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Transportable gas cylinders — Inspection and maintenance of cylinder valves

Bouteilles à gaz transportables — Contrôle et maintenance des robinets de bouteilles

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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 22434 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 2, *Cylinder fittings*.

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Transportable gas cylinders — Inspection and maintenance of cylinder valves

1 Scope

This International Standard specifies the requirements for the inspection and maintenance of cylinder valves, including valves with integrated pressure regulators (VIPR) (see ISO 22435).

This International Standard may be applied to cylinder valves at the time of the periodic inspection of gas cylinders, bundles, drums and trailers, and at any other time, e.g. at change of gas service (see ISO 11621). It does not apply to routine inspection of cylinder valves carried out at the time of cylinder filling.

NOTE National standards and regulations may apply to maintenance of cylinder valves.

2 Normative references

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

ISO 6406:2005, *Gas cylinders — Seamless steel gas cylinders — Periodic inspection and testing*

ISO 10156, *Gases and gas mixtures — Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets*

ISO 10297, *Transportable gas cylinders — Cylinder valves — Specification and type testing*

ISO 10463, *Cylinders for permanent gases — Inspection at time of filling*

ISO 10691, *Gas cylinders — Refillable welded steel cylinders for Liquified Petroleum Gas (LPG) — Procedures for checking before, during and after filling*

ISO 11113, *Cylinders for liquefied gases (excluding acetylene and LPG) — Inspection at time of filling*

ISO 11372, *Gas cylinders — Cylinders for dissolved acetylene — Inspection at time of filling*

ISO 11755, *Gas cylinders — Cylinder bundles for compressed and liquefied gases (excluding acetylene) — Inspection at time of filling*

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

ISO 14245, *Gas cylinders — Specifications and testing of LPG cylinder valves — Self-closing*

ISO 14246, *Transportable gas cylinders — Gas cylinder valves — Manufacturing tests and inspection*

ISO 15001, *Anaesthetic and respiratory equipment — Compatibility with oxygen*

ISO 15995, *Gas cylinders — Specifications and testing of LPG cylinder valves — Manually operated*

ISO 22435, *Gas cylinders — Cylinder valves with integrated pressure regulator — Specification and type testing*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
inspection
procedure to determine if a cylinder valve is suitable for further service

3.2
dismantling
separation of the cylinder valve into its component parts, such that the main pressure barrier of the valve is breached

3.3
removal
disconnection of the cylinder valve from the gas cylinder

3.4
maintenance
operations required to keep the cylinder valve in working condition

NOTE This covers minor repairs, major repairs and refurbishment.

3.4.1
minor repair
operation including cleaning, and replacement of non-pressure-retaining components, e.g. handwheel, outlet flow restrictor, residual pressure device fitted in the valve outlet

3.4.2
major repair
operation including replacement of valve accessories which are incorporated within the pressure boundary, but do not require dismantling of the cylinder valve, e.g. pressure relief device (PRD), pressure gauges, flowmeter

3.4.3
refurbishment
operation involving dismantling of the cylinder valve, evaluation of its internal components, and reassembly to make it suitable for further service

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4 General requirements

4.1 Occurrence

If a cylinder valve is deemed to require maintenance at any time, e.g. at time of periodic test of the gas cylinder, it shall either be scrapped, or be subject to the procedures given below.

4.2 Personnel

Cylinder valves shall be inspected, maintained and removed from gas cylinders by competent personnel only.

4.3 Safety concerns

Prior to removing the cylinder valve from a gas cylinder it shall be verified that no pressure remains in the cylinder. See ISO 6406:2005, Annex D.

NOTE Special techniques and equipment exist in some industries, e.g. LPG, for removing valves safely from cylinders under pressure.

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Inspection and minor repairs may be carried out on cylinder valves while they are connected to a pressurized gas cylinder, but this requires special procedures.

Major repairs and refurbishment shall only be performed on a cylinder valve in a de-pressurized cylinder or on a removed valve.

5 Inspection and maintenance

Inspection will determine if a cylinder valve is suitable for continued service or if maintenance is required, and the level of that maintenance.

5.1 Inspection

Inspection of cylinder valves comprises external examination preceded by cleaning, where necessary.

5.1.1 Cleaning

The cylinder valve shall be clean externally to facilitate inspection.

a) Contamination, foreign bodies and corrosion products shall be removed from the valve outlet taking care not to damage any sealing surfaces.

b) If any cleaning media are used, they are to be suitable for the intended gas service (e.g. medical), the materials of construction of the cylinder valve, the gas cylinder and the associated downstream equipment. Cleaning media shall be completely removed.

5.1.2 External examination — valve remaining in the gas cylinder

Cylinder valves shall be examined for defects including the following:

a) the spindle does not move smoothly or is difficult to turn;

b) bent, deformed, corroded, badly marked and scored bodies or those with cracks;

c) bent or damaged spindles;

d) cross-threaded, damaged, worn, corroded or stripped valve outlet and filling connections;

e) damaged, corroded or worn outlet sealing surfaces and/or any non-metallic sealing element;

f) any indication of having been subjected to excessive heat or having been in a fire;

g) foreign matter obstructing or blocking ports;

h) distorted wrenching flats on key operated valves;

i) evidence of abuse or tampering;

j) evidence of damaged gauges;

k) damage to handwheels;

l) missing or damaged residual pressure valve unit;

m) incorrect rating of pressure relief device;

n) inappropriate valve for the gas service;

o) contamination or suspect improper lubrication or sealant at the valve to cylinder interface;

p) loose gland nuts.

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5.1.3 Additional external examination — Valve removed from gas cylinder

In addition to the above requirements, if the cylinder valve has been removed from the gas cylinder, it shall be visually examined for the following additional defects after all residual jointing compound has been removed from the valve stem thread:

a) contamination, foreign bodies and corrosion products in the valve stem bore;

b) cross-threaded, damaged, worn, deformed or stripped valve stem threads;

c) damaged dip tube, eductor tube or retaining threads;

d) damaged inlet filter;

e) damaged liquid or pressure level indicating device;

f) damaged overfill prevention device;

g) damaged excess flow prevention device.

5.1.4 Acceptance criteria

Cylinder valves not exhibiting defects listed in 5.1.2 (and 5.1.3 if applicable) may re-enter service.

Cylinder valves with any of the defects listed above shall either be subject to maintenance in accordance with 5.2, or scrapped in accordance with Clause 9.

5.2 Maintenance

5.2.1 Minor repairs

Hand wheels and other non-pressure retaining parts shall be assessed for reuse, repair or replacement as appropriate.

5.2.2 Major repairs

If required, gland nuts shall be re-torqued to the original manufacturing value and using the recommended procedures.

For cylinder valves equipped with pressure relief devices (PRD), if the PRD is to be replaced, it shall be replaced by items to the manufacturer's original specification and in accordance with their instructions.

Other accessories requiring replacement are to meet the original valve manufacturer's specification and are to be replaced according to their instructions.

5.2.3 Refurbishment

5.2.3.1 General

Cylinder valves may only be refurbished if they are designed to be dismantled and reassembled.

Refurbishment shall be carried out after decontamination, as appropriate. Where replacement parts are used, they shall be in accordance with the cylinder valve manufacturer's specification for the intended gas service.

Cylinder valves shall be dismantled in accordance with the original manufacturer's specifications, using appropriate tools and in a work area specially set aside for this activity.

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5.2.3.2 Component examination and evaluation

The stem thread of each valve body shall be visually examined to assess whether it has been subjected to excessive damage, deformation or wear.

The outlet connection(s) of each valve body shall be visually examined to confirm freedom from corrosion, damage, or excessive wear.

Internal passageways shall be examined to ensure that they are free of foreign matter.

The valve outlet sealing face shall be examined for damage, wear and corrosion. Any outlet non-metallic sealing element shall be replaced by a new one in accordance with the valve manufacturer's specification.

If the design of the valve allows, any of the above defects may be corrected, provided the dimensions remain within the original design standard, otherwise the cylinder valve shall be scrapped in accordance with Clause 9.

All internal component parts of the cylinder valve shall be visually inspected to assess suitability for re-use (absence of excessive wear, damage or contamination). All non-metallic sealing materials shall be examined as to their suitability for further service and replaced as necessary in accordance with the manufacturer's recommendations.

Cylinder valves or components that are unsuitable for further service shall be scrapped in accordance with Clause 9.

All re-used components of the valve shall be clean to the original manufacturer's specification.

WARNING — Cylinder valves intended for oxygen service or other highly oxidizing gases (see ISO 10156) shall be clean for oxygen service (see ISO 15001).

5.2.3.3 Re-assembly

Cylinder valves shall be reassembled using appropriate tools and using torques and assembly procedures in accordance with the valve manufacturer's specification. The valve shall be operated "open to closed" to ensure that the operating mechanism is smooth and satisfactory.

6 Testing

All cylinder valves subjected to examination under 5.1, or maintenance under 5.2 shall undergo internal and external leak checks, e.g. of the gland, seat and cylinder neck connection, at intended operating pressure. (See ISO 10297 and ISO 14246 for examples of leak check procedures.) This may be carried out during first filling of the gas cylinder to which the valve is connected. (See the following International Standards for leak checks at the time of filling: ISO 11113, ISO 10463, ISO 10691, ISO 11372, ISO 11755, ISO 13341, ISO 14245, ISO 15995 and ISO 22435.)

NOTE For more complex valves (e.g. those embodying pressure regulation devices), extra checks may be carried out to ensure that the valve functions correctly to the manufacturer's specification before returning to service.

7 Marking

Cylinder valves that have undergone refurbishment (see 5.2.3) shall be permanently marked with at least the year, e.g. the last two digits, and an identification mark traceable to the facility which carried out the work. Such markings shall not adversely influence the performance of the valve and shall be visible to personnel preparing gas cylinders to enter service.

NOTE Where cylinder valves are routinely refurbished along with their unique accompanying cylinder, e.g. Self Contained Underwater Breathing Apparatus (Scuba) valves, refurbishment markings on the valve may be omitted provided the necessary information is stamped onto the cylinder.

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