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## **Transportable gas cylinders — Gas cylinder valves — Manufacturing tests and inspections**

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

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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 3.

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 member bodies casting a vote.

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

International Standard ISO 14246 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 58, *Gas cylinders*, Subcommittee SC 2, *Cylinder fittings*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this standard, read "...this European Standard..." to mean "...this International Standard...".

Annexes A and B of this International Standard are for information only.

Annex ZZ provides a list of corresponding International and European Standards for which equivalents are not given in the text.

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## Foreword

The text of EN ISO 14246:2001 has been prepared by Technical Committee CEN/TC 23 "Transportable gas cylinders", the secretariat of which is held by BSI, in collaboration with Technical Committee ISO/TC 58 "Gas cylinders".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2001, and conflicting national standards shall be withdrawn at the latest by October 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

Gas cylinders are usually fitted with a valve to contain the gas or allow its discharge. Requirements for the specification and type testing of cylinder valves are given in EN 849.

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## 1 Scope

This Standard specifies the requirements for tests and inspections of gas cylinder valves at time of manufacture.

This Standard is applicable to valves to be fitted to industrial and medical gas cylinders, up to 150 l water capacity, intended to convey compressed, liquefied or dissolved gases.

This Standard is only applicable to valves operated by a hand wheel or a key.

This Standard is not applicable to valves for breathing equipment, fire extinguishers, cryogenic equipment and liquefied petroleum gas (LPG).

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 720-2	<i>Transportable gas cylinders - Gases and gas mixtures - Part 2: Determination of flammability and oxidizing ability of gases and gas mixtures</i>
EN 849	<i>Transportable gas cylinders - Cylinder valves - Specification and type testing</i>
EN ISO 11114-3	<i>Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 3: Autogenous ignition test in oxygen atmosphere (ISO 11114-3:1997)</i>

## 3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply :

### 3.1 shift

period of continuous work not exceeding one day

### 3.2 batch

a quantity of valves of the same design, comprising either the production of one shift or 1 000 valves, whichever is the smaller

### 3.3 working pressure ( $p_W$ )

settled pressure, at a uniform temperature of 15 °C, for a full gas cylinder

### 3.4 valve test pressure ( $p_{Vt}$ )

for compressed gases:  $p_{Vt} = 1,2 p_W$

For liquefied gases and dissolved gases under pressure (for example, acetylene),  $p_{Vt}$  is at least equal to the minimum test pressure of the cylinder quoted in the relevant transportation regulation for that gas or gas group, taking account of the actual filling ratio to be used.

NOTE : Transportation regulations sometimes offer a choice of filling ratio together with appropriate minimum test pressures. Generally,  $p_{Vt}$  will be the highest of these minimum test pressures for the gas, but in circumstances where a lower filling ratio is to be used,  $p_{Vt}$  may be an appropriate lower test pressure.

## 4 Manufacturing tests and inspections

### 4.1 General

Manufacturing tests and inspections shall include :

- routine manufacturing checks (to be performed on every valve) ;
- batch acceptance tests ;
- revalidation tests.

### 4.2 Routine manufacturing checks

The presence of a through passage shall be established.

All valves shall be subjected to both internal and external tightness testing prior to dispatch. Testing shall be conducted at  $p_{Vt}$  or for valves equipped with pressure relief devices at 0,8 times the set pressure.

The tightness test shall be performed at ambient temperature. The internal or external leakage rate shall not exceed 6 cm<sup>3</sup>/h measured at 20 °C and 1 013 mbar. For valves for highly toxic or high purity gas service, a lower leakage rate may be specified.

Generally, these tests are conducted with oil free dry air or nitrogen but other gases may be used.

An example of a test procedure is given in annex A.

NOTE : Additional testing may be required for valves with special features, e.g. residual pressure valves, pressure reducing valves.

### 4.3 Batch acceptance tests

The valve manufacturer shall subject at least one valve per batch to the following checks and tests :

- a) tests shall be carried out for internal and external tightness at high and low pressures in accordance with the requirements of EN 849 at ambient temperature ;
- b) the torque required to seal the valve against an inlet pressure of  $p_{vt}$  with the outlet sealed shall not exceed the requirements of EN 849 ;
- c) the disassembly torques of the valve components shall be checked during disassembly of the valve. The assembly and components shall be checked for suitability, possible damage or contamination ;
- d) the cleanliness of valves intended for oxygen service shall be checked (less than 100 mg/m<sup>2</sup> of hydrocarbons) and the valves shall be free from particles ;

NOTE : EN 12300 (Cryogenic vessels - Cleanliness for cryogenic service) may be used as a guide.

- e) the dimensions of the outlet and inlet connections shall be checked to be in accordance with the relevant connection standard ;
- f) the marking of the valve shall be checked to ensure that it meets the requirements of EN 849 and any additional markings specified by the customer.

### 4.4 Revalidation tests

The manufacturer shall operate a quality assurance procedure which records any changes or modifications in the design (including the originally validated materials). Revalidation checks shall be carried out.

Tests shall be first carried out when the valve is approved or reapproved following changes to the non metallic materials or their suppliers, and then no later than every five years.

For valves for oxygen or gases which are more oxidizing than air (see definition in EN 720-2), non metallic materials (elastomer, plastics, lubricant, etc.) which may come in contact with the gas shall undergo an autogenous ignition test (as specified in EN ISO 11114-3) or equivalent test such as an adiabatic compression test.

Examples of typical revalidation procedures are given in Annex B.

## 5 Test record

Test results shall be recorded.

**Annex A**  
(informative)

**Example of leakage test method**

The following test method may be applied :

a) set the valve in the open condition with the outlet connection sealed. Apply the pressure through the valve stem passage. Check for any external leakage through the valve gland area ;

b) the valve outlet connection remaining sealed, close the valve under pressure. During this operation check the torque necessary to close the valve to establish that it is in accordance with EN 849 . Open the valve outlet connection and observe the release of trapped gas from the outlet. This ensures that the valve was not in a closed condition before the test and that the valve has a through passage ;

c) set the valve in the closed condition and then check for leakage across the seat.

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**Annex B**  
(informative)

**Examples of revalidation procedures**

**B.1** For valves for use with oxygen or gases more oxidizing than air (see definition in EN 720-2) :

1) test to be performed at least every year :

oxygen compatibility tests of non-metallic materials by an autogenous ignition test in accordance with EN ISO 11114-3 or spectrographic analysis, annually or on change of supplier to verify the conformity with the initial specification;

2) test to be performed at five years :

a) an adiabatic test in accordance with EN 849 to revalidate the valve ;

b) an endurance test in accordance with EN 849 to revalidate the valve.

**B.2** For other valves

test to be performed at five years :

- an endurance test in accordance with EN 849 to revalidate the valve.

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