receptacles;

UN Model Regulations, 6.2.2.7.3 i) (see ST/SG/AC.10/48/Add.1):

i) In the case of cylinders for compressed gases, UN 1001 **Acetylene, dissolved**, and UN 3374 **Acetylene, solvent free**, the working pressure in bar, preceded by the letters "PW". In the case of closed cryogenic receptacles, the maximum allowable working pressure preceded by the letters "MAWP";

Note.— When a cylinder shell is intended for use as an acetylene cylinder (including the porous material), the working pressure mark is not required until the acetylene cylinder is completed.

UN Model Regulations, 6.2.2.7.3 j) (see ST/SG/AC.10/48/Add.1):

j) In the case of cylinders for liquefied gases and dissolved gases and closed cryogenic receptacles, the water capacity in litres expressed to three significant figures rounded down to the last digit, followed by the letter "L". If the value of the minimum or nominal water capacity is an integer, the digits after the decimal point may be neglected;

UN Model Regulations, 6.2.2.7.3 k) and l) (see ST/SG/AC.10/48/Add.1):

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 ~~receptacle, the fittings and accessories not removed during filling, any coating, the porous mass, the solvent and the saturation gas~~ 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 (e.g. name or trademark); and

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

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 ~~receptacle, the fittings and accessories not removed during filling, any coating, and the porous mass~~ 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; and

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

5.2.7.4 The following manufacturing marks must be applied:

m) Identification of the cylinder thread (e.g. 25E). This mark is not required for closed cryogenic receptacles;

Note.— Information on marks that may be used for identifying threads for cylinders is given in ISO/TR 11364, Gas cylinders — Compilation of national and international valve stem/gas cylinder neck threads and their identification and marking system.

n) The manufacturer's mark registered by the appropriate national authority. When the country of manufacture is not the same as the country of approval, then the manufacturer's mark must be preceded by the character(s) identifying the country of manufacture, as indicated by the distinguishing signs used on vehicles in international road traffic. The country mark and the manufacturer's mark must be separated by a space or slash;

UN Model Regulations, 6.2.2.7.4 n) (see ST/SG/AC.10/48/Add.1):

Note 1.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

Note 2.— For acetylene cylinders, if the manufacturer of the acetylene cylinder and the manufacturer of the cylinder shell are different, only the mark of the manufacturer of the completed acetylene cylinder is required.

. . .

UN Model Regulations, 6.2.2.7.8 (see ST/SG/AC.10/48/Add.1):

5.2.7.8 ~~For acetylene cylinders, with the agreement of the national authority, the date of the most recent periodic inspection and the stamp of the body performing the periodic inspection and test~~ The marks in accordance with 5.2.7.7 may be engraved on a metallic ring ~~held on~~ affixed to the cylinder ~~by~~ when the valve is installed~~. The ring must be configured so that it can be~~ and which is ~~removed~~ removable only by disconnecting the valve from the cylinder.

UN Model Regulations, 6.2.2.8.1 (see ST/SG/AC.10/48/Add.1):

5.2.8 Marking of non-refillable UN cylinders ~~and closed cryogenic receptacles~~

5.2.8.1 Non-refillable UN cylinders ~~and closed cryogenic receptacles~~ must be marked clearly and legibly with certification and gas or cylinder ~~and closed cryogenic receptacle~~ specific marks. These marks must be permanently affixed (e.g. 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 ~~and closed cryogenic receptacle~~ or on a permanently affixed component of the cylinder ~~and closed cryogenic receptacle~~ (e.g. 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 ~~and closed cryogenic receptacles~~ with a diameter greater than or equal to 140 mm and 2.5 mm and ~~closed cryogenic receptacles~~ for cylinders with a diameter less than 140 mm. The minimum size of the "UN" mark must be 10 mm for cylinders ~~and closed cryogenic receptacles~~ with a diameter greater than or equal to 140 mm and 5 mm for cylinders ~~and closed cryogenic receptacles~~ with a diameter less than 140 mm. The minimum size of the "DO NOT REFILL" mark must be 5 mm.

5.2.8.2 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 The requirements of 5.2.7.5 must apply.

UN Model Regulations, 6.2.2.8.3 (see ST/SG/AC.10/48/Add.1):

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

5.2.8.4 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.

5.2.9 Marking of UN metal hydride storage systems

5.2.9.1 UN metal hydride storage systems must be marked clearly and legibly with the marks listed in 5.2.9.2. These marks must be permanently affixed (e.g. stamped, engraved, or etched) on the metal hydride storage system. The marks must be on the shoulder, top end or neck of the metal hydride storage system or on a permanently affixed component of the metal hydride storage system. Except for the United Nations packaging symbol, the minimum size of the marks must be:

— 5 mm for metal hydride storage systems with a smallest overall dimension greater than or equal to 140 mm; and

— 2.5 mm for metal hydride storage systems with a smallest overall dimension less than 140 mm.

The minimum size of the United Nations packaging symbol must be:

— 10 mm for metal hydride storage systems with a smallest overall dimension greater than or equal to 140 mm; and

— 5 mm for metal hydride storage systems with a smallest overall dimension less than 140 mm.

5.2.9.2 The following marks must be applied:

a) The UN packaging symbol 

This symbol must not be used for any purpose other than for certifying that a packaging complies with the relevant requirements in Chapters 1 to 6;

b) "ISO 16111" (the technical standard used for design, manufacture and testing);

c) The character(s) identifying the country of approval, as indicated by the distinguishing signs used on vehicles in international road traffic;

Note 1.— The distinguishing sign used on vehicles in international road traffic is the distinguishing sign of the State of registration used on motor vehicles and trailers in international road traffic, e.g. in accordance with the

Geneva Convention on Road Traffic of 1949 or the Vienna Convention on Road Traffic of 1968.

Note 2.— For the purpose of this mark the State of approval means the State of the appropriate national authority that authorized the initial inspection and test of the individual system at the time of manufacture.

d) The identity mark or stamp of the inspection body that is registered with the appropriate national authority of the country authorizing the marking;

e) The date of the initial inspection, the year (four digits), followed by the month (two digits) and separated by a slash (i.e. "/");

f) The test pressure of the cylinder in bar, preceded by the letters "PH" and followed by the letters "BAR";

g) The rated charging pressure of the metal hydride storage system in bar, preceded by the letters "RCP" and followed by the letters "BAR";

h) The manufacturer's mark registered by the appropriate national authority. When the country of manufacture is not the same as the country of approval, then the manufacturer's mark must be preceded by the character(s) identifying the country of manufacture, as indicated by the distinguishing signs used on vehicles in international road traffic. The country mark and the manufacturer's mark must be separated by a space or slash;

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

i) The serial number assigned by the manufacturer;

j) In the case of steel cylinders and composite cylinders with steel liner, the letter "H" showing compatibility of the steel (see 1SO 11114-1:2012); and

k) In the case of metal hydride storage systems having limited life, the date of expiry, denoted by the letters "FINAL" followed by the year (four digits), followed by the month (two digits) and separated by a slash (i.e. "/").

The certification marks specified in a) to e) above must appear consecutively in the sequence given. The test pressure referred to in f) must be immediately preceded by the rated charging pressure referred to in g). The manufacturing marks specified in h) to k) must appear consecutively in the sequence given.

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

5.2.9.4 In addition to the preceding marks, each metal hydride storage system that meets the periodic inspection and test requirements of 5.2.4 must be marked indicating:

a) the character(s) identifying the country authorizing the body performing the periodic inspection and test, as indicated by the distinguishing sign used on vehicles in international road traffic. This mark is not required if this body is approved by the appropriate national authority of the country approving manufacture;

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

b) the registered mark of the body authorized by the appropriate national authority for performing periodic inspection and test;

c) the date of the periodic inspection and test, the year (two digits), followed by the month (two digits) and separated by a slash (i.e."/"). Four digits may be used to indicate the year.

The above marks must appear consecutively in the sequence given.

5.2.10 Not used.

UN Model Regulations, 6.2.2.11 (see ST/SG/AC.10/48/Add.1):

Should the following be "Marking of closures for refillable UN cylinders *and closed cryogenic receptacles*? UN text is "Marking of closures for refillable UN pressure receptacles".

5.2.11 Marking of closures for refillable UN cylinders

5.2.11.1 For closures the following permanent marks must be applied clearly and legibly (e.g. stamped, engraved or etched):

a) manufacturer's identification mark;

b) design standard or design standard designation;

c) date of manufacture (year and month or year and week); and

d) the identity mark of the inspection body responsible for the initial inspection and test, if applicable.

5.2.11.2 The valve test pressure must be marked when it is less than the test pressure which is indicated by the rating of the valve filling connection.

. . .

5.4 REQUIREMENTS FOR AEROSOL DISPENSERS, SMALL RECEPTACLES CONTAINING GAS (GAS CARTRIDGES) AND FUEL CELL CARTRIDGES CONTAINING LIQUEFIED FLAMMABLE GAS

UN Model Regulations, 6.2.4 (see ST/SG/AC.10/48/Add.1):

5.4.1 The internal pressure of aerosol dispensers at 50 °C must not exceed 1.2 MPa (12 bar) when using flammable liquefied gases, 1.32 MPa (13.2 bar) when using non-flammable liquefied gases, and 1.5 MPa (15 bar) when using non-flammable compressed or dissolved gases. In case of a mixture of several gases, the stricter limit applies.

5.4.2 Each filled aerosol dispenser or gas cartridge or fuel cell cartridge must be subjected to a test in a hot water bath in accordance with 5.4.2.1 or an approved water bath alternative in accordance with 5.4.2.2.

5.4.2.1 HOT WATER BATH TEST

5.4.2.1.1 The temperature of the water bath and the duration of the test must be such that the internal pressure reaches that which would be reached at 55°C (50°C if the liquid phase does not exceed 95 per cent of the capacity of the aerosol dispenser, gas cartridge or fuel cell cartridge at 50°C). If the contents are sensitive to heat or if the aerosol dispensers, gas cartridges or fuel cell cartridges are made of plastics material which softens at this test temperature, the temperature of the bath must be set at between 20°C and 30°C but, in addition, one aerosol dispenser, gas cartridge or fuel cell cartridge in 2 000 must be tested at the higher temperature.

5.4.2.1.2. No leakage or permanent deformation of an aerosol dispenser, gas cartridge or fuel cell cartridge may occur, except that a plastic aerosol dispenser, gas cartridge or fuel cell cartridge may be deformed through softening provided that it does not leak.

5.4.2.2 ALTERNATIVE METHODS

With the approval of the appropriate national authority, alternative methods which provide an equivalent level of safety may be used provided that the requirements of 5.4.2.2.1 and, as appropriate, 5.4.2.2.2 or 5.4.2.2.3 are met.

5.4.2.2.1 *Quality system*

5.4.2.2.1.1 Aerosol dispenser, gas cartridge or fuel cell cartridge fillers and component manufacturers must have a quality system. The quality system must implement procedures to ensure that all aerosol dispensers, gas cartridges or fuel cell cartridges that leak or that are deformed are rejected and not offered for transport.

5.4.2.2.1.1.1 The quality system must include:

a) a description of the organizational structure and responsibilities;

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

c) quality records, such as inspection reports, test data, calibration data and certificates;

d) management reviews to ensure the effective operation of the quality system;

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

f) a means for control of non-conforming aerosol dispensers, gas cartridges or fuel cell cartridges;

g) training programmes and qualification procedures for relevant personnel; and

h) procedures to ensure that there is no damage to the final product.

5.4.2.2.1.1.2 An initial audit and periodic audits must be conducted to the satisfaction of the appropriate national authority. These audits must ensure the approved system is and remains adequate and efficient. Any proposed changes to the approved system must be notified to the appropriate national authority in advance.

5.4.2.2.2 *Aerosol dispensers*

5.4.2.2.2.1 *Pressure and leak testing of aerosol dispensers before filling*

Each empty aerosol dispenser must be subjected to a pressure equal to or in excess of the maximum expected in the filled aerosol dispensers at 55°C (50°C if the liquid phase does not exceed 95 percent of the capacity of the receptacle at 50°C). This must be at least two-thirds of the design pressure of the aerosol dispenser. If any aerosol dispenser shows evidence of leakage at a rate equal to or greater than 3.3×10^{-2} mbar.l.s^{-1} at the test pressure, distortion or other defect, it must be rejected.

5.4.2.2.2.2 *Testing of the aerosol dispensers after filling*

5.4.2.2.2.2.1 Prior to filling, the filler must ensure that the crimping equipment is set appropriately and the specified propellant is used.

5.4.2.2.2.2.2 Each filled aerosol dispenser must be weighed and leak tested. The leak detection equipment must be sufficiently sensitive to detect at least a leak rate of 2.0×10^{-3} mbar.l.s^{-1} at 20°C.

5.4.2.2.2.3 Any filled aerosol dispenser which shows evidence of leakage, deformation or excessive mass must be rejected.

5.4.2.2.3 *Gas cartridges and fuel cell cartridges*

5.4.2.2.3.1 *Pressure testing of gas cartridges and fuel cell cartridges*

5.4.2.2.3.1.1 Each gas cartridge or fuel cell cartridge must be subjected to a test pressure equal to or in excess of the maximum expected in the filled receptacle at 55°C (50°C if the liquid phase does not exceed 95 per cent of the capacity of the receptacle at 50°C). This test pressure must be that specified for the gas cartridge or fuel cell cartridge and must not be less than two thirds the design pressure of the gas cartridge or fuel cell cartridge. If any gas cartridge or fuel cell cartridge shows evidence of leakage at a rate equal to or greater than 3.3×10^{-2} mbar.l.s^{-1} at the test pressure, distortion or any other defect, it must be rejected.

5.4.2.2.3.2 *Leak testing gas cartridges and fuel cell cartridges*

5.4.2.2.3.2.1 Prior to filling and sealing, the filler must ensure that the closures (if any) and the associated sealing equipment are closed appropriately and the specified gas is used.

5.4.2.2.3.2.2 Each filled gas cartridge or fuel cell cartridge must be checked for the correct mass of gas and must be leak tested. The leak detection equipment must be sufficiently sensitive to detect at least a leak rate of 2.0×10^{-3} mbar.l.s^{-1} at 20°C.

5.4.2.2.3.2.3 Any gas cartridge or fuel cell cartridge that has a gas mass not in conformity with the declared mass limits or shows evidence of leakage or deformation, must be rejected.

5.4.2.3 With the approval of the appropriate national authority, aerosols and receptacles, small, are not subject to 5.4.2.1 and 5.4.2.2 if they are required to be sterile, but may be adversely affected by water bath testing, provided:

a) they contain a non-flammable gas and either:

i) contain other substances that are constituent parts of pharmaceutical products for medical, veterinary or similar purposes; or

ii) contain other substances used in the production process for pharmaceutical products; or

iii) are used in medical, veterinary or similar applications;

b) an equivalent level of safety is achieved by the manufacturer's use of alternative methods for leak detection and pressure resistance, such as helium detection and water bathing using a statistical sample of at least 1 in 2 000 from each production batch; and

c) for pharmaceutical products according to a) i) and iii) above, they are manufactured under the authority of a national health administration. If required by the appropriate national authority, the principles of Good Manufacturing Practice (GMP) established by the World Health Organization (WHO)[1] must be followed.

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Chapter 6

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

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Paragraph 3.1.2.9 of the DGP-WG/21 report:

UN Model Regulations, 6.3.2.1 (see ST/SG/AC.10/48/Add.1):

6.2 REQUIREMENTS FOR PACKAGINGS

6.2.1 The requirements for packagings in this section are based on packagings, as specified in Chapter 2, currently used. In order to take into account progress in science and technology, there is no objection to the use of packagings having specifications different from those in this chapter provided that they are equally effective, acceptable to the competent authority and able to successfully ~~to withstand the tests~~ fulfil the requirements described in 6.5. Methods of testing other than those described in these Instructions are acceptable provided they are equivalent.

6.2.2 Packagings must be manufactured and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each packaging meets the requirements of this chapter.

The following note is in the Model Regulations but not the Technical Instructions, so added for sake of alignment:

Note.— ISO 16106:2020 Transport packages for dangerous goods — Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings — Guidelines for the application of ISO 9001 provides acceptable guidance on procedures which may be followed.

6.2.3 Manufacturers and subsequent distributors of packagings must provide information regarding procedures to be followed (including closure instructions for inner packagings and receptacles), a description of the types and dimensions of the closures (including required gaskets) and any other components needed to ensure that packages, as presented for transport, are capable of passing the applicable performance tests of this chapter.

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1. WHO Publication: Quality assurance of pharmaceuticals. A compendium of guidelines and related materials. Volume 2: Good manufacturing practices and inspection.

UN Model Regulations, 6.4.12.1 (see Corrigendum No. 1 to ST/SG/AC.10/1/Rev.21, Vol. I and II):

6.5.3.2.2 Where the samples are in the shape of a drum or a jerrican, three must be dropped, one in each of the following orientations:

a) diagonally on the top ~~chime~~ edge, with the centre of gravity directly above the point of impact;

b) diagonally on the base ~~chime~~ edge;

c) flat on the body or side.

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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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7.11 TEST PROCEDURES AND DEMONSTRATION OF COMPLIANCE

Paragraph 3.1.2.9 of the DGP-WG/21 report:

UN Model Regulations, 6.4.12.1 (see Corrigendum No. 1 to ST/SG/AC.10/1/Rev.21, Vol. I and II):

7.11.1 Demonstration of compliance with the performance standards required in ~~2;7.2.3.1.3, 2;7.2.3.1.4,~~ 2;7.2.3.3.1, 2;7.2.3.3.2, 2;7.2.3.4.1, 2;7.2.3.4.2, 2;7.2.3.4.3 and 6;7.1 to 6;7.10 must be accomplished by any of the methods listed below or by a combination thereof:

a) Performance of tests with specimens representing special form radioactive material, or low dispersible radioactive material or with prototypes or samples of the packaging, where the contents of the specimen or the packaging for the tests must simulate, as closely as practicable, the expected range of radioactive contents and the specimen or packaging to be tested must be prepared as presented for transport;

b) Reference to previous satisfactory demonstrations of a sufficiently similar nature;

c) Performance of tests with models of appropriate scale incorporating those features which are significant with respect to the item under investigation when engineering experience has shown results of such tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as penetrator diameter or compressive load, must be taken into account;

d) Calculation, or reasoned argument, when the calculation procedures and parameters are generally agreed to be reliable or conservative.

7.11.2 After the specimen, prototype or sample has been subjected to the tests, appropriate methods of assessment must be used to assure that the requirements for the test procedures have been fulfilled in compliance with the performance and acceptance standards prescribed in ~~2;7.2.3.1.3, 2;7.2.3.1.4,~~ 2;7.2.3.3.1, 2;7.2.3.3.2, 2;7.2.3.4.1, 2;7.2.3.4.2, 2;7.2.3.4.3 and 6;7.1 to 6;7.10.

7.11.3 All specimens must be inspected before testing in order to identify and record faults or damage including the following:

a) divergence from the design;

b) defects in manufacture;

c) corrosion or other deterioration; and

d) distortion of features.

The containment system of the package must be clearly specified. The external features of the specimen must be clearly identified so that reference may be made simply and clearly to any part of such a specimen.

UN Model Regulations, 6.4.24.1 (see ST/SG/AC.10/48/Add.1):

7.24 TRANSITIONAL MEASURES FOR CLASS 7

7.24.1 Packages not requiring competent authority approval of design under the 1985, 1985 (As AMENDED 1990),1996 ~~edition~~, 1996 ~~edition~~ (revised), 1996 (as amended 2003), 2005, 2009 and 2012 editions of the IAEA ~~Safety Series No. 6 and 2012 edition of IAEA Safety Standards Series No. SSR-6~~ Regulations for the Safe Transport of Radioactive Material

≠ Packages not requiring competent authority approval of design (excepted packages, Type IP-1, Type IP-2, Type IP-3 and Type A packages) must meet these Instructions in full, except that:

a) packages that meet the requirements of the 1985 or 1985 (As Amended 1990) Editions of ~~IAEA Safety Series No.6~~ the IAEA Regulations for the Safe Transport of Radioactive Material:

i) may continue in transport provided that they were prepared for transport prior to 31 December 2003, and are subject to the requirements of 6.4.24.4 of the UN Model Regulations, if applicable;

ii) may continue to be used, provided that all of the following conditions are met:

1) they were not designed to contain uranium hexafluoride;

2) the applicable requirements of 1;6.3 of these Instructions are applied;

3) the activity limits and classification in Part 2;7 of these Instructions are applied;

4) the requirements and controls for transport in Parts 1, 3, 4, 5 and 7 of these Instructions are applied;

5) the packaging was not manufactured or modified after 31 December 2003.

b) packages that meet the requirements of the 1996, 1996 (revised), 1996 (as amended 2003), 2005 ~~or,~~ 2009 or 2012 Editions of ~~IAEA Safety Series No. 6, or 2012 Edition of IAEA Safety Standards Series No. SSR-6~~ the IAEA Regulations for the Safe Transport of Radioactive Material:

i) may continue in transport provided that they were prepared for transport prior to 31 December 2025 and are subject to the requirements of 6.4.24.4 of the UN Model Regulations, if applicable; or

ii) may continue to be used, provided that all the following conditions are met:

1) the applicable requirements of 1;6.3 of these Instructions are applied;

2) the activity limits and classification in Part 2;7 of these Instructions are applied;

3) the requirements and controls for transport in Parts 1, 3, 4, 5 and 7 of these Instructions are applied; and

4) the packaging was not manufactured or modified after 31 December 2025.

UN Model Regulations, 6.4.24.2 (see ST/SG/AC.10/48/Add.1):

7.24.2 Package designs approved under the 1985, 1985 (As amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005 ~~and~~, 2009 and 2012 Editions of the IAEA ~~Safety Series No. 6 and 2012 Edition of IAEA Safety Standards Series No. SSR-6~~Regulations for the Safe Transport of Radioactive Material

7.24.2.1 Packages requiring competent authority approval of the design must meet these Instructions in full except that:

a) packagings that were manufactured to a package design approved by the competent authority under the provisions of the 1985 or 1985 (As Amended 1990) Editions of the IAEA ~~Safety Series No.6~~ Regulations for the Safe Transport of Radioactive Material may continue to be used provided that all of the following conditions are met:

i) the package design is subject to multilateral approval;

ii) the applicable requirements of 1;6.3 of these Instructions are applied;

iii) the activity limits and classification in Part 2;7 of these Instructions are applied;

iv) the requirements and controls for transport in in Parts 1, 3, 4, 5 and 7 of these Instructions are applied;

v) for a package containing fissile material and transported by air, the requirement of 7.10.11 is met;

b) packagings that were manufactured to a package design approved by the competent authority under the provisions of the 1996, 1996 (revised), 1996 (as amended 2003), 2005 ~~or,~~ 2009 or 2012 Editions of the IAEA ~~Safety Series No. 6, or 2012 Edition of IAEA Safety Standards Series No. SSR-6~~ Regulations for the Safe Transport of Radioactive Material may continue to be used provided that all of the following conditions are met:

i) the package design is subject to multilateral approval after 31 December 2025;

ii) the applicable requirements of 1;6.3 of these Instructions are applied;

iii) the activity limits and material restrictions of Part 2;7 of these Instructions are applied;

iv) the requirements and controls for transport in Parts 1, 3, 4, 5 and 7 of these Instructions are applied.

UN Model Regulations, 6.4.24.3 (see Corrigendum No. 1 to ST/SG/AC.10/1/Rev.21, Vol. I and II):

7.24.2.2 No new manufacture of packagings to a package design meeting the provisions of the ~~1973, 1973 (As Amended)~~, 1985, and 1985 (As Amended 1990) Editions of the IAEA ~~Safety Series No. 6~~ Regulations for the Safe Transport of Radioactive Material is permitted to commence.

UN Model Regulations, 6.4.24.4 (see ST/SG/AC.10/48/Add.1):

7.24.2.3 No new manufacture of packagings of a package design meeting the provisions of the 1996, 1996 (revised), 1996 (as amended 2003), 2005 ~~or~~, 2009 or 2012 Editions of the IAEA ~~Safety Series No. 6, or 2012 Edition of IAEA Safety Standards Series No. SSR-6~~ Regulations for the Safe Transport of Radioactive Material is permitted to commence after 31 December 2028.

UN Model Regulations, 6.4.24.6 (see ST/SG/AC.10/48/Add.1):

7.24.3 Special ~~FORM~~ form radioactive material approved under the 1985, 1985 (As amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005 ~~or~~, 2009 and 2012 Editions of the IAEA ~~Safety Series No. 6 or 2012 Edition of IAEA Safety Standards Series No. SSR-6~~ Regulations for the Safe Transport of Radioactive Material

Special form radioactive material manufactured to a design ~~that~~ which had received unilateral approval by the competent authority under the 1985, 1985 (As Amended 1990), 1996, 1996 (revised), 1996 (as amended 2003), 2005 ~~and~~, 2009 and 2012 editions of the IAEA ~~Safety Series No. 6 and 2012 Edition of IAEA Safety Standards Series No. SSR-6~~ Regulations for the Safe Transport of Radioactive Material may continue to be used when in compliance with the mandatory management system in accordance with the applicable requirements of 1;6.3. There must be no new manufacture of special form radioactive material to a design that had received unilateral approval by the competent authority under the 1985 or 1985 (As amended 1990) Editions of the IAEA ~~Safety Series No. 6~~ Regulations for the Safe Transport of Radioactive Material. No new manufacture of special form radioactive material to a design that had received unilateral approval by the competent authority under the 1996, 1996 (revised), 1996 (as amended 2003), 2005 ~~and~~, 2009 ~~Editions of IAEA Safety Series No. 6,~~ and 2012 Editions of the IAEA Regulations for the Safe Transport of Radioactive Material ~~Safety Standards Series No. SSR-6~~ is permitted to commence after 31 December 2025.

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