

INTERNATIONAL STANDARD

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Gas tightness of equipment for gas welding and allied processes

Étanchéité aux gaz des appareils pour soudage aux gaz et techniques connexes



Reference number
ISO 9090 : 1989 (E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 9090 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*.

Annex A forms an integral part of this International Standard.

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Gas tightness of equipment for gas welding and allied processes

1 Scope

This International Standard specifies the maximum external leakage rates which are acceptable for equipment used for welding, cutting and allied processes.

It applies to individual components which are used in the gas supply to a blowpipe from the connecting point of the hose (outlet of the cylinder valve or connecting point to a gas supply plant). It does not apply to gas supply plants.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2503 : 1983, *Pressure regulators for gas cylinders used in welding, cutting and allied processes*.

ISO 3821 : 1977, *Welding — Flexible hoses for gas welding and allied processes*.

3 Definition

For the purposes of this International Standard, the following definition applies.

external gas leakage: Undesired escape of gas to the atmosphere.

4 Expression of leakage

The maximum permissible external leakage rates which are specified in this International Standard are total leakage rates for a complete component including inlet connections.

These rates are given in cubic centimetres per hour¹⁾ of the gas for which the equipment was designed, corrected to standard conditions²⁾, measured at room temperature.

NOTE — Connections that are necessary only for the test are excluded.

1) $1 \text{ cm}^3/\text{h} = 0,28 \times 10^{-9} \text{ m}^3/\text{s}$

2) Standard conditions: 23 °C/1,013 bar (0,101 3 MPa).

5 Gas to be used for the tests

Devices to be used with helium shall be tested with helium and devices to be used with hydrogen shall be tested with hydrogen or helium.

Devices to be used with other gases shall be tested with dry oil-free air or nitrogen.

If the test is carried out with a gas other than the gas for which the equipment is designed, appropriate corrections shall be made (see annex A).

6 Test pressure

6.1 Regulators

Regulators shall be tested at pressures p_1 and p_2 as defined in ISO 2503.

6.2 Other equipment

6.2.1 Type tests

Other devices shall be tested at the following pressures:

- maximum working pressure as given by the manufacturer;
- 10 % of the maximum working pressure.

6.2.2 Routine tests

All devices shall be tested at that pressure (of the two pressures specified in 6.2.1) which gave the most unfavourable results during the type tests.

7 Maximum permissible leakage rates

NOTE — The leakage rate for individual devices will be incorporated directly in the relevant standards for that device when they are revised.

7.1 Regulators

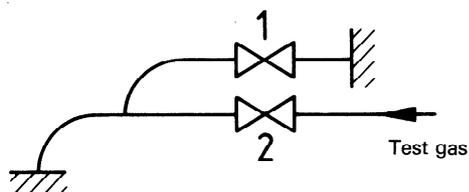
Regulators shall not have a total leakage rate greater than $10 \text{ cm}^3/\text{h}$.

7.2 Blowpipes

With the gas hose connected to one of the inlet connections, blowpipes shall be submitted to the following test:

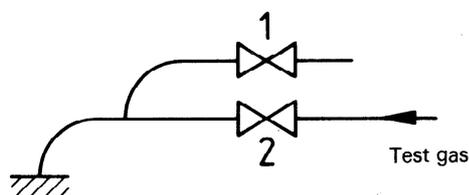
- a) Close off the nozzle and the other inlet connection and half-open both the valves.

Permissible leakage rate: $8 \text{ cm}^3/\text{h}$



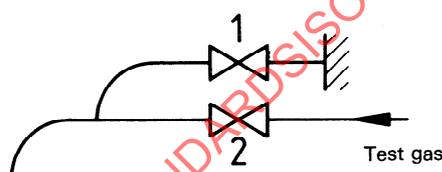
- b) Close off the nozzle and open the second inlet connection; half-open valve 2 and close valve 1.

Permissible leakage rate: $4 \text{ cm}^3/\text{h}$



- c) Close off the second inlet connection and open the nozzle; close valve 2.

Permissible leakage rate: $4 \text{ cm}^3/\text{h}$



NOTE — This test procedure enables total leakage and leakage through each valve to be tested.

7.3 Safety devices

Safety devices shall not have a total leakage rate greater than $8 \text{ cm}^3/\text{h}$.

7.4 Quick-action couplings

Connected quick-action couplings shall not have a total leakage rate greater than $10 \text{ cm}^3/\text{h}$.

7.5 Devices with combined functions

Devices with combined functions shall have a total leakage rate not exceeding the maximum rate applicable to any individual function.

7.6 Other equipment

Other equipment which may be used on an installation for gas welding and allied processes shall not have an overall leakage rate greater than $8 \text{ cm}^3/\text{h}$.

7.7 Hoses

Hoses shall conform to the requirements laid down in ISO 3821 in terms of the leakage rate and/or gas permeability.

8 Measurement of the leakage rate

The method described below is used to determine the leakage rate of a device; it is a type test method which determines whether a device conforms to the requirements specified in clause 7.

For routine purposes, manufacturers may use whatever method is most suited to their requirements.

8.1 Principle of the test method

Immersion of the device to be tested in water, with the device connected to a gas source throughout the test; collection of the gas leaking from the device in a graduated cylinder initially full of water.

Other test methods are permitted, provided that it can be shown that these give results as accurate as those available from the method given in this clause.

8.2 Test apparatus (see the figure)

8.2.1 Water-bath, having suitable dimensions for complete immersion of the device to be tested.

8.2.2 Gas supply, allowing pressurization of the device throughout the test.

8.2.3 Graduated cylinder, initially full of water, mounted above the device to be tested.

The size and scale graduations of the graduated cylinder shall be such that the volume can be read to an accuracy of $0,5 \text{ cm}^3$.

8.2.4 Funnel, allowing the escaping gas to be collected.

The funnel shall be suitable to collect all the gas which may escape from the device, but not that which escapes from the connection with the gas supply pipe.

8.3 Procedure

8.3.1 Connect the device to be tested to the gas supply (8.2.2), all other possible openings being closed so that the leakage rate may be determined.

8.3.2 Immerse the device in the water-bath (8.2.1) to a depth of at least 20 cm and supply the device with gas at a pressure equal to the test pressure, as given in clause 6, plus the pressure Δp due to the immersion depth.

8.3.3 Wait 10 min to allow the trapped air adhering to the outside surfaces of the device to escape, then place the graduated cylinder (8.2.3) and the funnel (8.2.4) in position and maintain the device under pressure for 1 h.

8.3.4 At the end of the test, raise or lower the graduated cylinder so as to equalize the levels of the water in the tube and in the bath; measure the volume of collected gas by reading the graduation on the tube.

8.3.5 Correct the measured volume, as specified in clauses 4 and 5, to take into account the gas and the standard temperature and pressure conditions.

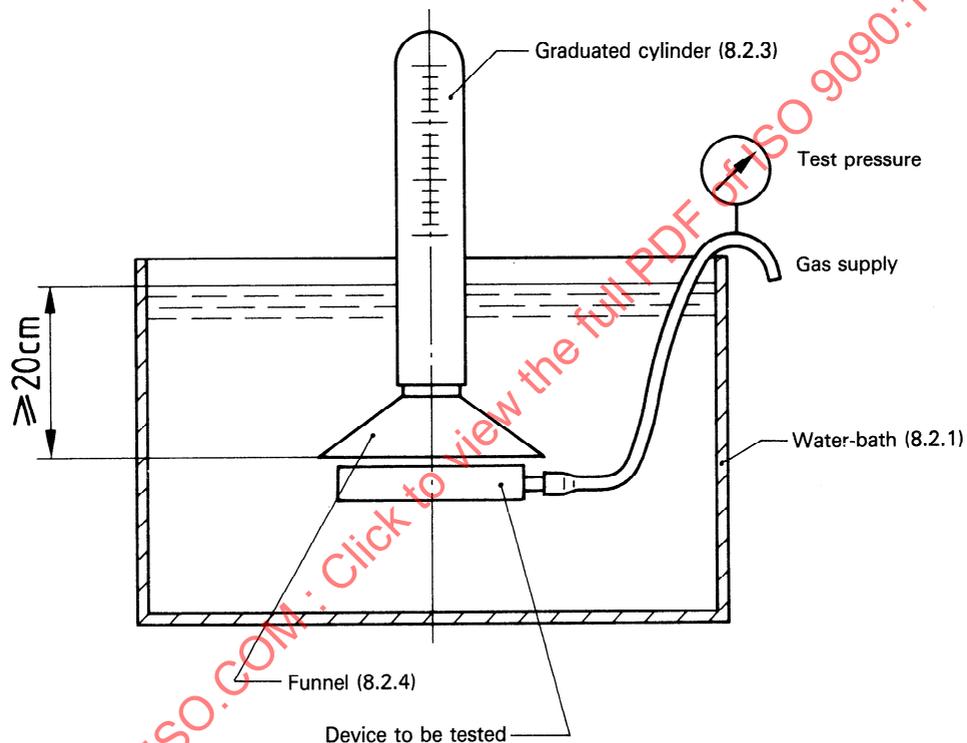


Figure 1 — Test apparatus

Annex A
(normative)

Correction of measurements

If the tests are not carried out with the gas for which the device is designed, the measured leakage rate shall be multiplied by the appropriate correction factor given in the table.

Gas used for the tests	Correction factor for the leakage rate measured						
	Air	Oxygen	Nitrogen	Argon	Hydrogen	Helium	Acetylene
Air	1	0,950	1,02	0,852	—	—	1,05
Nitrogen	0,983	0,930	1	0,837	—	—	1,03
Hydrogen	—	—	—	—	1	—	—
Helium	—	—	—	—	1,431	1	—

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