
Gas welding equipment — Rubber hoses for welding, cutting and allied processes

Matériel de soudage aux gaz — Tuyaux souples en caoutchouc pour le soudage, le coupage et les techniques connexes

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 8, *Equipment for gas welding, cutting and allied processes*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Official interpretations of TC 44 documents, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

This fifth edition cancels and replaces the fourth edition (ISO 3821:2008) which has been technically revised.

The main changes compared to the previous edition are as follows:

- the definition of maximum working pressure has been added;
- [Clauses 7](#) to [9](#) have been revised;
- the requirements for marking have been revised;
- editorial changes have been made.

This corrected version of ISO 3821:2019 incorporates the following corrections:

- the publication year has been corrected from 2018 to 2019 on the cover page as well as in the headers and footers of the document.

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Gas welding equipment — Rubber hoses for welding, cutting and allied processes

1 Scope

This document specifies requirements for rubber hoses (including twin hoses) for welding, cutting and allied processes.

This document specifies requirements for rubber hoses for normal duty of 2 MPa (20 bar) and light duty [limited to hoses for maximum working pressure of 1 MPa (10 bar) and with bore up to and including 6,3 mm].

This document applies to hoses operated at temperatures $-20\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$ and used in:

- gas welding and cutting;
- arc welding under the protection of an inert or active gas;
- processes allied to welding and cutting, in particular, heating, brazing, and metallization.

This document does not specify requirements for hose assemblies; these are detailed in ISO 8207.

This document applies neither to thermoplastics hoses nor to hoses used for high pressure [$>0,15\text{ MPa}$ ($>1,5\text{ bar}$)] acetylene.

2 Normative references

ISO 3821:2019

<https://standards.iteh.ai/catalog/standards/sist/e800cbd9-6e93-4697-8236-2885759ca6d/iso-3821-2019>

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 1307:2006, *Rubber and plastics hoses — Hose sizes, minimum and maximum inside diameters, and tolerances on cut-to-length hoses*

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 10619-1, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature*

ISO 10619-2, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures*

ISO 1817, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 4080, *Rubber and plastics hoses and hose assemblies — Determination of permeability to gas*

ISO 4671, *Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies*

ISO 7326, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8033, *Rubber and plastics hoses — Determination of adhesion between components*

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

ISO 11114-3, *Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 3: Autogenous ignition test for non-metallic materials in oxygen atmosphere*

ISO 15296, *Gas welding equipment — Vocabulary*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8330 and ISO 15296 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 twin hose

two normal rubber hoses joined together longitudinally

3.2 universal fuel gas hose

hose which can be used for all fuel gases except fluxed fuel gas

Note 1 to entry: Fuel gases are listed in [Table 5](#).

3.3 flux fuel gas hose

hose suitable for fuel gas containing a flux

3.4 maximum working pressure

maximum pressure to which the equipment may be subjected in service

4 Abbreviated terms

LPG	liquefied petroleum gases
MPS	methylacetylene-propadiene mixtures

5 Application

Hoses shall only be used for the gas service for which they are identified (see [10.2](#)).

6 Hose designation

The hoses covered by this document are designated using the following information:

- inside diameter, see [Table 1](#);
- light or normal duty (pressure rating), see [Table 4](#);
- colour and marking (gas service), see [Table 5](#).

EXAMPLE 1 6,3 mm, light duty. Blue (Oxygen).

EXAMPLE 2 10 mm, normal duty. Red and Orange (Universal fuel gases).

EXAMPLE 3 6,3 mm, light duty, FLUX. Red (Fluxed fuel gases).

7 Materials

7.1 Construction

7.1.1 Light and normal duty hoses

The hose shall consist of:

- a) a rubber lining of minimum thickness 1,3 mm for hoses with total wall thickness of 3,0 mm or less and 1,5 mm for hoses with total wall thickness greater than 3,0 mm;
- b) reinforcement applied by any suitable technique;
- c) a rubber cover of a minimum thickness of 1,0 mm.

7.1.2 Flux fuel gas hose

The flux fuel gas hose shall consist of the following:

- a) a rubber lining with an additional inner plastic layer, which shall be of maximum thickness 0,5 mm, to give a minimum total thickness of a rubber lining of 1,3 mm for hoses with total wall thickness of 3,0 mm or less and 1,5 mm for hoses with total wall thickness greater than 3,0 mm;
- b) reinforcement applied by any suitable technique;
- c) a rubber cover of minimum thickness 1,0 mm.

7.1.3 Twin hose

Each hose used for twin hose construction shall be as specified in 7.1.1 or 7.1.2. The two hoses shall be joined longitudinally during the extrusion and/or vulcanization process. They shall be capable of being separated free of damage to enable end fittings to be fitted (see 9.3.7).

7.2 Manufacture

The lining and cover shall be of uniform thickness and free from holes, porosity and other defects.

8 Dimensions and tolerances

8.1 Inside diameters

The inside diameters of the hoses shall be in accordance with the dimensions and tolerances shown in Table 1.

Table 1 — Dimensions and tolerances on inside diameter

Nominal size	Inside diameter	
	Basic dimension mm	Tolerance mm
4,0	4,0	±0,4
4,8	4,8	
5,0	5,0	
6,3	6,3	
7,1	7,1	
8,0	8,0	±0,5
9,5	9,5	
10,0	10,0	
12,5	12,5	±0,6
16,0	16,0	
20,0	20,0	
25,0	25,0	
32,0	32,0	±1,0
40,0	40,0	±1,25
50,0	50,0	

NOTE 1 Nominal sizes, basic dimensions and their tolerances on inside diameters do not comply with ISO 1307:2006, Table 1.

NOTE 2 For intermediate dimensions, numbers are chosen from the R20 series of preferred numbers (see ISO 3) with tolerances for the next larger inside diameter listed.

8.2 Outside diameters

The basic dimensions of the outside diameters of the hoses shall be determined by the manufacturer by determining the total wall thickness of the hoses (including rubber lining, rubber cover and reinforcement layer) relative to the basic dimensions of the inside diameter by the manufacturer. The tolerances on the basic dimensions of the outside diameters shall be in accordance with the values shown in [Table 2](#).

Table 2 — Outside diameter ranges and its corresponding tolerance and concentricity

OD range	Tolerance on OD	Concentricity maximum
	mm	mm
Up to and including 12,0 mm	±0,6	0,6
Greater than 12,0 mm up to and including 16,0 mm	±0,8	0,7
Greater than 16,0 mm up to and including 22,5 mm	±1,0	0,8
Greater than 22,5 mm up to and including 42,0 mm	±1,5	1,0
Greater than 42,0 mm	±1,8	1,3

8.3 Wall thickness

The wall thickness of rubber lining, rubber cover and inner plastic layer of the hoses shall be not less than the minimum thickness specified in [7.1.1](#) and [7.1.2](#).

8.4 Concentricity (total indicator reading)

The concentricity of the hose, measured in accordance with ISO 4671, shall be in accordance with the values given in [Table 2](#).

8.5 Cut lengths and tolerances

The tolerances for cut lengths shall be in accordance with ISO 1307.

8.6 Disclosure of inside diameter and outside diameter

The manufacturer shall indicate the combination of the basic dimensions of the inside diameter and the outside diameter on the hose as specified in [10.3](#). In addition, basic dimensions of the inside diameter and outside diameter of the hose and their permissible tolerances should be disclosed in the documents such as the catalogues, specifications, instruction manuals and the like.

9 Requirements and type tests

9.1 General

A summary of requirements and type tests with the corresponding number of samples is given in [Annex D](#).

9.2 Basic requirements

9.2.1 Tensile strength and elongation at break

Measurements shall be made on test pieces cut from the hoses. The materials used in the lining and cover, when tested in accordance with ISO 37, shall have a tensile strength and elongation at break not less than the values given in [Table 3](#).

Table 3 — Tensile strength and elongation at break

Rating	Tensile strength MPa	Elongation at break %
Rubber lining	5	200
Cover	7	250
Inner plastic layer	5	120

9.2.2 Accelerated ageing

Measurements shall be made on test pieces cut from the hoses. After ageing for 7 days at a temperature of $(70 \pm 2) ^\circ\text{C}$ as specified in ISO 188 (air oven), the tensile strength and elongation at break respectively of the lining and cover shall not decrease from the original values obtained by more than 25 % for the tensile strength and 50 % for elongation at break.

9.2.3 Adhesion

When tested in accordance with ISO 8033 using the type 2 or type 4 test piece, the minimum adhesion between adjacent components of the hose shall be 1,5 kN/m. For flux fuel gas hoses (see [9.3.4](#)). For flux fuel gas hoses, the inner plastic layer shall be removed prior to the test.