ISO/FDIS 13265:2023(E)

ISO/TC 138/SC 1/WG 6

Secretariat: AFNOR

Date: 2023-12-292024-xx

Thermoplastics piping systems for non-pressure underground drainage and sewerage — Joints for buried non-pressure applications — Test method for the long-term sealing performance of joints with elastomeric seals by estimating the sealing pressure

Systèmes de canalisations thermoplastiques pour branchements et collecteurs d'assainissement enterrés sans pression — Assemblages pour applications enterrées sans pression — Méthode d'essai de la performance à long terme des assemblages avec garnitures d'étanchéité en élastomère par l'estimation de la pression d'étanchéité

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Published in Switzerland

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ISO 20344, Personal protective equipment — Test methods for footwear

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents.www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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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.htmlwww.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 1, *Plastics pipes and fittings for soil, waste and drainage (including land drainage)*.

This second edition cancels and replaces the first edition (ISO 13265:2010), which has been technically revised.

The main changes are as follows:

— the principle of the method has been reviewed and updated;

— the apparatus and procedure have been reviewed and updated;

— the document has been editorially revised.

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.htmlwww.iso.org/members.html.

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Thermoplastics piping systems for non-pressure underground drainage and sewerage — Joints for buried non-pressure applications — Test method for the long-term sealing performance of joints with elastomeric seals by estimating the sealing pressure

1 Scope

This document specifies a method for determining the long-term sealing pressure of elastomeric seals in assembled joints for buried non-pressure sewerage plastics piping and ducting systems.

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.

<std>ISO 9967, *Thermoplastics pipes — Determination of creep ratio*</std>

ISO 9967, *Thermoplastics pipes — Determination of creep ratio*

EN 681-1, Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber

<std>EN 681-2, Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers</std>

<std>EN 681-3, Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 3: Cellular materials of vulcanized rubber</std>

<std>EN 681-4, Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 4: Cast polyurethane sealing elements</std>

<std>EN 837-1, *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*</std>

EN 837-1, *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

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4 Symbols

B	theoretical pressure, in bar[1],bar[1] , in the Polytetrafluoroethylenepolytetrafluoroethylene (PTFE) tube at t = 1 h
D	drop factor of extrapolated pressure data at 24 h and 100 years
M	gradient of the curve
p	pressure
p_t	pressure measured in the PTFE tube at a flow of 120 ml/min and the time t hours
p_0	initial leakage pressure, in bar, measured in the PTFE tube after completing the assembly
p_{ta}, p_{tb}, p_{tc}	pressure measured in the three PTFE tubes in the tested joint, marked a, b and c, respectively, at time t hours
p_x	extrapolated pressure, in bar, at 100 years
p_y	calculated pressure, in bar, at 24 h
p_{xa}, p_{xb}, p_{xc}	extrapolated pressure, in bar, at 100 years in the three PTFE tubes in the tested joint, marked a, b and c, respectively
$p_{100\,y}$	arithmetic mean value of the pressures obtained for each of the three extrapolated values, p_x, at 100 years
$p_{24\,h}$	arithmetic mean value of the pressures obtained for each of the three calculated values, p_y, at 24 h
R	correlation coefficient
t	time, in hours

[1]) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

5 Principle

The sealing pressure in a joint is estimated by measuring the pressure necessary to lift the seal, in each of three PTFE tubes, unless otherwise specified in other standards, equally distributed over the circumference of a joint located between the rubber seal and the spigot or socket, as appropriate (see Figure 1).Figure 1).

In a temperature-controlled environment and at increasing time intervals, a constant flow rate of 120 ml/min of nitrogen or air is forced through three flexible PTFE tubes.

If it was not possible to keep the pressure constant at 120 ml/min during the measurement, calculate the pressure value, p, at a flow rate of 120 ml/min according to 8.2.8.2. For this purpose, the intersection point of the pressure at 120 ml/min shall be read from the recorded pressure/flow curve and this resulting pressure shall be recorded.

The nitrogen or air pressure, p, necessary to achieve this flow, is measured. The pressure, p_t, is measured at increasing time intervals over a period of time. The extrapolated regression lines for p_t are used to calculate the estimated value p_x at 100 years and p_y at 24 h.

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[1] 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

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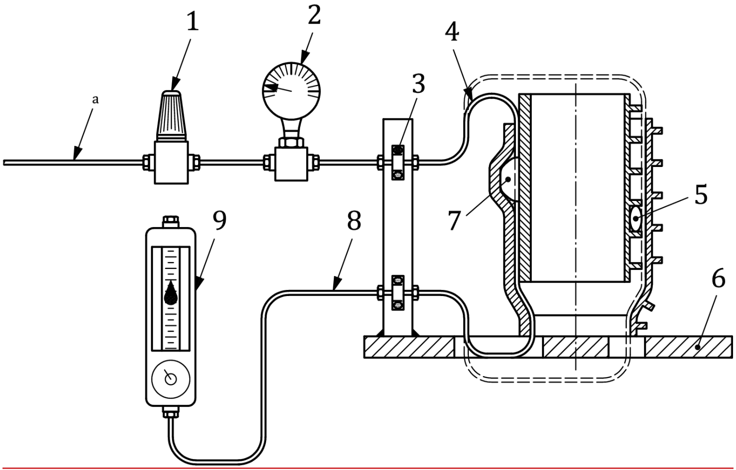

Key

1	regulator/pressure controller	6	test assembly base
2	pressure gauge	7	position of the tube in a joint with sealing ring positioned in the socket
3	fixed coupler	8	connecting tube
4	PTFE tube	9	flow meter
5	position of the tube in a joint with the sealing ring positioned on the spigot	a	Source of nitrogen or clean air.
a	Source of nitrogen or clean air.		

Figure 1 — Typical arrangement of the test assembly

6 Apparatus

6.1 Source of nitrogen, with a purity of at least 99,8 % or, alternatively, cleaned air (oil-free), capable of supplying a pressure of at least 10 bar.

6.2 Regulator/pressure controller, capable of regulating of pressure at least 10 bar and a flow at least of up to 200 ml/min.

6.3 Pressure gauge, for measuring the pressure in the main line and capable of checking conformity to 8.28.2 (class 0,6 or better, in accordance with EN 837-1).

6.4 Connecting tube, with an inside diameter of at least 4 mm.

6.5 PTFE tube, conforming to the following:

a) a) capable of sustaining at least 10 bar pressure;

b) b) the total thickness of the flattened PTFE tube shall be between 0,12 mm and 0,24 mm, measured in the middle of the sample and carried out in two positions perpendicular to each other;

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c) c) the total width of the flattened tube shall be between 6 mm and 10 mm.

NOTE The PTFE tube used for this test is a blown-up tube, normally applied as a shrinkage tube. The original diameter and wall thickness after shrinkage are normally specified. Attention is drawn that the blown-up dimensions are normally not specified.

Care should be taken that the wall thickness and the diameter of the tube as received are verified. The given tolerances should be seen as a guide for the supplier.

6.6 Flow meter, with a capacity of up to 200 ml/min and a tolerance of ±5 ml/min.

6.7 Means for storing test assembly, capable of fixing and storing the test assembly in such a way that no additional movements in the joint can occur. It shall be capable of fixing the PTFE tubes in such a way that, when connecting or disconnecting to the pressure gauge and flow meter, no movement of the PTFE tube in the sealing area can occur.

6.8 Lubricant, an aerosol of silicon (polydimethylsiloxane) with gas propellant (propane/butane).

7 Test pieces

7.1 General

Each test piece shall consist of a complete joint, together with its elastomeric seal and PTFE tube(s). Unless otherwise specified in the referring standard, the number of PTFE tubes shall be three, marked as a, b and c, equally spaced around the spigot.

7.2 Assembly

Prior to assembly, the test pieces shall be conditioned at the test temperature for at least 24 h.

Clean the rubber sealing ring, the socket and the spigot.

Prepare the PTFE tube by pressing it together several times until permanently flattened and place it along the smooth surface of the spigot or socket.

Lubricate the smooth wall in the joint (spigot or socket), the seal and PTFE tube(s). The lubricant defined in 6.86.8 shall be used. Use sufficient lubricant to ensure that the PTFE shrinkage tube(s) and seal can be assembled without damage, and the seal can equalize its position within the groove circumference.

Assemble the socket and spigot, including the seal, in accordance with the manufacturer's instructions and the following requirements.

a) a) The joint shall be assembled in such a way that the PTFE tubes are mounted between the spigot or socket and the seal (see Figure 1);Figure 1); precautions shall be taken to avoid squeezing the PTFE tube outside the sealing area.

b) b) It is permitted to mill a grove, insert thin plastics strips along the tube, drill holes in the spigot or socket or any other method that gives room for sufficient flow through the tube outside the sealing area. The method selected shall not significantly influence the creep behaviour of the joint in the sealing housing area.

c) c) Ensure that the PTFE tube can move freely in the axial direction and that the flattened section of the PTFE tube is located under the sealing ring, and not distorted, when the joint is made.

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