

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.

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

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 9809-1:1999	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa. <i>Note.— The note concerning the F factor in section 7.3 of this standard must not be applied for UN cylinders.</i>	Until 31 December 2018
ISO 9809-1:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa.	Until 31 December 2026
ISO 9809-1:2019	Gas cylinders – Design, construction and testing of refillable seamless steel gas cylinders and tubes – Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa.	Until further notice
ISO 9809-2:2000	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa.	Until 31 December 2018
ISO 9809-2:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa.	Until 31 December 2026
ISO 9809-2:2019	Gas cylinders – Design, construction and testing of refillable seamless steel gas cylinders and tubes – Part 2: Quenched and tempered steel cylinders and tubes with tensile strength greater than or equal to 1 100 MPa.	Until further notice
ISO 9809-3:2000	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 3: Normalized steel cylinders.	Until 31 December 2018
ISO 9809-3:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 3: Normalized steel cylinders.	Until 31 December 2026
ISO 9809-3:2019	Gas cylinders – Design, construction and testing of refillable seamless steel gas cylinders and tubes – Part 3: Normalized steel cylinders and tubes.	Until further notice
≠ ISO 9809-4:2014	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa	Until 31 December 2028
+ ISO 9809-4:2021	Gas cylinders – Design, construction and testing of refillable seamless steel gas cylinders and tubes – Part 4: Stainless steel cylinders with an Rm value of less than 1 100 MPa <i>Note.— Small quantities are a batch of cylinders not exceeding 200.</i>	Until further notice
ISO 7866:1999	Gas cylinders – Refillable seamless aluminium alloy gas cylinders – Design, construction and testing. <i>Note.— The note concerning the F factor in section 7.2 of this standard must not be applied for UN cylinders. Aluminium alloy 6351A – T6 or equivalent must not be authorized.</i>	Until 31 December 2020
ISO 7866: 2012+ Cor 1:2014	Gas cylinders – Refillable seamless aluminium alloy gas cylinders – Design, construction and testing	Until further notice

Reference	Title	Applicable for manufacture
	<i>Note.— Aluminium alloy 6351A or equivalent must not be used.</i>	
ISO 4706:2008	Gas cylinders – Refillable welded steel cylinders – Test pressure 60 bar and below.	Until further notice
ISO 18172-1:2007	Gas cylinders – Refillable welded stainless steel cylinders – Part 1: Test pressure 6 MPa and below.	Until further notice
ISO 20703:2006	Gas cylinders – Refillable welded aluminium-alloy cylinders – Design, construction and testing.	Until further notice
ISO 11119-1:2002	Gas cylinders of composite construction – Specification and test methods – Part 1: Hoop wrapped composite gas cylinders.	Until 31 December 2020
≠ ISO 11119-1:2012	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 L	Until 31 December 2028
+ ISO 11119-1:2020	Gas cylinders – Design, construction and testing of refillable composite gas cylinders and tubes – Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 L	Until further notice
ISO 11119-2:2002	Gas cylinders of composite construction – Specification and test methods – Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners.	Until 31 December 2020
≠ ISO 11119-2:2012 + Amd 1:2014	Gas cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners.	Until 31 December 2028
+ ISO 11119-2:2020	Gas cylinders – Design, construction and testing of refillable composite gas cylinders and tubes – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners.	Until further notice
ISO 11119-3:2002	Gas cylinders of composite construction – Specification and test methods – Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners. <i>Note.— This standard must not be used for linerless cylinders manufactured from two parts joined together.</i>	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. <i>Note.— This standard must not be used for linerless cylinders manufactured from two parts joined together.</i>	Until 31 December 2028
+ ISO 11119-3:2020	Gas cylinders – Design, construction and testing of refillable composite gas cylinders and tubes – Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with non-load-sharing metallic or non-metallic liners or without liners.	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 shells must be designed for a design life of not less than fifteen years.

Note 2.— Composite cylinder shells with a design life longer than fifteen years must not be filled after fifteen years from the date of manufacture, unless the design has successfully passed a service life test programme. The programme must be part of the initial design type approval and must specify inspections and tests to demonstrate that composite cylinder shells manufactured accordingly remain safe to the end of their design life. The service life test programme and the results must be approved by the appropriate national authority of the country of approval that is responsible for the initial approval of the cylinder design. The service life of a composite cylinder shell must not be extended beyond its initial approved design life.

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 (such as MRI or cooling machines).

For the cylinder shell:

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 9809-1:1999	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa. <i>Note.— The note concerning the F factor in section 7.3 of this standard must not be applied for UN cylinders.</i>	Until 31 December 2018
ISO 9809-1:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa.	Until 31 December 2026
ISO 9809-1:2019	Gas cylinders – Design, construction and testing of refillable seamless steel gas cylinders and tubes – Part 1: Quenched and tempered steel cylinders and tubes with tensile strength less than 1 100 MPa.	Until further notice
ISO 9809-3:2000	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 3: Normalized steel cylinders.	Until 31 December 2018
ISO 9809-3:2010	Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing – Part 3: Normalized steel cylinders.	Until 31 December 2026
ISO 9809-3:2019	Gas cylinders – Design, construction and testing of refillable seamless steel gas cylinders and tubes – Part 3: Normalized steel cylinders and tubes.	Until further notice
ISO 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 <i>Note.— Aluminium alloy 6351A or equivalent must not be used</i>	Until further notice

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

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
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

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:

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 21029-1:2004	Cryogenic vessels – Transportable vacuum insulated vessels of not more than 1 000 L volume – Part 1: Design, fabrication, inspection and tests.	Until 31 December 2026
ISO 21029-1:2018 + 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

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:

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 16111:2008	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride.	Until 31 December 2026
ISO 16111:2018	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride.	Until further notice

5.2.1.6 Not used.

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.

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
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 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 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.

5.2.1.9 The following standards apply for the design, construction and initial inspection and test of non-refillable UN cylinders except that the inspection requirements related to the conformity assessment system and approval must be in accordance with 6.5.2.5.

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

5.2.2 Materials

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

	<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
≠	ISO 11114-1:2020	Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 1: Metallic materials.	Until further notice
≠	ISO 11114-2:2021	Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials.	Until further notice

5.2.3 Closures and their protection

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

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 31 December 2026
ISO 11117:2019	Gas cylinders – Valve protection caps and guards – Design, construction and tests.	Until further notice
ISO 10297:1999	Gas cylinders – Refillable gas cylinder valves – Specification and type testing.	Until 31 December 2008
ISO 10297:2006	Gas cylinders – Refillable gas cylinder valves – Specification and type testing.	Until 31 December 2020
ISO 10297:2014	Gas cylinders – Cylinder valves – Specification and type testing	Until 31 December 2022
ISO 10297:2014 + Amd 1:2017	Gas cylinders – Cylinder valves – Specification and type testing	Until further notice
ISO 14246:2014	Gas cylinders – Cylinder valves – Manufacturing tests and examination	Until 31 December 2024
ISO 14246:2014 + Amd 1:2017	Gas cylinders – Cylinder valves – Manufacturing tests and examination	Until further notice
ISO 17871:2015	Gas cylinders – Quick-release cylinders valves – Specification and type testing <i>Note.— This standard must not be used for flammable gases.</i>	Until 31 December 2026
ISO 17871:2020	Gas cylinders – Quick-release cylinder valves – Specification and type testing.	Until further notice
ISO 17879:2017	Gas cylinders – Self-closing cylinder valves – Specification and type testing <i>Note.— This standard must not be applied to self-closing valves in acetylene cylinders.</i>	Until further notice
+ ISO 23826:2021	Gas cylinders – Ball valves – Specification and testing	Until further notice

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 31 December 2026
ISO 16111:2018	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride.	Until further notice

5.2.4 Periodic inspection and test

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

Reference	Title	Applicable for manufacture
ISO 6406:2005	Seamless steel gas cylinders – Periodic inspection and testing.	Until 31 December 2024
≠ ISO 18119:2018	Gas cylinders – Seamless steel and seamless aluminium-alloy gas cylinders and tubes – Periodic inspection and testing.	Until 31 December 2026
+ 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
ISO 10460:2005	Gas cylinders – Welded carbon-steel gas cylinders – Periodic inspection and testing. <i>Note.— The repair of welds described in clause 12.1 of this standard must not be permitted. Repairs described in clause 12.2 require the approval of the appropriate national authority which approved the periodic inspection and test body in accordance with 5.2.6.</i>	Until 31 December 2024
ISO 10460:2018	Gas cylinders – Welded aluminium-alloy, carbon and stainless steel gas cylinders – Periodic inspection and testing.	Until further notice
ISO 10461:2005 + Amd 1:2006	Seamless aluminium-alloy gas cylinders – Periodic inspection and testing.	Until 31 December 2024
ISO 10462:2013	Gas cylinders – Acetylene cylinders – Periodic inspection and maintenance.	Until 31 December 2024

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
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 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 11623:2015	Gas cylinders – Composite construction – Periodic inspection and testing	Until further notice
ISO 22434:2006	Transportable gas cylinders – Inspection and maintenance of cylinder valves <i>Note. — These requirements may be met at times other than at the periodic inspection and test of UN cylinders.</i>	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.

<i>Reference</i>	<i>Title</i>	<i>Applicable for manufacture</i>
ISO 16111:2008	Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride	Until 31 December 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

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.

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 5.1.4.4 gives details of which parts of cylinders and closed cryogenic receptacles 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;
- b) Not used; and
- 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.

5.2.5.2 General requirements

5.2.5.2.1 Appropriate national authority