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Thermoplastics piping systems for non-pressure underground drainage and sewerage — Thermoplastics inspection chamber and manhole bases — Test methods for buckling resistance

Systèmes de canalisations thermoplastiques pour branchements et collecteurs d'assainissement enterrés sans pression — Éléments de fond de boîtes d'inspection et de branchement et de regards thermoplastiques — Méthode d'essai de résistance au flambage

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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).

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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.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 13267:2010), which has been technically revised.

The main changes are as follows:

— normative references have been updated;

— definitions have been removed;

— technical changes have been made in 8.1, including new figures;

— minor editorial changes have been made.

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.

Thermoplastics piping systems for non-pressure underground drainage and sewerage — Thermoplastics inspection chamber and manhole bases — Test methods for buckling resistance

1 Scope

This document specifies methods of test for the resistance of the base of thermoplastics inspection chambers and manholes to external soil and ground-water pressure after installation.

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 9967:2016, *Thermoplastics pipes — Determination of creep ratio*

CEN/TS 1046:2021, *Thermoplastics piping and ducting systems — Outside the building structures for gravity and pressurised systems — Trench installation*

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 sealed test assembly, comprising an inspection chamber or manhole base with a minimum height of 300 mm above the top of the main channel, is placed free standing, or buried in a test box on a 100 mm sand or granular bed and covered with granular backfill to a level of minimum 300 mm above the top of the outlets and inlets of the main channel(s). In some cases, the first section of the riser may be required in order to achieve the minimum height of 300 mm.

The assembly is then subjected to a constant internal negative pressure, specified by the product or system standard, for a specified time at a temperature of between 15 °C and 25 °C or as otherwise specified in the product standard.

Alternatively, the pressure difference can be achieved by exposing the test assembly to a constant positive external hydrostatic pressure of the same numeric value as that specified by the product or system standard. The assembly is submerged under water in a closed tank for a specified time at a temperature of between 15 °C and 25 °C or as otherwise specified in the product standard.

During the test, the assembly may be monitored by measuring increasing deflections with time as defined in the product standard.

At the end of the test, the chamber base/manhole is visually checked for cracking or other defects likely to impair the performance of the inspection chamber or manhole.

5 Apparatus

5.1 Test box, large enough to accommodate the test assembly, including the first 300 mm of riser shaft above the top of the outlet and inlets of the main channel, such that at each side there is a free space of 300 mm minimum between the test assembly and the side/top of the test box.

5.2 Backfill material, to cover the test assembly in the box, conforming to CEN/TS 1046:2021, Annex A. Backfill material shall be in accordance with the minimum specification of the manufacturer.

5.3 Sealable water tank or **pressure vessel**, with internal dimensions capable of accommodating the test assembly to ensure all-round clearance and a lockable lid allowing access to the open top of the inspection chamber or manhole. The water tank or pressure vessel shall be such that the test assembly is not able to gain support from the sides or base of the tank or vessel.

It is essential that the removable cover of the tank be designed in such a way that there is a watertight connection between the cover and the open top of the chamber/manhole shaft or base, and that there is an opening big enough for visual inspection inside the chamber or manhole.

The temperature of the water applied shall be (20 ± 2) °C or as otherwise specified in the product standard.

5.4 End closures, to seal any open pipe socket(s), spigot(s) and additionally, the riser shaft. When testing for structural integrity (20 °C), the end closures shall be created using standard pipes with end caps. Plates welded to the end of the sockets or spigots may be used to seal the connections.

5.5 Pressure or **vacuum source**, capable of applying and maintaining the test pressure specified in the product standard specification for the inspection chamber or manhole base as being the maximum pressure that the inspection chamber or manhole base shall be able to withstand (subject to a minimum of −0,02 MPa).

5.6 Pressure measuring devices, capable of measuring the internal negative or external water test pressure to within an accuracy of ±2 %.

5.7 Thermometer, capable of measuring the temperature of the medium surrounding the test assembly to an accuracy of ±0,5 °C.

5.8 Deflection measuring equipment (optional), capable of measuring the deflection of the main channel to within an accuracy of ±0,1 mm (if required by the product standard).

5.9 Test assembly, comprising the base and a portion of the riser, if required, to ensure a height of at least 300 mm above the top of the main channel. Unless otherwise specified in the product standard, one test assembly shall be prepared for each test carried out.

NOTE The preferred configuration for testing the inspection chamber/manhole base is the straight through configuration without side entries.

6 Conditioning

Unless otherwise specified in the product standard, the test piece shall be tested no less than 21 days after manufacture and after conditioning in air for at least 6 h at a temperature of between 15 °C and 25 °C.

7 Test environment

Unless otherwise specified in the product standard, testing shall be carried out at a temperature of between 15 °C and 25 °C.

8 Procedure

8.1 Internal negative pressure testing using a free-standing test assembly

8.1.1 Seal all inlets and outlets of the test assembly and the top of the riser shaft using the end closures.

NOTE 1 Internal or external tie bars can be used between the inlet and outlet closures to avoid the transmission of external end loading forces to the inspection chamber/manhole base via the end closures.

NOTE 2 The test assembly can be turned 180° upside down to simplify the test.

If the base is designed with a double wall, where the outer wall is designed to withstand upthrust, one or more 3 mm to 4 mm diameter holes shall be drilled through the inner wall to ensure that the internal negative pressure is loaded against the outside wall of the base assembly.

If required by the referring product standard, the deflection H_B is to be measured to check if this deflection does effect on the predicted 50-year deflection of the main channel H_M.

8.1.2 If the measurement of deflection is required by the product standard, install the two devices for measuring deflection at points *W* and *H*, as shown in Figure 1 a), b), c) and Figure 2 a) b).

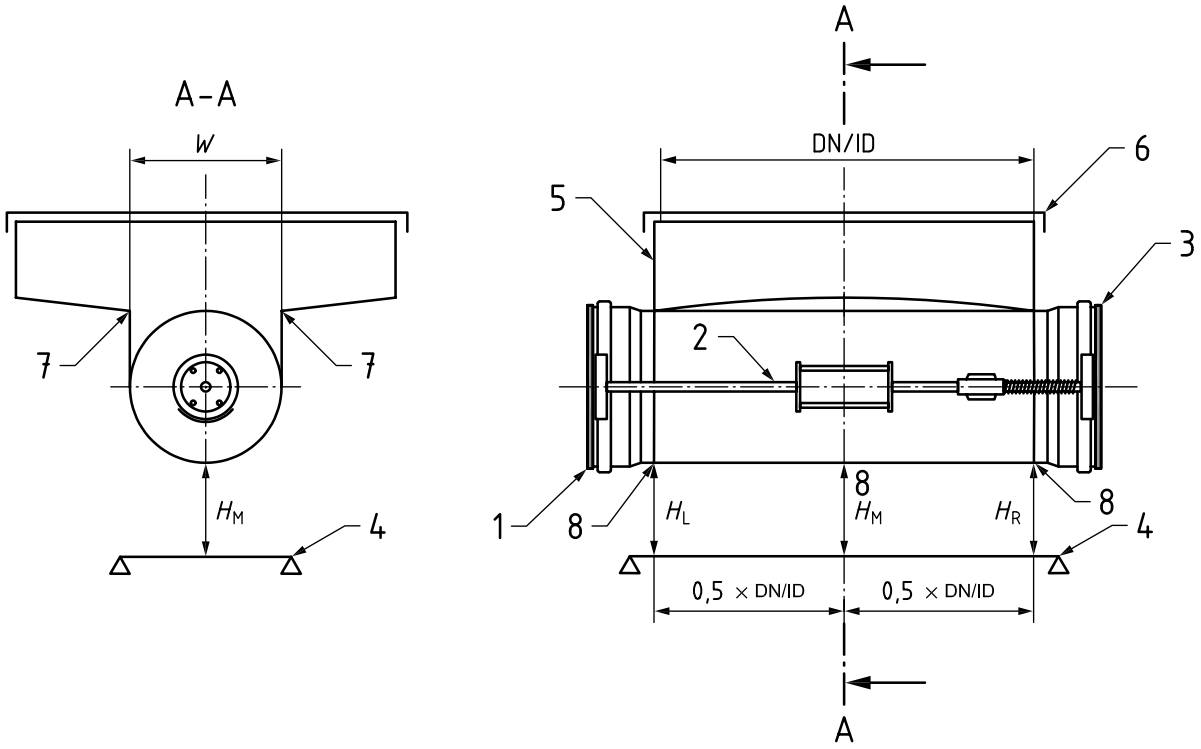
The relative vertical deformation of the base can be measured directly from a datum provided by a stiff beam connected at points H_L and H_R.

If a separate datum is used, the points H_L, H_R and H_M shall be measured from that datum during the test and the final deflection, expressed as Y_V, which is given by Formula (1):

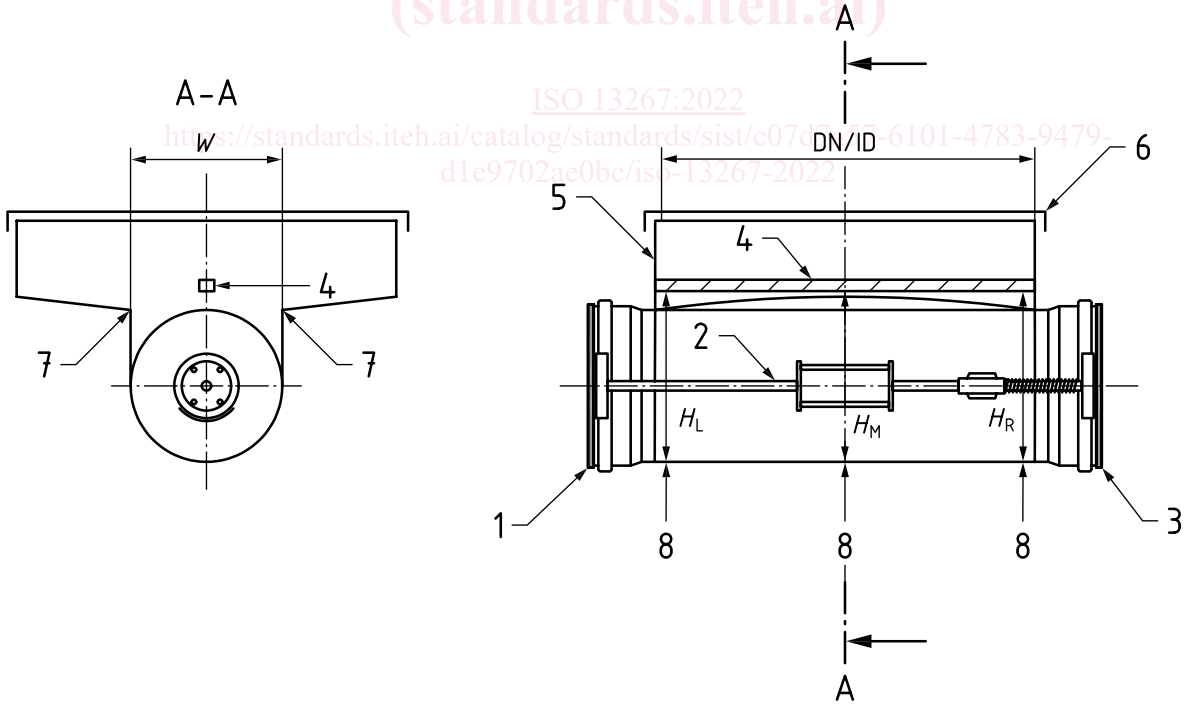
$$Y_V = [(H_L + H_R)/2] - H_M \quad (1)$$

The change of the width of the main channel shall be expressed as Y_H, where this is the change to dimension *W*.

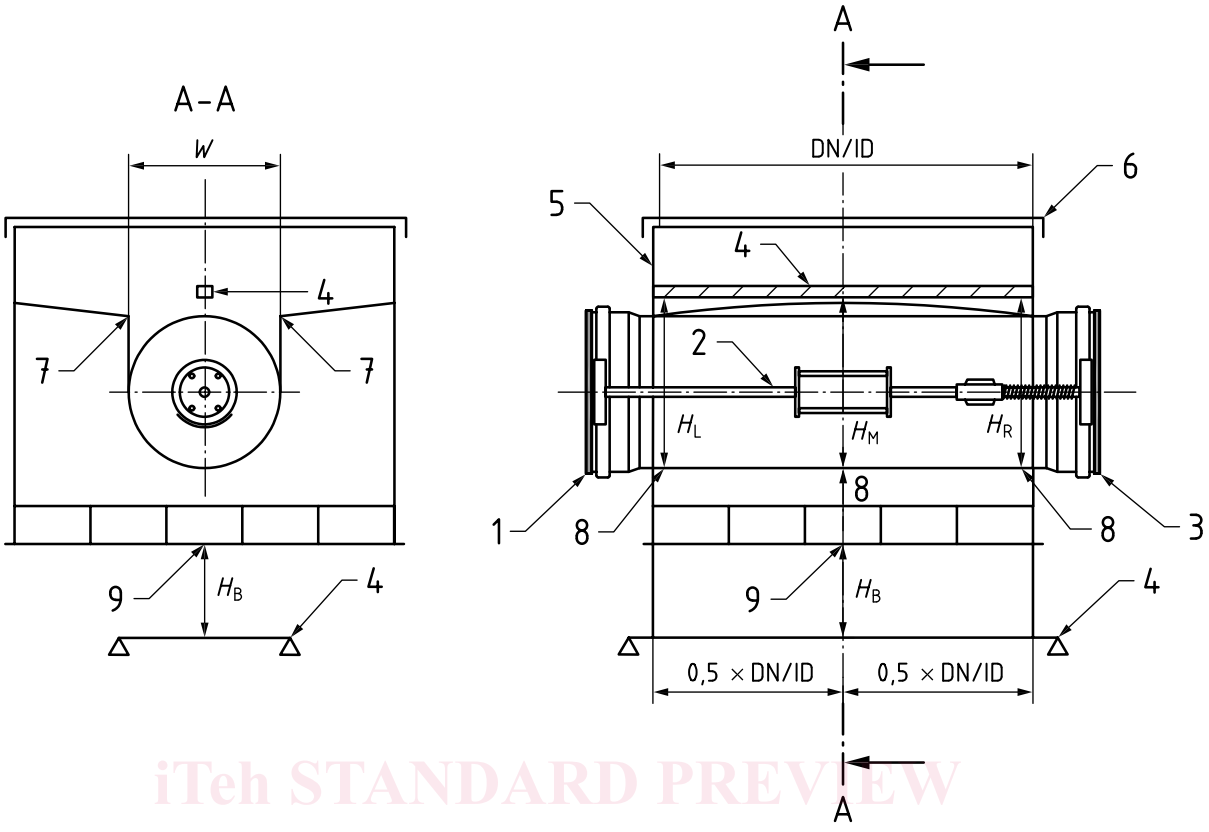
The sample shall be visibly inspected for evidence of cracks after completion of the test.



a) Example of test arrangement for single wall constructions with external measuring points



b) Example of test arrangement for single wall constructions with internal measuring points

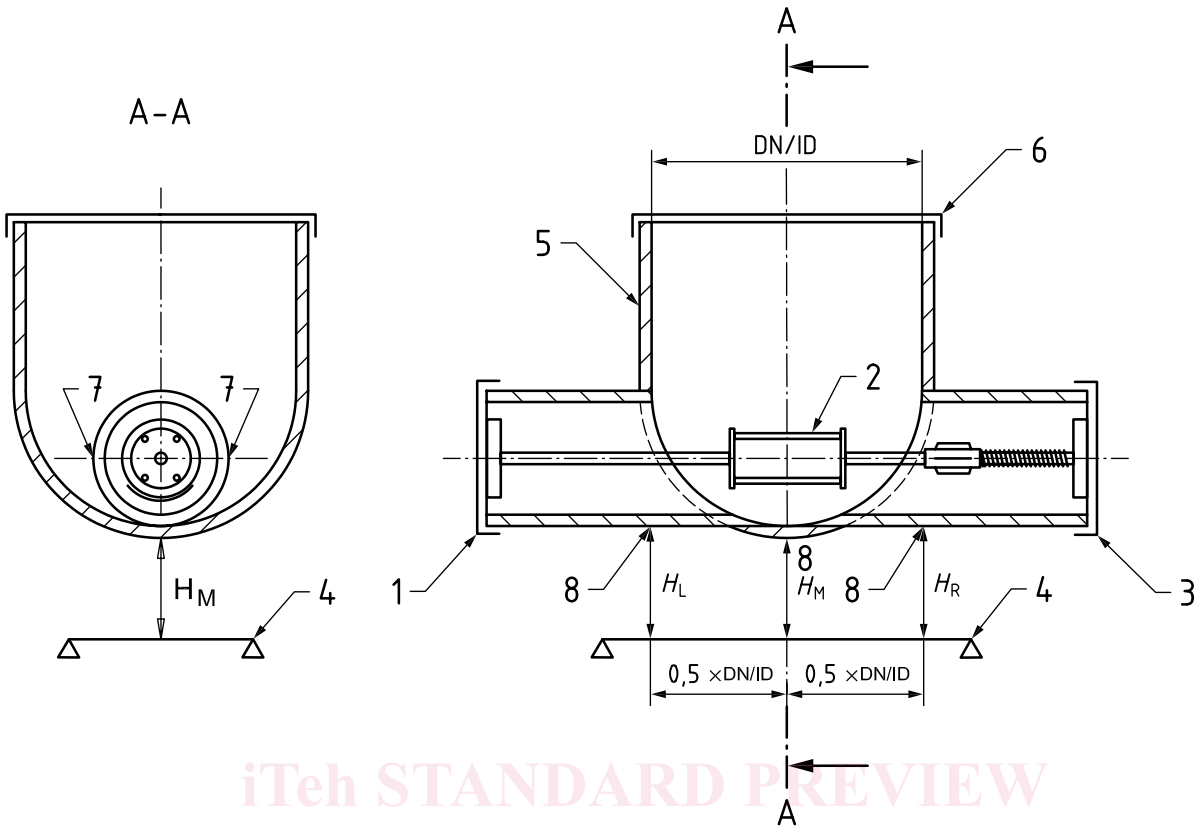


c) Example of test arrangement for double wall constructions with internal measuring points

Key

1 plug-inlet
2 plug support device (optional)
3 plug-outlet
4 reference line, datum
5 base section
6 removable cover
7 measuring point for dimension W
8 measuring point for dimensions H_L, H_M and H_R
9 measuring point for dimension H_B

Figure 1 — Examples of test arrangement for double and single wall constructions



a) Spherical constructions with external measuring points