INTERNATIONAL STANDARD

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Gas welding equipment — Quick-action couplings with shut-off valves for welding, cutting and allied processes

Matériel de soudage aux gaz — Raccords rapides à obturation pour soudage, coupage et techniques connexes

Reference number
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web 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 7289 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 8, *Equipment for gas welding, cutting and allied processes*.

This third edition cancels and replaces the second edition (ISO 7289:1996) which has been technically revised.

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 8 via your national standards body, a complete listing which can be found at http://www.iso.org.

Introduction

Quick-action couplings with shut-off valves are used in equipment for gas welding, cutting and allied processes to connect the hoses used between the regulator and the torch, either to one another or to the regulators and the torches themselves.

These couplings are fitted with shut-off devices that interrupt the gas flow when the two elements are disconnected, so that coupling and uncoupling operations can be performed manually while the equipment is under pressure.

Gas welding equipment — Quick-action couplings with shut-off valves for welding, cutting and allied processes

1 Scope

This International Standard defines the specifications and the type tests for quick-action couplings with shut-off valves. It applies to quick-action couplings used between the regulator and the torch in equipment for gas welding, cutting and allied processes.

This International Standard applies to cases where these couplings are used with hoses in accordance with ISO 3821 or threaded unions in accordance with ISO 3253.

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 3253, *Gas welding equipment — Hose connections for equipment for welding, cutting and allied processes*

ISO 5175:1987, *Equipment used in gas welding, cutting and allied processes — Safety devices for fuel gases and oxygen or compressed air — General specifications, requirements and tests*

ISO 6150, *Pneumatic fluid power — Cylindrical quick-action couplings for maximum working pressures of 10 bar, 16 bar and 25 bar (1 MPa, 1,6 MPa, and 2,5 MPa) — Plug connecting dimensions, specifications, application guidelines and testing*

ISO 9090, *Gas tightness of equipment for gas welding and allied processes*

ISO 9539, *Gas welding equipment — Materials for equipment used in gas welding, cutting and allied processes*

3 Terms and definitions

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

3.1
quick-action coupling with shut-off valve
device enabling rapid coupling or uncoupling under pressure, of equipment and/or hoses, and preventing the mutual connection of two lines containing incompatible gases (e.g. oxygen and fuel gas)

3.2
element
device comprising two elements, a male and a female element, of which the female element is fitted with an automatic shut-off system that prevents gas leakage when the two elements are uncoupled

4 Types of coupling

This International Standard deals with three types of quick-action coupling with shut-off valves, according to the gases for which they are intended.

These three types are the following:

a) type O – oxygen;

b) type F – fuel gas;

c) type N – other gases specific for welding processes.

5 Installation

The quick-action couplings with shut-off valves shall be installed so that the element with the shut-off device is located upstream in terms of the gas flow from the source.

6 Design requirement

6.1 Dimensions, non-interchangeability and interchangeability

In order to ensure that:

a) elements of different types and

b) elements of different types and couplings for compressed air, in accordance with ISO 6150

are not interchangeable, quick-action couplings with shut-off valves in accordance with this International Standard shall have the dimensions specified in Figure 1 and Table 1 for couplings of types O, F and N.

Table 1 — Dimensions of male element

Dimensions in millimetres

Gas	Type	A **h10**	B **h10**	C [a] **JS13**
Oxygen	O	6,8	12,8	4,5
Fuel gas	F	7,3	12,3	5
Other gases specific for welding processes	N	6,3	13,3	4

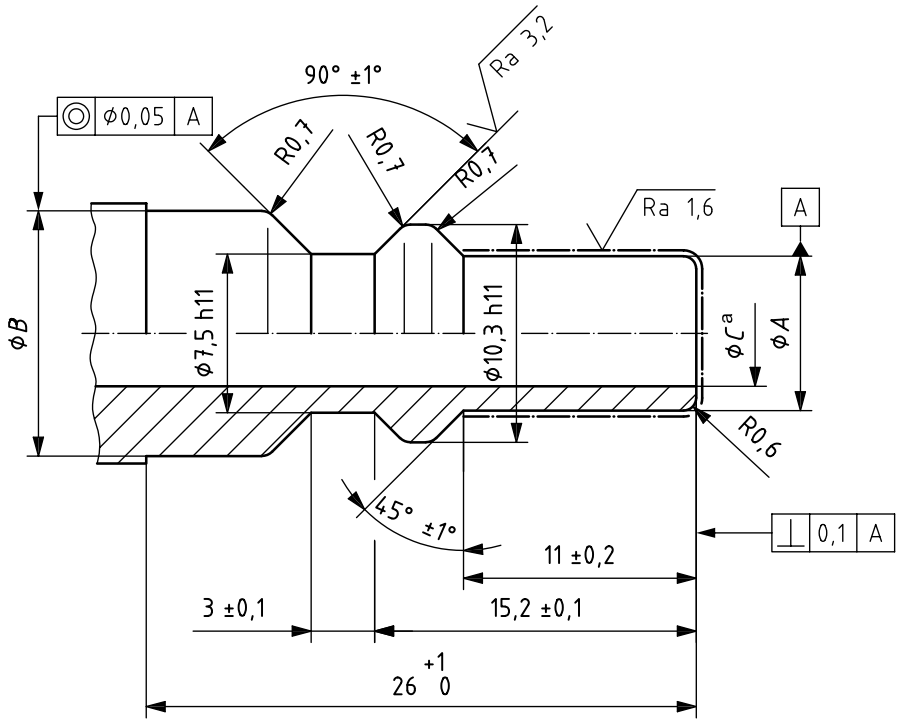
[a] Diameter C shall be observed over a length of 20 mm.

The dimensions and fabrication details not specified in Figure 1 and Table 1 are left to the discretion of the manufacturer, with the proviso that quick-action couplings with shut-off valves of the same type shall be interchangeable, regardless of their manufacturer.

6.2 Configuration

The shut-off system shall be located in the female element of the quick-action coupling.

Dimensions and tolerances of coaxiality
and perpendicularity in millimetres,
surfaces roughness values in micrometers



a The internal diameter C shall be for a minimum length of 20 mm.

Figure 1 — Male element

6.3 Coupling and uncoupling

The choice of the coupling and uncoupling means is left to the discretion of the manufacturer.

Coupling and uncoupling shall be achieved with ease and shall not require the use of tools. It shall not be possible to disengage the two elements by:

a) either a simple rotation of one element against the other;

b) the application of a longitudinal traction force of less than 1 kN.

Under service conditions, as defined by the manufacturer, no undesired uncoupling shall occur. The opening and closing of the shut-off system shall occur automatically.

6.4 Connections

The outside-threaded connections shall conform to the recommendations given in ISO 3253. A right-hand thread shall be used for couplings of types O and N and a left-hand thread shall be used for couplings of type F.

6.5 Materials

The materials used for the construction of these couplings shall conform to the requirements given in ISO 9539.

The male element shall be constructed from material of a surface hardness not less than 125 HV10. (This specification refers to the surface hardness of the standardized external profile over a length of 15,2 mm.)

7 Working requirements

7.1 Pressure resistance

Quick-action couplings with shut-off valves shall be designed for a maximum working pressure of 2 MPa (20 bar). When tested under the conditions given in 9.2, they shall withstand:

a) a test pressure of 4 MPa (40 bar) without permanent deformation;

b) a test pressure of 6 MPa (60 bar) without rupture.

7.2 Gas tightness

7.2.1 General requirements

The general requirements for gas tightness given in ISO 9090 shall be satisfied.

7.2.2 Specific requirements

During tests performed in accordance with 9.3, the measured leakage rate, in both the coupled and the uncoupled position, shall not exceed 10 cm^3/h.

7.3 Pressure drop

At the maximum operating pressure and the flow rate specified by the manufacturer, the pressure loss introduced by the quick-action couplings with shut-off valves shall not exceed 10 % of the specified maximum operating pressure.

7.4 Resistance to flash-back

After having been submitted to one flash-back in accordance with the conditions specified in 9.4, quick-action couplings with shut-off valves shall continue to conform to the requirements specified in Clause 8.

7.5 Resistance to tensile load

When tested under the conditions indicated in 9.5, the quick-action couplings with shut-off valves shall:

a) remain suitable for normal service and fulfil the test requirements specified in this International Standard, after having been submitted to an axial load of 600 N;

b) remain coupled and gas tight after having been submitted to an axial load of 1 kN.

7.6 Resistance to radial loads

When tested under conditions indicated in 9.6, the quick-action couplings with shut-off valves shall:

a) remain suitable for normal service and fulfil the test requirements specified in this International Standard, after having been submitted to a radial load of 1 kN;

b) remain coupled and gas tight after having been submitted to a radial load of 2 kN.

7.7 Endurance

When tested under the conditions specified in 9.7, the quick-action couplings with shut-off valves shall remain gas tight after they have been submitted to a minimum of 1 000 coupling/uncoupling cycles at a maximum working pressure (see 7.2).

7.8 Other functions

In cases where a quick-action coupling with shut-off valve is associated with any other function than those specified in this International Standard, it shall comply with the requirements of Clauses 6 and 7 and shall then be tested in accordance with Clauses 8 and 9 after it has met the requirements necessary to perform the other function.

8 General test conditions

8.1 General

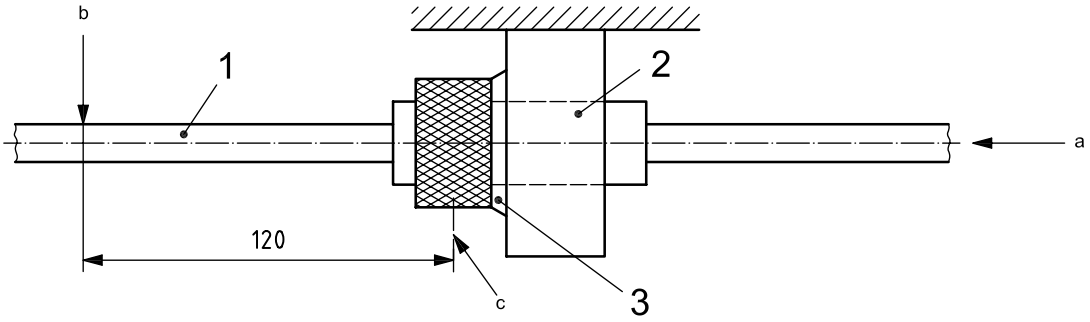
The tests described hereunder are the type tests.

Unless otherwise specified, they shall be performed at an ambient temperature of (23 ± 2) °C using oil-free air or in nitrogen. The pressure resistance test shall be performed under hydraulic pressure.

Eight samples of the quick-action couplings with shut-off valves shall be tested. The two elements of each of these samples shall be carefully marked to ensure that all tests are performed using the same pair of elements.

Figures 2 to 4 show the principle of the tensile load test and examples of the test rigs for gas tightness and resistance to radial loads.

Dimensions in millimetres

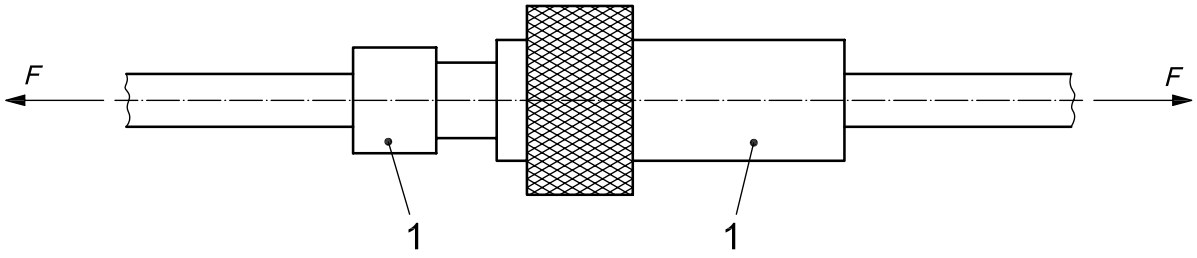


Key

1 rod connected to the male element
2 fixture to hold female element
3 coupled test coupling

a Pressure [2 MPa (20 bar); 0,02 MPa (0,2 bar)].
b Load perpendicular to the coupling centreline (40 N).
c Centreline of locking device.

Figure 2 — Test rig for the gas tightness test in the coupled position



Key

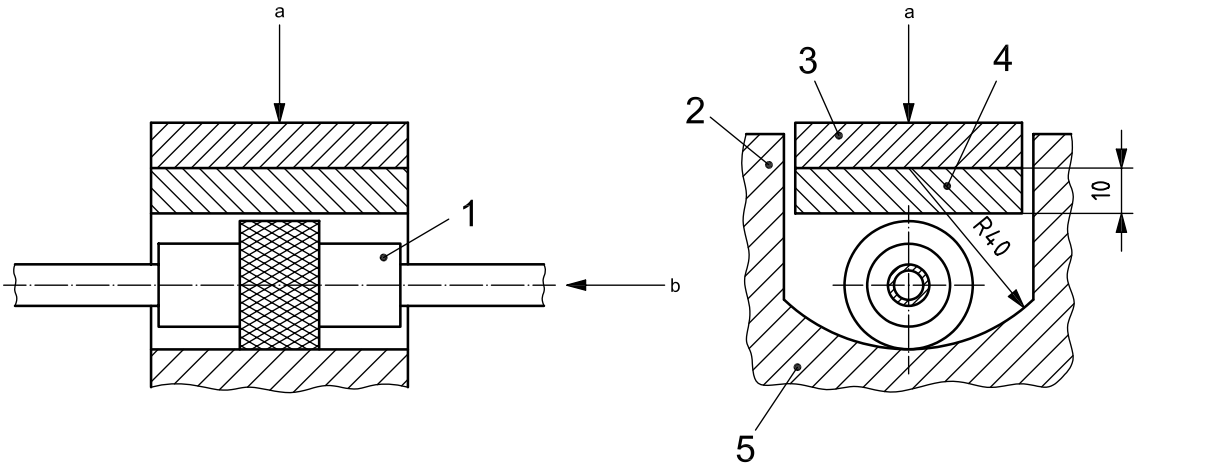
1 threaded or tapped parts

F tensile load

NOTE Internal pressure 2 MPa (20 bar).

Figure 3 — Principle of the tensile load test

Dimensions in millimetres



Key

1 coupling to be tested
2 support
3 loading counter plate
4 rubber plate (chlorophrene, Shore hardness 80 IRHD)
5 steel base of the support

a Load.

b Circulate gas at a pressure of 2 MPa (20 bar).

Figure 4 — Test rig for under radial loads

8.2 Test sequence

Each of the eight samples shall be submitted to the tests described in Clause 9, as indicated by the crosses in Table 2. The tests shall be performed in the sequence shown in Table 2 with the test series being performed in alphabetical order; one sample shall be used for each test series A, B and C and five samples shall be used for test series D.

Table 2 — Test sequence and test series

Test sequence	Subclause		Test series			
	Requirements	Test	A	B	C	D
Pressure resistance	7.1	9.2	x	—	—	—
Interchangeability	6.1	8.3	—	x	—	—
Gas tightness	7.2	9.3	—	x	x	x
Pressure drop	7.3		—	—	—	x
Flame flash-back	7.4	9.4	—	—	—	x
Tensile load						
600 N	7.5 a)	9.5	—	—	—	x
1 kN	7.5 b)	9.5	—	x	—	—
Radial load						
1 kN	7.6 a)	9.6	—	—	—	x
2 kN	7.6 b)	9.6	—	—	x	—
Endurance	7.7	9.7	—	—	—	x

8.3 Test for interchangeability

The test for interchangeability shall be performed on the sample used for test series B as follows:

a) check that the male element conforms to the specifications given in Figure 1 and Table 1;

b) connect the female element of the coupling to a male reference element, which shall be machined to the maximum dimensions shown in Figure 1; perform the following tests:

   1) check that the shut-off device functions properly;

   2) perform a tensile load test, with an axial load of 1 kN, in accordance with 7.5 b) and 9.5;

   3) perform a gas tightness test in accordance with 7.2 and 9.3;

c) connect the female element of the coupling to a male reference element which shall be machined to the minimum dimensions shown in Figure 1; repeat tests 1), 2) and 3) as specified in b).

9 Test procedure

9.1 Examination of dimension

Check the dimensions of the elements of the quick-action coupling with shut-off valve against those shown in Figure 1 and Table 1.

9.2 Pressure resistance

Connect the female element of a quick-action coupling with shut-off valve to a hydraulic pressure source and plug the opening of the male element.

Increase the pressure inside the device to 4 MPa (40 bar) over a period of not less than 20 s and maintain this pressure for 1 min. Check for any permanent deformation of the coupling (see 7.1).

Increase the pressure inside the device to 6 MPa (60 bar) over a period of not less than 30 s and maintain this pressure for at least 1 min. Check that no rupture of the coupling has occurred (see 7.1).

9.3 Gas tightness test

9.3.1 General

For these tests, measure the leakage rate:

a) in the uncoupled position (on the female element only);

b) in the coupled position, with an exterior load applied to the male element, the female element being clamped in a rigid position.

These tests shall be performed successively at pressures of 2 MPa (20 bar) and 0,02 MPa (0,2 bar).

9.3.2 Basic method and test device

The general arrangements for performing these tests shall be in accordance with the specifications given in ISO 9090.

9.3.3 Particular specifications

9.3.3.1 Test in the uncoupled position

Test the female element alone according to ISO 9090.

9.3.3.2 Test in the coupled position

Test the complete and coupled quick-action coupling with shut-off valve in accordance with ISO 9090, with the female element secured in a device which clamps it over the greatest possible width, as close as possible to the centreline of the locking device. Fasten a rod to the male element so that a load of 40 N can be applied at a distance of 120 mm from the centreline of the locking device (see Figure 2).

9.4 Flash-back test

For this test the device shall be tested in the coupled condition with the gas flow entering through the male element. The device shall be tested to withstand a flame flash-back (in a flowing gas mixture) with a static mixture in accordance with the test procedure for flame arrestors, acetylene type, in accordance with ISO 5175:1987, 7.6.2.

9.5 Resistance to tensile load

Secure the coupled quick-action coupling to be tested in an appropriate test rig, enabling the application of a tensile load to the entire device (see Figure 3), and submit it to a test pressure of 2 MPa (20 bar).

Apply a tensile load, F, to the device as specified in 7.5 a) or 7.5 b) for test series D or test series B respectively.

9.6 Resistance to radial load

Secure the quick-action couplings with shut-off valves to be tested in a test rig as shown in Figure 4 and submit it to a test pressure of 2 MPa (20 bar).

Load the device, without inertial effect and for 1 min, using the forces specified in 7.6 a) or 7.6 b) for test series D or test series C respectively. Rotate the quick-action couplings with shut-off valves by 45° and repeat the test.

9.7 Endurance test

Carry out the test with an upstream pressure of 2 MPa (20 bar), with the downstream line shut off. Disconnect the device with both the upstream and the downstream lines under pressure. The duration of one complete test cycle shall be no less than 30 s. Perform 1 000 test cycles.

10 Marking

The female element of the quick-action coupling with shut-off valve shall be marked in a durable manner with the following information in the order given:

a) the number of this International Standard, i.e. ISO 7289;

b) the type of coupling (i.e. “O” for oxygen, “F” for combustible gases and “N” for other gases specific for welding processes);

c) the name or trade mark of the manufacturer [given as XYZ in the EXAMPLE under d)];

d) an arrow indicating the direction of gas flow.

EXAMPLE ISO 7289 – F – XYZ – →

In addition, if colour coding is used, it shall be in accordance with national regulations.

11 Instructions for use

When distributed, the quick-action coupling shall be accompanied by the manufacturer's instructions which shall contain, as a minimum, the following information:

a) the function of the quick-action coupling;

b) operational and performance data (maximum working pressure);

c) permissible types of gas;

d) an explanation of the abbreviations marked on the device;

e) instructions, for installation of equipment;

f) instructions in case of malfunction;

g) recommendations for inspection, testing and maintenance.

Bibliography

[1] ISO 3821, *Gas welding equipment — Rubber hoses for welding, cutting and allied processes*

ICS 25.160.30

Price based on 10 pages