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Gas cylinders — Cylinder valves — Manufacturing tests and examinations

Bouteilles à gaz — Robinets de bouteilles à gaz — Essais de fabrication et contrôles

[Revision of first edition (ISO 14246:2001)]

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.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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 14246 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 2, *Cylinder fittings*.

This second edition cancels and replaces the first edition (ISO 14246:2001), which has been technically revised.

The main changes from ISO 14246:2001 are

— the scope refers to cylinder valves and cylinder valves with integrated pressure regulators according to ISO 10297 only,

— the definitions were brought in line with the proposed future revision of ISO 10297 and ISO 10286,

— addition of a separate clause for the determination of the valve test pressure,

— modification/addition/deletion of manufacturing related definitions (batch/sample/shift),

— modification of tests to be performed on every valve,

— modification of inspections, verifications and examinations to be performed on a sample,

— addition of procedures to verify materials of construction and components,

— deletion of revalidation tests, and

— modification of example of test protocol on every valve.

Gas cylinders — Cylinder valves — Manufacturing tests and examinations

1 Scope

This International Standard specifies the procedures and acceptance criteria for manufacturing testing and examination of cylinder valves that have been manufactured to achieve type approval.

This International Standard is applicable to cylinder valves and cylinder valves with integrated pressure regulators designed and type tested according to ISO 10297.

The principles of these tests and examinations can be beneficially applied to cylinder valves type tested to national or International Standards other than ISO 10297.

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

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

NOTE In the European region, the additional requirements listed in Annex B apply.

3 Terms, definitions and symbols

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

3.1
valve working pressure
p_w
settled pressure of a compressed gas at a uniform reference temperature of 15 °C in a full gas cylinder for which the valve is intended

Note 1 to entry: This definition does not apply to liquefied, e.g. carbon dioxide, or dissolved gases, e.g. acetylene.

[SOURCE: ISO 10297]

3.2
valve test pressure
p_{vt}
pressure applied to a valve through a gas during testing

[SOURCE: ISO 10297]

3.3
external leak tightness
leak tightness to atmosphere (leakage in and/or leakage out) when the valve is open

[SOURCE: ISO 10297]

3.4
internal leak tightness
leak tightness across the valve seat (leakage in and/or leakage out) when the valve is closed

[SOURCE: ISO 10297]

3.5
batch
quantity of valves of the same type tested design and production order, which is produced as a controlled number in a time period not exceeding that marked on the valve, i.e. year and month, or year and week

Note 1 to entry: Marking of valves is specified in ISO 10297.

3.6
sample
quantity of valves selected from a batch according to a recognized sampling procedure, chosen and validated by the manufacturer

Note 1 to entry: The ISO 2859 series specifies sampling procedures for inspection.

3.7
endurance torque at start
$T_{e,\ start}$
endurance torque to be applied at the beginning of the endurance test

4 Cleaning

Cylinder valves shall be supplied clean and dry to meet the requirements of the intended service. In addition, cylinder valves for oxygen and highly oxidizing gases (see ISO 10156) shall be supplied cleaned from oil, grease and particulate matter to meet the requirements of ISO 15001 or any relevant standard or regulation, except for non-medical applications where the maximum particle size shall be less than 200 µm. This shall be ensured by the cleaning process.

5 Manufacturing tests and examinations

5.1 General

Manufacturing tests and examinations shall include

— tests to be performed on every valve,

— inspections, verifications and examinations to be performed on a sample, and

— procedures to verify materials of construction and components.

Test results and examinations shall be recorded.

In the European region, the additional requirements listed in Annex B apply.

5.2 Valve test pressure

a) For compressed gases:

$$p_{vt} = 1{,}2 \times p_w$$

b) For liquefied gases, e.g. carbon dioxide, and dissolved gases, e.g. acetylene:

p_{vt} shall be at least equal to the minimum test pressure quoted in the relevant transport regulation for that gas or

5.3 Tests to be performed on every valve

All valves shall be subjected to both internal leak tightness and external leak tightness testing prior to dispatch.

For external leak tightness the valve shall be pressurized from the inlet passage with the outlet connection sealed or pressurized from the outlet connection with the inlet connection sealed. For internal leak tightness the valve shall be pressurized from the inlet passage. The external leak tightness of cylinder valves fitted with accessories which form the pressure envelope, e.g. pressure relief devices and pressure gauges, shall be determined with these accessories in place.

In addition, the presence of a through passage shall be verified.

Testing shall be conducted at p_{vt} or for valves equipped with pressure activated pressure relief devices at 0,8 times the lowest value of the range of the set pressure of the pressure relief device or as per the applicable national regulation and/or standard.

Leak tightness tests shall be performed at ambient temperature (usually between +15 °C and +30 °C). Valves shall be closed with the closing torque specified by the manufacturer but not exceeding $T_{e,\,start}$ as used during type testing according to ISO 10297. The internal or external leakage rate shall not exceed 6 cm^3/h. For high integrity valves, e.g. valves for highly toxic or ultra high purity gas service, lower leakage rates for both internal and external tightness tests can be required. Additionally an extra external tightness test to measure the leakage in value can be required.

These tests are usually conducted with oil free dry air or nitrogen but other suitable test gases may be used.

An example of a test protocol is given in Annex A. Other qualified or accepted methods that comply with this clause may also be used.

NOTE Additional testing can be required for valves with special features, e.g. residual pressure valves or valves with integrated pressure regulators.

5.4 Inspections, verifications and examinations to be performed on a sample

These procedures shall be performed on a sample. The sampling procedure, the sequence and the detailed content shall be specified in the manufacturer's quality assurance system. The corresponding inspections, verifications and examinations shall be carried out to verify the manufacturing process with regard to at least

— compliance with production or customer order by comparison with the general assembly drawing and other documentation,

— metallic and non-metallic materials by verification of suppliers' documentation, e.g. according to EN 10204:2004 certificate type 3.1 or respective national standards,

— stress relieving (if required) by verification of manufacturing documentation,

— machining by visual and metrological inspection,

— dimensions by metrological inspection,

— cleanliness by visual examination and verification of manufacturing documentation,

— assembling by visual inspection for use of correct components, of application and quantity of lubricants, sealants and adhesives and inspection of torques during disassembly,

— testing by verification of manufacturing documentation, and

— marking by visual examination.

5.5 Procedures to verify materials of construction and components

Manufacturers shall define a quality management system that includes their suppliers, subcontractors, third party laboratories and their own facilities (if necessary) with the aim of ensuring that metallic and non-metallic materials of the correct and proven specifications, as well as components, are incorporated into cylinder valves as per the current type approval.

Annex A
(informative)

Example of test protocol on every valve

The following test protocol can be applied for valves for industrial service.

a) Set the valve in the open condition with the outlet connection sealed. Apply the valve test pressure through the valve inlet passage. Check for any external leakage.

b) With the valve outlet connection remaining sealed, close the valve under the applied valve test pressure with the closing torque specified by the manufacturer but not exceeding $T_{e,\ start}$ as used during type testing according to ISO 10297. Remove the seal from the valve outlet connection and verify the release of trapped gas from the valve outlet. This procedure ensures that the valve was not in a closed condition before the test and that the valve has a through passage.

c) With the valve remaining in the same closed condition as above check at the outlet connection for any internal leakage across the valve seat.