SLOVENSKI STANDARD
oSIST prEN ISO 18119:2015

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Plinske jeklenke - Nevarjene jeklene in aluminijeve zlitine plinskih jeklenk in cevi - Periodični pregled in preskušanje (ISO/DIS 18119:2015)

Gas cylinders - Seamless steel and seamless aluminium-alloy gas cylinders and tubes - Periodic inspection and testing (ISO/DIS 18119:2015)

Gasflaschen - Nahtlose Gasflaschenund Großflaschen aus Stahl und Aluminiumlegierungen - Wiederkehrende Inspektion und Prüfung (ISO/DIS 18119:2015)

Bouteilles à gaz - Bouteilles à gaz en acier et en alliages d'aluminium, sans soudure - Contrôles et essais périodiques (ISO/DIS 18119:2015)

Ta slovenski standard je istoveten z: **prEN ISO 18119**

ICS:

23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders

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Gas cylinders — Seamless steel and seamless aluminium-alloy gas cylinders and tubes --- Periodic inspection and testing

Bouteilles à gaz — Bouteilles à gaz en acier et en alliages d'aluminium, sans soudure — Contrôles et essais périodiques

ICS: 23.020.30

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 18119 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 4, *Operational requirements for gas cylinders*.

This first edition cancels and replaces the second editions of ISO 6406:2005, ISO 10461:2005, with the following specific changes:

a) An added section for symbols used in the document

b) A detailed account of steps to be taken if the actual cylinder wall thickness is less than the minimum design wall thickness

c) A clearer way to ultrasonically test cylinders with a built-in footring, especially for steel cylinders with a convex base

d) Improved guidelines for dealing with the effects of any heating in the case of aluminium-alloy cylinders

Introduction

This International Standard provides information and procedures for the periodic inspection and testing of seamless steel and seamless aluminium-alloy cylinders and the condition of the test equipment. The principal aim of periodic inspection and testing is that at the completion of the test the cylinders may be reintroduced into service for a further period of time.

This International Standard requires that well-trained and competent inspectors undertake the work as described in this standard, who consult the cylinder's manufacturer if there are any doubts about aspects of the standard, so that the cylinder manufacturer's current recommendations are taken into account.

ISO 18119 is intended to be used under a variety of national and international regulatory regimes. This International Standard has been written so that it is suitable to be reference in the UN *Model Regulations* [1]. Where there is any conflict between this International Standard and any applicable regulation, the regulation always takes precedence.

Gas cylinders — Seamless steel and seamless aluminium-alloy gas cylinders and tubes — Periodic inspection and testing

1 Scope

This International Standard is applicable to seamless steel and seamless aluminium-alloy transportable gas cylinders (single or those that comprise a bundle) intended for compressed and liquefied gases under pressure, of water capacity from 0,5 l up to 150 l and to seamless steel and seamless aluminium-alloy transportable gas tubes (single or those that comprise a bundle) intended for compressed and liquefied gases under pressure, of water capacity greater than 150 l. It also applies, as far as practical, to cylinders of less than 0,5 l water capacity.

This International Standard specifies the requirements for periodic inspection and testing to verify the integrity of such gas cylinders and tubes to be re-introduced into service for a further period of time.

This International Standard does not apply to periodic inspection and maintenance of acetylene cylinders or to the periodic inspection and testing of composite cylinders.

Unless noted by exception, the use of "cylinder" in this International Standard refers to both cylinders and tubes.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel*

ISO 10286:—[1)], *Gas cylinders — Terminology*

ISO 11114-1, *Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials*

ISO 11114-2, *Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials*

ISO 11621, *Gas cylinders — Procedures for change of gas service*

ISO 13341, *Gas cylinders — Fitting of valves to gas cylinders*

ISO 13769, *Gas cylinders — Stamp marking*

ISO 22434, *Transportable gas cylinders — Inspection and maintenance of cylinder valves*

ISO 25760, *Gas cylinders — Operational procedures for the safe removal of valves from gas cylinders*

1) To be published.

ISO/TR 22694, *Gas cylinders — Methods for establishing acceptance/rejection criteria for flaws in seamless steel and aluminium alloy cylinders at time of periodic inspection*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10286 and the following apply.

3.1
working pressure
settled pressure of a compressed gas (3.4) at a uniform reference temperature of 15 °C in a full gas cylinder

NOTE 1 to entry: In North America service pressure is often used to indicate a similar condition, usually at 21,1 °C (70 °F).

NOTE 2 to entry: In East Asia service pressure is often used to indicate a similar condition, usually at 35 °C.

Source: ISO 10286:—[2)]

3.2
SBT
sidewall-to-base transition region

3.3
FBH
flat bottom hole

3.4
compressed gas
gas which, when packaged under pressure, is entirely gaseous at −50 °C (including all gases with a critical temperature less than or equal to −50 °C)

3.5
liquefied gas
gas which, when packaged under pressure, is partially liquid at temperatures above −50 °C

NOTE 1 to entry: A distinction is made between
a) high pressure liquefied gas: a gas with a critical temperature between −50 °C and 65 °C, and
b) low pressure liquefied gas: a gas with a critical temperature above 65 °C.

3.6
toxic gas
gas which is known to be so toxic or corrosive to humans to pose a health hazard or which is presumed to be toxic or corrosive to humans because it has a LC_{50} value for acute toxicity equal to or less than 5 000 ml/m^3 (ppm)

NOTE 1 to entry: Other risks such as tissue corrosiveness are sometimes associated.

Source: ISO 10286:—[2)]

3.7
proof test pressure
hydraulic pressure which demonstrates the structural integrity of the manifold

2) To be published.

3.8
rejected cylinder
cylinder not fit for service in its present condition

3.9
competent authority
any national body or authority designated or otherwise recognized as such, having jurisdiction for the transport of dangerous goods and the approval of gas cylinders and tubes

NOTE 1 to entry: Adapted from UN *Model Regulations* [1].

3.10
minimum design wall thickness
thickness of the cylinder wall calculated from the design standard, taking into account the material properties and dimensions at time of manufacture

4 Symbols

C, compressibility in square metres/Newton (Pa−1);

D, depth of notch in ultrasonic test sample (mm)

K, factor for individual temperature (listed in Table C.1)

L, length of notch in ultrasonic test sample (mm)

P, pressure (bar);

V, cylinder water capacity (l)

W, width of notch in ultrasonic test sample (mm)

X, flaw length (mm)

Y, flaw depth ratio

t_{mc}, minimum measured wall thickness of the calibration specimen (mm)

t_m, minimum design wall thickness, (mm)

5 Intervals between periodic inspections and tests

A cylinder shall be due for periodic inspection and testing on its first receipt by a filler following the expiry of the interval established in accordance with the requirements of national or international regulations or, in the absence of regulations, in accordance with the United Nations *Model Regulations* [1] (see Annex A). The expiry date is based on the last test date stamped on the cylinder. Other means of indicating the expiry date are permitted.

Seamless steel or seamless aluminium-alloy cylinders used for self-contained breathing apparatus or self-contained underwater breathing apparatus that are not covered by transport regulations shall be submitted for inspection within the interval shown in Table A.1.

Provided the cylinder has not been subjected to abusive and abnormal conditions such as being involved in an accident, heat exposure, or other severe conditions that would render the cylinder unsafe, there is no requirement for the user to return a gas cylinder before the contents have been used even though the periodic inspection and testing interval has lapsed.

6 List of procedures for periodic inspections and tests

Each cylinder shall be submitted to periodic inspections and tests. The following procedures, where applicable, form the requirements for such inspections and tests and are explained more fully in subsequent clauses:

a) identification of cylinder and preparation for inspection and tests (Clause 7);

b) depressurization and devalving procedures (Clause 8);

c) external visual inspection (Clause 9);

d) inspection of cylinder neck (Clause 10);

e) check of internal condition (Clause 11);

f) supplementary tests (Clause 12);

g) pressure test or ultrasonic examination (Clause 13);

h) inspection of valve and other accessories (Clause 14);

i) replacement of cylinder parts (Clause 15);

j) cylinder repairs (Clause 16);

k) final operations (Clause 17); and

l) rejection and rendering cylinder unserviceable (Clause 18).

The inspections and tests shall be carried out only by persons who are competent in the subject and authorized under the relevant regulations. The testing facility shall establish a procedure to ensure inspectors are trained and qualified to perform their job function. The eyesight acuity of inspectors is critical.

It is recommended that the above listed procedures be performed in the sequence listed in order to improve the safety of the operation and to detect potential harmful damage. In particular, the external visual inspection (see Clause 9) shall be carried out before the pressure test, internal visual inspection (when required) or ultrasonic examination (see Clause 13).

When a cylinder passes the above listed procedures but the condition of the cylinder remains in doubt, additional, supplementary tests shall be performed to confirm its suitability for continued service (see Clause 12) or the cylinder shall be rendered unserviceable.

Depending on the reason for rejection, some cylinders may be recovered (see Annex B).

Mechanical properties of steel and aluminium-alloy cylinders can be affected by heat exposure. Therefore, the maximum temperature for any operation shall be limited in accordance with the manufacturer's recommendation. (For aluminium-alloy cylinders, see 17.1.2.)

Cylinders that fail an inspection or test and cannot be recovered shall be rendered unserviceable (see Clause 18).

7 Identification of cylinder and preparation for inspections and tests

The labelling and permanent markings on the cylinder shall be checked and the information recorded before carrying out any further work. When a toxic, flammable or pyrophoric gas is involved, the owner or the individual presenting the cylinder for retest shall inform the testing facility accordingly. Cylinders with incorrect or illegible markings or unknown gas contents shall be set aside for special handling.

For seamless steel cylinders, the following applies in addition:

If the contents are identified as hydrogen or other embrittling gas, only those cylinders manufactured or qualified as hydrogen cylinders shall be used for that service. It shall be checked that the cylinder is compatible for hydrogen service, i.e. with respect to the maximum tensile strength and internal surface condition. Cylinders marked in accordance with ISO 13769 are stamped “H” (applies only to seamless steel cylinders). Seamless steel cylinders which have not been checked or are not stamped "H" shall not be reintroduced into hydrogen service. Their suitability for their new, intended service shall be evaluated in accordance with ISO 11621.

8 Depressurization and devalving procedures

8.1 General

Cylinders that require an internal visual inspection shall be depressurized and emptied in a safe, controlled manner and devalved prior to inspection in accordance with ISO 25760.

Cylinders to be ultrasonically inspected may be examined without being depressurized and having the valve removed.

WARNING — The uncontrolled removal of valves from cylinders can lead to injury, death or property damage.

8.2 Cylinders requiring devalving

All cylinders received by the testing facility for which an internal visual inspection is required shall be safely devalved in accordance with 8.1.

Additionally, cylinders with a footring shall be devalved for internal inspection and may be subsequently evaluated by ultrasonic examination.

8.3 Cylinders not requiring devalving

Cylinders intended for ultrasonic examination do not require the valves to be removed unless otherwise specified in this International Standard.

NOTE It is recommended that cylinders requiring certain operations, e.g. shot blasting, be depressurized.

9 External visual inspection

9.1 Preparation for external visual inspection

If a cylinder's external condition prevents or hinders a proper visual inspection of the surface, then the cylinder shall be prepared before the inspection. If any welded or brazed attachment (e.g. neckring) is seen, the cylinder shall be rendered unserviceable (see Clause 18).

The cylinder shall be cleaned and have all loose coatings, labels, corrosion products, tar, oil or other foreign matter removed from its external surface. In order not to remove any signs of previous damage, the cylinder shall not be at this stage brushed or blasted, until the external visual inspection has been completed. Aluminium-alloy cylinders should be prepared for visual examination in accordance with Annex E. Aluminium-alloy cylinders shall not be shot blasted using steel media; however, blasting may be conducting with other appropriate media (e.g. walnut shells, dry ice pellets, etc.).

The method used to clean the cylinder shall be a validated, controlled process. Care shall be taken at all times to avoid damaging the cylinder (see Annex B).

If fused nylon, polyethylene or a similar coating has been applied and the coating is seen to be damaged or it prevents proper inspection, then the coating shall be stripped. If the coating has been removed by the application of heat, then care shall be taken that the applied temperature has not altered the mechanical properties of the cylinder material. The temperatures at which damage occurs are as follows:

a) For seamless steel cylinders: In no case shall the temperature of the cylinder have exceeded 300 °C; and

b) For aluminium-alloy cylinders: In no case shall the temperature of the cylinder have exceeded the limits specified in 17.1.2.2.

For both seamless steel and aluminium-alloy cylinders, contact the manufacturer if there is doubt about heat exposure. If the manufacturer cannot be consulted, the cylinder shall be rendered unserviceable.

9.2 Inspection procedure

The external surface of each cylinder shall be inspected for:

a) dents, cuts, gouges, bulges, cracks, laminations or excessive base wear;

b) heat damage, torch or electric arc burns (see Table B.1);

c) corrosion (see Table B.2). Attention shall be given to areas where water can be trapped. These include the entire base area and the neckring;

d) other defects such as illegible, incorrect or unauthorized stamp markings, or unauthorized additions or modifications;

e) integrity of all permanent attachments (see B.2);

f) vertical stability (see Table B.1).

g) When inspecting cylinders with footrings, extra attention shall be given to the footring area, especially the transition area cylindrical part/footring, and the gap-area convex base/footring. In these areas corrosion is likely to occur. At this stage, the cylinder shall be visually inspected for signs of corrosion (see Table B.2 for rejection criteria). If corrosion is detected, then the corrosion products and paint shall be removed (e.g., shotblasted), particularly in the areas of corrosion. If the extent of the corrosion cannot be determined, including doubt about the remaining wall thickness, then the cylinder shall be rejected.

For rejection criteria, see Annex B. Cylinders no longer suitable for future service shall be rendered unserviceable (see Clause 18).

10 Inspection of cylinder neck

10.1 Cylinder-to-valve threads

When the valve is removed, the cylinder-to-valve threads shall be examined to identify the type of thread (e.g. see ISO 11363 for 25E) and to ensure that they are

— clean and of full form; and

— free of damage (e.g. burrs, cracks, cross-threading, corrosion, etc.).

In case of any doubt, threads may be verified using appropriate gauges.

Neck cracks manifest themselves as lines that run down the thread across the thread faces (see Figure B.8.) Special attention should be paid to look for the presence of cracks at the area at the bottom of the last thread. They should not be confused with tap marks (thread machining stop marks). See Figure B.9.