

STANDARDS AUSTRALIA

Australian Standard

Gas cylinders

Part 5: Filling, inspection and testing of refillable cylinders

1 SCOPE

This Standard specifies requirements for the filling, inspection and testing of refillable gas cylinders for the storage and transport of compressed and liquefied gases, of water capacity ranging from 0.1 kg to 3000 kg.

This Standard does not apply to the following.

- (a) Acetylene cylinders.
- (b) Closed cryogenic receptacles.
- (c) Cylinders forming part of aircraft equipment and used solely in aircraft other than as a reference made in a direction pursuant to the Civil Aviation Regulations.
- (d) Pressure drums or vessels constructed to a pressure vessel standard.

The requirements for gas cylinders in fire extinguisher systems and fire extinguishers, apply only where suitable requirements are not given in another Australian Standard.

NOTES:

- 1 The term 'cylinder' is used interchangeably with 'gas cylinder' in this Standard.
- 2 AS 2030.1 sets out requirements for design, verification and manufacturing of all gas cylinders.
- 3 AS 2030.2 sets out requirements for compressed dissolved acetylene.
- 4 AS 2030.4 sets out requirements for closed cryogenic receptacles (formerly called welded cylinders-insulated).

2 REFERENCED DOCUMENTS

A list with titles of the documents referred to in this Standard is given in Appendix A.

3 DEFINITIONS

For the purpose of this Standard, the definitions in AS 2030.1, and those below apply.

3.1 Automatic fill limiter (AFL) valve

A device in the filling system which automatically shuts off the filling when a pre-determined level in the gas cylinder has been reached.

3.2 Filling ratio definitions

3.2.1 Filling ratio

The ratio of the mass of gas to the mass of water at 15°C that is filled in a gas cylinder ready for use.

3.2.2 Maximum filling ratio

The maximum ratio of the mass of gas to the mass of water at 15°C that is permitted to be filled into a gas cylinder by Table 3 or 4 or the cylinder design.

TABLE 1A
PERIODIC INSPECTION INTERVALS AND TESTS—WELDED METALLIC CYLINDERS

Description	Periodic inspection interval, years	External examination	Internal examination	Specified test	Note references
General case General case for welded cylinders not listed below.	5	Yes	Yes	P	2, 3
Welded steel cylinders					
(a) Dry non-corrosive compressed and liquefied gases, except LP Gas.	10	Yes	Yes	Not required (Note 1, 15)	2, 3
(b) Toxic or corrosive gases.	5	Yes	Yes	Not required (Note 1, 15)	2, 10
(c) Anhydrous ammonia.	5	Yes	Yes	Not required (Note 1, 15)	2
(d) Anhydrous ammonia in cylinder <5.5 kg water capacity.	N/A	N/A	N/A	Not required (Note 1, 15)	8
Welded stainless steel cylinders	10	Yes	Yes	P	11
Welded aluminium cylinders Compressed and liquefied gases and gas mixtures, which are non-corrosive to aluminium cylinder alloys.	10	Yes	Yes	P	2, 10
Welded cylinders (steel, stainless steel and aluminium), for liquefied petroleum gas (LP Gas)					
LP Gas in cylinders with removable cylinder valves.	10	Yes	Yes	Not required (Note 1, 15)	2
LP Gas in cylinder of <5.5 kg water capacity with internally-fitted self-closing valves which prevent internal inspection (see Clause 9.6).	10	Yes	No	Not required (Note 1, 15)	2
LP Gas in cylinders of ≥100 kg water capacity and in accordance with Clause 9.4.	15	Yes	Yes	Not required (Note 1, 15)	2

TABLE 1B
PERIODIC INSPECTION INTERVALS AND TESTS—SEAMLESS METALLIC CYLINDERS

Description	Periodic inspection interval, years	External examination	Internal examination	Specified test	Note references
Seamless metallic cylinders not listed below	5	Yes	Yes	P, UT	2, 3
Seamless steel cylinders (except for SCBA and SCUBA)					
(a) Dry non-toxic, non-corrosive compressed and liquefied gases, dry natural gas or methane, (including mixtures containing $\leq 5\%$ CO ₂).	10	Yes	Yes	P, UT	2, 3, 4, 7
(b) Dry CO ₂ and mixtures containing $>5\%$ CO ₂ in cylinders with residual pressure valves (RPV).	10	Yes	Yes	P, UT	2, 3, 4
(c) CO ₂ and mixtures containing $>5\%$ CO ₂ , without RPVs.	5	Yes	Yes	P, UT	2, 3, 4
(d) CO and mixtures containing more than 1000 ppm CO.	5	Yes	Yes	P, UT	2, 4
(e) Toxic or corrosive gases.	5	Yes	Yes	P, UT	2, 4, 10
(f) Seamless steel tubes containing dry non-toxic non-corrosive gases.	Note 14	Yes	Note 13	P, UT, AE	2, 4, 7, 10, 13
(g) Dry non-toxic, non-corrosive compressed and liquefied gases used in fixed fire protection systems and fitted with an approved fire protection cylinder valve.	10	Yes	Yes	P, UT	2, 3, 4
Seamless aluminium cylinders except for SCBA and SCUBA					
Compressed and liquefied gases and gas mixtures, which are non-corrosive to aluminium cylinder alloys, including toxic gases.	10	Yes	Yes	P, UT	2, 4, 10
Seamless cylinders for dry CNG in automotive use (see Note 5)	3	Yes	No	P	7, 9
Seamless stainless steel cylinders					
Compressed and liquefied gases and gas mixtures except LP Gas, which are non-corrosive to stainless steel cylinder alloys.	10	Yes	Yes	P, UT	4, 10, 11
Steel or aluminium cylinders for self-contained breathing apparatus					
(a) SCBA (see AS 3848.2).	5	Yes	Yes	P, UT	2, 4
(b) SCUBA (see AS 3848.2).	1	Yes	Yes	P, UT	2, 4
Cylinders with shrunk-on foot-rings	2	Yes	Yes	P	12

TABLE 1C
PERIODIC INSPECTION INTERVALS AND TESTING—COMPOSITE CYLINDERS

Description	Periodic inspection interval, years	External examination	Internal examination	Specified test	Note references
General composite cylinders including hoop-wrapped, fully wrapped, and of lined or liner-less construction except those listed below, containing compressed or liquefied non-toxic gases which are compatible with the materials of construction of the cylinder and valve.	5	Yes	Yes	P	2, 3, 6
Composite cylinders used for breathing gases					
(a) Breathing gases in SCBA.	5	Yes	Yes	P	2, 6
(b) Breathing gases in SCUBA.	1	Yes	Yes	P	2, 6
Composite cylinders with steel liners					5
(a) Dry CO ₂ when fitted with a residual pressure valve (RPV).	5	Yes	Yes	P	2, 6
(b) Gases or gas mixtures corrosive to steel, e.g. Cl ₂ , NO, non-dry CO ₂ , SO ₂ .	3	Yes	Yes	P	2, 6
(c) CO, H ₂ , CH ₄ and other embrittling gases not specifically approved by the cylinder design code.	3	Yes	Yes	P	2, 6
(d) Toxic, non-corrosive gases or gas mixtures.	5	Yes	Yes	P	2, 6, 10
Composite cylinders with aluminium liners					
Corrosive or toxic gases or gas mixtures LC50 ≤ 200 ppm v/v.	3	Yes	Yes	P	6, 10
Composite cylinders with non-metallic liners or without liners					
LP Gas cylinders	5	Yes	Yes	P	6
Composite cylinders for dry compressed natural gas (CNG), for motor vehicle use.	3	Yes	Yes	P	6, 7, 9

LEGEND:

P = hydraulic stretch or proof test

UT = ultrasonic test

AE = acoustic emission test

NOTES TO TABLES 1A, 1B AND 1C:

- 1 Any or all of these tests may be warranted if defects are suspected. The mass test is always to be applied regardless of gas or use, if general corrosion is being assessed.
- 2 The mass test shall be applied regardless of gas or use, if general corrosion is being assessed. The mass test is not applicable to stainless steel cylinders.
- 3 This Standard applies to cylinders for firefighting equipment where specific requirements are not given in another relevant Australian Standard.
- 4 The internal inspection is not required if an ultrasonic inspection in accordance with AS 2337.1 is performed and no internal defects are indicated.
- 5 The periodic inspection interval shall be reduced if there is evidence of corrosion at the specified periodic inspection interval.
- 6 Where a maximum service life is specified by a manufacturer or by the cylinder specifications, that maximum shall be complied with.
- 7 Commercially pure dry methane, or dry natural gas, which are commercially free of corroding components.
- 8 No periodic inspection interval is specified for anhydrous ammonia cylinders of less than 5.5 kg water capacity. These are subject to external examination prior to each fill.
- 9 Cylinders manufactured to and used in accordance with AS 4838, CSA B51 Part 2, ANSI/IAS NGV2 and ISO 11439, storing compressed natural gas for automotive use, may be inspected by an external examination only. This external examination shall be as specified by the cylinder manufacturer, and shall apply only whilst the cylinder remains in automotive traffic.
- 10 Corrosive gases include those gases which become corrosive when wet, i.e. by hydrolysis.
- 11 Stainless steel may exhibit pin-hole, crevice, or inter granular corrosion under certain circumstances, none of which are readily picked up by an internal visual examination.
- 12 Cylinders with shrunk-on foot-rings are susceptible to corrosion between the foot-ring and the cylinder body.
- 13 AE examination is suitable for seamless steel tubes made to DOT-3AA and -3AAX specifications. Where AE is used, an internal examination is not required.
- 14 As per the manufacturer's specification, but not exceeding 10 years.
- 15 A hydrostatic test is not specified for welded carbon steel cylinders, as the introduced water creates the risk of corrosion, nor for welded LP Gas cylinders, as the internal corrosion risk is minimal.
- 16 Certain requirements may necessitate a shorter time interval e.g. presence of mercury in hydrogen polymerisation or decomposition reactions, or severity of service. The compatibility of gas to be filled with the liner material shall be checked against AS 4955.1 and AS 4955.2.
- 17 The periodic inspection interval shall apply, unless a shorter interval is specified by the cylinder Standard.
- 18 Toxic gases or gas mixtures shall not be filled into cylinders with non-metallic liners or without liners.