INTERNATIONAL STANDARD

ISO 6182-12

Third edition
2019-04

Fire protection — Automatic sprinkler systems —

Part 12: Requirements and test methods for grooved-end components for steel pipe systems

Protection contre l'incendie — Systèmes d'extinction automatiques du type sprinkler —

Partie 12: Exigences et méthodes d'essai pour les raccords de tuyauterie en acier à extrémités rainurées

Reference number
ISO 6182-12:2019(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 5, *Fixed firefighting systems using water*.

This third edition cancels and replaces the second edition (ISO 6182-12:2014), which has been technically revised. The main changes compared to the previous edition are as follows:

— Updated tables on groove dimensions are included.

A list of all the parts in the ISO 6182 series, can be found on the ISO website.

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.

Fire protection — Automatic sprinkler systems —

Part 12: Requirements and test methods for grooved-end components for steel pipe systems

1 Scope

This document specifies performance requirements, grooving dimensions, test methods and marking requirements for couplings used in the joining of grooved steel tubes, pipes, grooved-end fittings and other grooved-end components up to 300 DN nominal diameter.

2 Normative references

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 or heat resistance tests*

ISO 898-1:2013, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

ISO 898-2:2012, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread*

ISO 1083:2018, *Spheroidal graphite cast irons — Classification*

ISO 4200:1991, *Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length*

ASTM A47/A47M-99 (2004), *Standard Specification for Ferritic Malleable Iron Castings*

ASTM A183, *Standard Specification for Carbon Steel Track Bolts and Nuts*

ASTM A536-84 (2004), *Standard Specification for Ductile Iron Castings*

ASTM A563-07a, *Standard Specification for Carbons and Alloy Steel Nuts*

ASTM B633-07, *Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel*

ASTM D395-03, *Standard Test Methods for Rubber Property — Compression Set*

EN 12329, *Corrosion protection of metals — Electrodeposited coatings of zinc with supplementary treatment on iron or steel*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
grooved-end components
pipe, tubes, fittings and other devices that are used to form grooved mechanical coupling joints

3.1.2
mechanical coupling
device consisting of two or more housings, fasteners such as bolts and nuts and a pressure-responsive gasket, used to mechanically join *grooved-end components* (3.1.1) to form a sealed joint

3.1.3
flexible mechanical coupling
mechanical coupling forming a sealed joint in which there is limited angular, axial and rotational movement without overstressing the pipe joint

Note 1 to entry: See 6.8.

3.1.4
rigid mechanical coupling
mechanical coupling forming a sealed joint in which there is essentially no free angular, axial or rotational movement

3.1.5
reducing mechanical coupling
mechanical coupling used to join *grooved-end components* (3.1.1) of different outside diameters (ODs)

3.1.6
mechanical coupling housing
structural parts of a *mechanical coupling* (3.1.2) that mechanically fit onto *grooved-end components* (3.1.1) to provide physical restraint and enclosure of the gasket

3.1.7
pressure-responsive gasket
gasket that improves its seal with the application of pressure, i.e. additional pressure results in additional force between the gasket and the surface to which it is sealing

3.1.8
rated working pressure
maximum service pressure at which a grooved piping system is intended to operate

3.2 Abbreviated terms

OD	outside diameter

4 Product consistency

It shall be the responsibility of the manufacturer to implement a quality-control programme to ensure that production consistency meets the requirements of this document in the same manner as the originally tested samples.

5 Product assembly

Product assembly shall be in accordance with the installation instructions in 8.3.

6 Requirements

6.1 Grooved-end dimensions

6.1.1 Grooved ends shall be dimensionally compatible with the coupling.

NOTE See Annexes A, B and C for typical dimensions.

6.2 Minimum pipe wall thickness

6.2.1 Grooved-end pipe couplings tested in accordance with 7.7.1 shall be tested with pipes according to ISO 4200:1991, Table 1, range D. Pipes with a higher wall thickness may be used if this corresponds to the minimum wall thickness specified by the manufacturer.

6.2.2 Grooved-end pipe couplings tested in accordance with 7.7.2 shall be tested with pipe having the minimum nominal wall thickness specified in the manufacturer's installation instructions.

6.3 Mechanical coupling housing

The casting materials of the housings shall be ductile iron in accordance with ISO 1083:2018, Grade 400-15; ASTM A536-84(2004), Grade 65-45-12 or malleable iron in accordance with ASTM A47/A47M-99(2004), Grade 32510 or 32518; or material having at least equivalent strength and corrosion resistance.

6.4 Pressure-responsive gasket

Materials for the coupling gaskets shall be ethylene-propylene diene monomer-rubber (EPDM), nitrile, silicone rubber or other elastomeric materials suitable for the intended service.

6.5 Bolts

Oval neck track head bolts shall be in accordance with ISO 898-1:2013, minimum Class 8.8, heavy hex bolts in accordance with ASTM A183 or other bolts which prevent rotation and have a minimum tensile strength of 800 N/mm^2. Bolts shall be zinc plated in accordance with ASTM B633-07, SC1, or EN 12329, or be of a material that provides at least equivalent corrosion resistance.

6.6 Nuts

Nuts shall be hexagon nuts in accordance with ISO 898-2:2012, minimum Class 8, or heavy (large) hexagon nuts in accordance with ASTM A563-07a, Grade B or equivalent. Nuts shall be zinc plated in accordance with ASTM B633-07, SC1, or EN 12329, or be of a material that provides at least the equivalent corrosion resistance.

6.7 Hinge pins

Hinge pins, if provided, shall be a ferrous material, zinc plated in accordance with ASTM B633-07, Class FE/ZN5, or EN 12329, or be of a material that provides at least the equivalent corrosion resistance.

6.8 Flexible coupling

A flexible mechanical coupling shall permit axial displacement, rotation and at least 1° of angular movement for pipe diameter sizes less than 200 OD and 0,5° for pipe diameter sizes 200 OD and greater without inducing harm on the joint when tested in accordance with 7.7.

6.9 Vacuum (see 7.2)

The coupling assembly shall maintain a vacuum of 0,08 MPa (0,8 bar) for a period of 5 min without leakage when tested in accordance with 7.2.

6.10 Air leakage (see 7.3)

The coupling assembly shall show no evidence of air leakage when tested in accordance with 7.3.

6.11 Low-temperature exposure (see 7.4)

The coupling assembly shall show no evidence of air leakage when tested in accordance with 7.4.

6.12 Heat aging (see 7.5)

The coupling assembly shall show no evidence of air leakage or cracking of the gasket when tested in accordance with 7.5.

6.13 Hydrostatic pressure (see 7.6)

The coupling assembly shall show no evidence of leakage, fracture or rupture when tested in accordance with 7.6.

6.14 Bending moment (see 7.7)

The coupling assembly shall show no evidence of fracture or rupture or evidence of water leakage when tested in accordance with 7.7.1 or 7.7.2.

6.15 Gasket material evaluation

6.15.1 Compression set

Compression set shall not exceed 25 % when tested in accordance with ASTM D395-03, method B.

6.15.2 Tensile strength and elongation

6.15.2.1 Gasket materials shall have the following properties when tested in accordance with ISO 37:

a) for silicone rubber (having poly-organo-siloxan as its constituent characteristics), a minimum tensile strength of 3,4 MPa (34 bar) and a minimum ultimate elongation of 100 %; or

b) for natural rubber and a synthetic rubber other than silicone rubber, a minimum tensile strength of 10,3 MPa (103 bar) and a minimum ultimate elongation of 150 %, or a minimum tensile strength of 15,2 MPa (152 bar) and a minimum ultimate elongation of 100 %.

6.15.2.2 When tested in accordance with ISO 188, the physical properties of the gasket material after oven ageing at 100 °C for 70 h shall be at least 60 % of the as-received tensile strength and elongation values. Any change in the hardness shall not exceed 5 % of the as-received value.

6.16 Fire resistance (see 7.8)

The design of the coupling system should be such that a joint shall not leak in excess of single drops, i.e. not in form of flowing water or water spray, after a fire test in accordance with 7.8.

NOTE In some countries this test is not mandatory.

6.17 Rated working pressure

The rated working pressure of a coupling shall not be less than 1,2 MPa (12 bar).

6.18 Nominal sizes

The size of a coupling shall be in accordance with the pipe sizes given in ISO 4200.

7 Test methods

7.1 Test conditions and assembly

7.1.1 Test conditions

All tests shall be performed at an ambient temperature of (24 ± 5) °C, if not otherwise specified. Unless otherwise specified, the tolerance for all testing parameters shall be ±5 %.

7.1.2 Test assembly

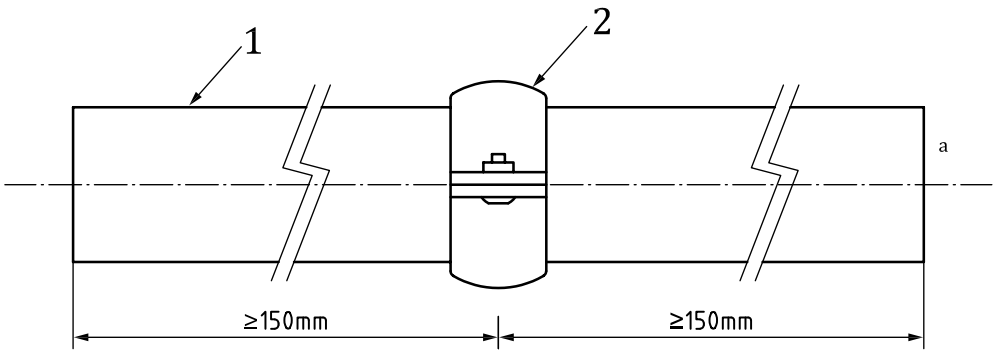
Unless otherwise specified, the test assembly shall consist of two sections of piping, each at least 150 mm long fitted with end caps. See Figure 1. The test coupling shall be assembled in accordance with the manufacturer's installation instructions.

7.2 Vacuum (see 6.9)

7.2.1 The test assembly (see Figure 1) shall be equipped with a vacuum gauge to permit visual verification of the actual vacuum being applied.

7.2.2 Using a suitable vacuum pump, the test assembly shall be subjected to an internal vacuum pressure of 0,08 MPa (0,8 bar), and then isolated by closing shut off valves located between the test sample and the vacuum pump. The 0,08 MPa (0,8 bar) vacuum pressure may be re-established, if necessary, following an appropriate stabilization period.

7.2.3 Once the vacuum pressure has been established, there shall be no increase of more than 0,01 MPa (0,1 bar) below relative ambient pressure during the 5 min test period.



Key

1 pipe section
2 pipe coupling
a Pipe tap provided in the end.

Figure 1 — Test assembly

7.3 Air leakage (see 6.10)

7.3.1 The test assembly (see Figure 1) shall be equipped with pressure measuring equipment to permit visual verification of the internal pressure being applied.

7.3.2 The air pressure shall then be increased to 0,3 MPa (3 bar) and held for 5 min and then soapy water or leakage test fluid applied.

CAUTION — Pneumatic pressure testing requires appropriate safety precautions.

7.3.3 There shall be no loss of air pressure of more than 0,01 MPa (0,1 bar) observed by pressure measuring equipment or evidence of leakage during a 5 min test period.

7.4 Low-temperature exposure (see 6.11)

7.4.1 The test assembly (see Figure 1) shall be equipped with a pressure gauge to permit visual verification of the pressure being applied.

7.4.2 Water to the depth of 3 mm shall be added to the horizontal assembly. The assembly and water shall be at an ambient temperature of (24 ± 5) °C. The assembly shall then be pressurized with air to 0,3 MPa (3 bar), sealed, checked for leakage as specified in 7.3.2, and then placed in a chamber at −40 °C in the horizontal position for a period of 24 h. Following the exposure, the assembly shall be restored to ambient temperature.

CAUTION — Pneumatic pressure testing requires appropriate safety precautions.

7.4.3 The air pressure in the assembly shall be observed to return to 0,3 MPa (3 bar) within 24 h. There shall be no loss of air pressure of more than 0,01 MPa (0,1 bar).

7.5 Heat aging (see 6.12)

7.5.1 The test assembly (see Figure 1) shall be initially pressurized to 0,3 MPa (3 bar) to check for leakage as specified in 7.3.2, then depressurized and placed in the oven at 135 °C for 45 days.

CAUTION — Pneumatic pressure testing requires appropriate safety precautions.

7.5.2 Following exposure, the assembly shall be conditioned at an ambient temperature of (24 ± 5) °C for a minimum of 24 h. The test assembly shall then be submerged in water and pressurized with air to 0,3 MPa (3 bar) for 5 min.

CAUTION — Pneumatic pressure testing requires appropriate safety precautions.

7.5.3 There shall be no loss of air pressure observed by the formation of air bubbles at the test coupling during the 5 min test period.

7.5.4 The test assembly shall be disassembled and the gasket shall not crack when two diametrically opposite points are squeezed together by hand until they touch. Gaskets intended for use with components 200 OD and larger shall also not crack when opposite sides are twisted by hand into a half turn.

7.6 Hydrostatic pressure test (see 6.13)

7.6.1 The test assembly (see Figure 1) shall be filled with water and purged of any entrapped air.

CAUTION — Hydrostatic pressure testing requires appropriate safety precautions.