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**Plastics piping systems —  
Elastomeric-sealing-ring-type socket  
joints for use with plastic pipes —  
Test method for leaktightness under  
negative pressure, angular deflection  
and deformation**

*Systèmes de canalisations en plastiques — Assemblages par  
emboîture à bague d'étanchéité en élastomère pour les tubes en  
plastiques — Méthode d'essai pour l'étanchéité sous pression  
négative, déviation angulaire et déformation*

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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](http://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](http://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](http://www.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 5, *General properties of pipes, fittings and valves of plastic materials and their accessories — Test methods and basic specifications*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 13844:2015), which has been technically revised.

The main change is as follows:

- the shape of the beams used in the test method has been aligned with ISO 13259.

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](http://www.iso.org/members.html).

# Plastics piping systems — Elastomeric-sealing-ring-type socket joints for use with plastic pipes — Test method for leaktightness under negative pressure, angular deflection and deformation

**WARNING** — Persons using this document should be familiar with normal laboratory practice, if applicable. The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

## 1 Scope

This document specifies a method for testing the leak tightness under negative pressure, angular deflection and deformation of assembled joints between elastomeric-sealing-ring-type sockets made of plastic or metal and plastic pressure pipes.

## 2 Normative references

There are no normative references in this document.

## 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/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Principle

A test piece consisting of a plastic pipe mounted into a socket is exposed within a specified temperature range to two specified negative internal pressures for a specified test period, while the pipe is being subjected to an angular deflection in the socket and to deformation. During the test, the test piece is monitored for signs of leakage.

## 5 Test parameters and requirements

The test parameters of the standard which refers to this document shall be used and the requirements shall be fulfilled. If one or more test parameters are not given in the referring standard, the ones given in [Annex A](#) shall apply.

The following test parameters should be given by the standard which refers to this document:

- a) test medium;
- b) test pressure (bar or MPa);
- c) test duration (h);

- d) test temperature (°C);
- e) deformation (%);
- f) angle of deflection (°);
- g) free length (mm).

## 6 Apparatus

**6.1 Framework**, comprising at least two fixing devices, one of which is movable, to allow angular deflection to be applied to the test joint, while a negative air pressure (partial vacuum) is being applied.

**6.2 Vacuum gauge**, capable of checking conformity to the specified test pressure to within  $\pm 1$  % of the measured values.

**6.3 Equipment**, designed to produce a deforming force on the pipe spigot at a specified distance from the mouth of the socket. A typical arrangement is shown in [Figure 1](#).

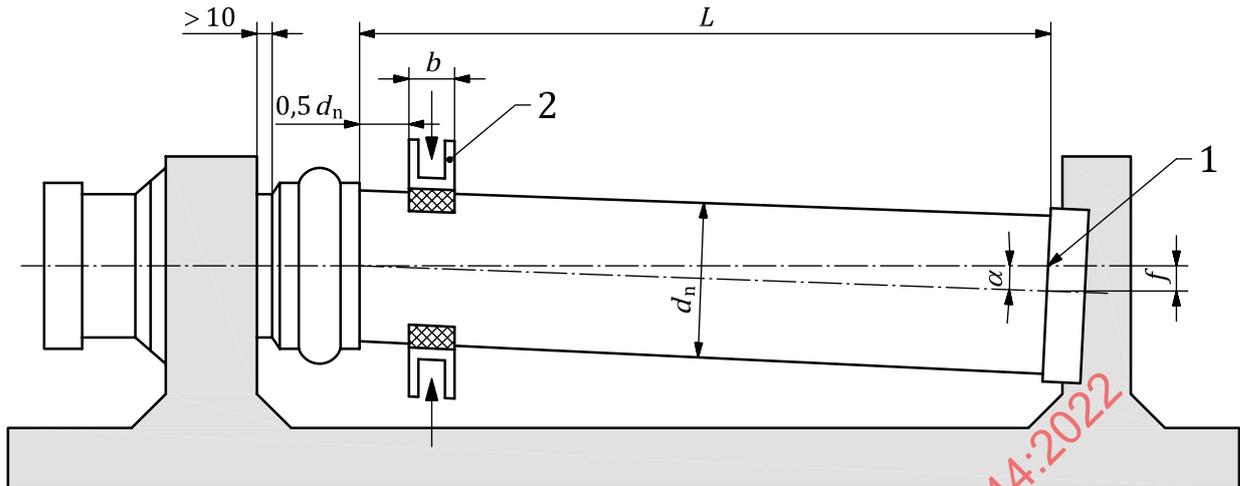
**6.4 Vacuum source (pump)**, capable of producing in the test piece the partial vacuum specified in the referring standard (see [8.6](#)).

**6.5 Isolation valve**, between the test piece and the vacuum pump (see [8.6](#)).

**6.6 Mechanical or hydraulic device**, capable of applying the necessary diametric deformation to the spigot (see [8.2](#)) and acting on a beam which is free to move in the vertical plane square to the axis of the pipe. For pipes with a diameter equal to or greater than 400 mm, each beam may be elliptically shaped to suit the expected shape of the pipe when deformed as required. The length of the beam or the curved part of the beam shall be greater than the contact area with the deformed spigot.

The following width,  $b$ , (see [Figure 1](#)), shall depend upon the nominal outside diameter,  $d_n$ , of the pipe:

- $b = 100$  mm for  $d_n \leq 710$  mm;
- $b = 150$  mm for  $710 \text{ mm} < d_n \leq 1\,000$  mm;
- $b = 200$  mm for  $d_n > 1\,000$  mm.



### Key

- 1 starting point for measuring and adjusting the angle of deflection,  $\alpha$
- 2 for pipes where deformation is required by the referring standard, a pair of beams to deform the pipe (see 8.2)
- $L$  free length of the pipe between the socket mouth and the end-seal
- $b$  width of the beam (see 6.6)
- $d_n$  nominal outside diameter of the pipe

NOTE The deflection,  $f$ , and the angle of deflection,  $\alpha$ , are related by the formula:  $f = L \sin \alpha$ . For  $\alpha = 2^\circ$ , the deflection is  $f = 0,035 L$ .

**Figure 1 — Typical test arrangement**

## 7 Test pieces

The test piece shall comprise an assembly of a plastic pipe section mounted into the socket to be tested.

The fittings and pipes shall not be tested until 24 h after their production. For practical reasons, the manufacturer may wait a shorter time before testing. In case of dispute, a duration of 24 h shall apply.

The assembly shall be carried out in accordance with the socket manufacturer's instructions.

A pipe of the same nominal pressure (PN) or the same pipe series (S) as that of the socket shall be used for the test.

The mean outside diameter,  $d_{em}$ , of the pipe should preferably conform to the minimum specified value, and the socket dimensions (mean inside diameter,  $d_{im}$ , and the diameter of the groove for housing the sealing ring) should preferably conform to the maximum values stated by the manufacturer, in order to have dimensions as close as possible to the extreme limits of their relevant tolerances.

## 8 Procedure

**8.1** Secure the socket, without any deformation, to the solid framework and align the pipe section with the axis of the socket.

**8.2** Apply the deformation to the pipe in the vertical plane, as required by the referring standard, using a pair of beams (6.6) placed at a distance of  $0,5 d_n$  from the mouth of the test socket. Measure the deformation at the face of the beam adjacent to the mouth of the socket.

**8.3** For pipes where no deformation is required by the referring standard, carry out procedures given in [8.4](#) to [8.6](#) without applying the deforming force.

**8.4** By inclining the pipe in the test apparatus, determine the free angle of deflection,  $\alpha_{\text{free}}$ , which the joint can tolerate without forcing.

If the free angle of deflection is greater or equal to the required one, firmly anchor the pipe to maintain the deflected pipe in this position for the remainder of the test.

If the free angle of deflection is less than the required one, carry out the test at the required deflection measured at the starting point (see [Figure 1](#)), by forcing the pipe to that position.

**8.5** Carry out the procedure of [8.6](#) under the following conditions:

- a) with the angular deflection applied in the vertical plane while constantly inspecting for and recording any signs of leakage;
- b) with the specified temperature constant to within  $\pm 2$  °C.

**8.6** Apply a negative pressure as specified in the referring standard to the test piece until a constant gauge pressure is achieved.

Isolate the vacuum pump from the test piece, monitor the pressure for the specified test duration, and record any change in the negative pressure. If the change in negative pressure exceeds 0,05 bar (5 kPa), stop the test.

Unless the change in negative pressure was not more than 0,05 bar (5 kPa), apply a further negative pressure as specified in the referring standard to the test piece until a second constant gauge pressure is achieved.

Again, isolate the vacuum pump from the test piece, monitor the pressure for the second specified test duration and record any change in negative pressure.

## 9 Test report

The test report shall include the following information:

- a) a reference to this document (ISO 13844:2022) and the referring standard (including its year of publication);
- b) the nominal pressure class or S series of the components [e.g. fitting(s), pipe] comprising the joint(s) under test;
- c) all details necessary for identification of the test pieces, including the nominal size of the pipes and fittings used to produce the test pieces, the type of material and the manufacturer's code;
- d) the angle of deflection,  $\alpha$ , used for the test;
- e) the test temperature;
- f) the test duration;
- g) the test procedure;
- h) the amount of deformation, if applicable (see [8.2](#) and [8.3](#));
- i) information on the leak tightness of the joint including the pressure at which a leakage occurred (if any);
- j) any factors which can have affected the results, such as any incidents or any operating details not specified in this document, any deviations from the procedure and any unusual features observed;

k) the date of the test.

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