BS EN 13598-1:2010

BSI Standards Publication

Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE)

Part 1: Specifications for ancillary fittings including shallow inspection chambers

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National foreword

This British Standard is the UK implementation of EN 13598-1:2010. It supersedes BS EN 13598-1:2003, which is withdrawn. Together with BS EN 13598-2:2009, it supersedes BS 7158:2001, which will be withdrawn on 01 January 2013. It also partially supersedes BS 4660:2000 because some of the access fittings, but not all (i.e. cleaning eyes), in BS 4660:2000 are covered in BS EN 13598-1:2010.

BS EN 13598-1:2010 specifies a wider range of access fitting opening sizes and Inspection Chamber riser sizes than is allowed in the UK, by Approved Document H of the Building Regulations. To be compliant with Approved Document H of the Building Regulations, the following limitations would need to be observed when these products are used in the UK.

In accordance with clause 2.48 and Table 11 of Approved Document H:

1. The minimum access fitting opening dimensions into the pipe are 150 mm x 100 mm or 150 mm diameter;
2. The maximum installation depth using a 190 mm minimum diameter riser is 0,9 m;
3. The maximum installation depth using a 450 mm minimum diameter riser is 1,2 m.

The UK participation in its preparation was entrusted to Technical Committee PRI/88/1, Plastics piping for non-pressure applications.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Plastics piping systems for non-pressure underground drainage and sewerage - Unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 1: Specifications for ancillary fittings including shallow inspection chambers

Systèmes de canalisations en plastique pour les branchements et les collecteurs d'assainissement enterrés sans pression - Poly(chlorure de vinyle) non plastifié (PVC-U), polypropylène (PP) et polyéthylène (PE) - Partie 1: Spécifications pour raccords auxiliaires y compris les boîtes de branchement

Kunststoff-Rohrleitungssysteme für erdverlegte drucklose Abwasserkanäle und -leitungen - Weichmacherfreies Polyvinylchlorid (PVC-U), Polypropylen (PP) und Polyethylen (PE) - Teil 1: Anforderungen an Schächte und Zubehörteile

This European Standard was approved by CEN on 23 October 2010.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Contents

Page

Foreword

This document (EN 13598-1:2010) has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2011, and conflicting national standards shall be withdrawn at the latest by June 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13598-1:2003.

The main changes compared to the previous edition are:

a) the opening of the standard to allow the controlled use of external reclaim materials (Annex A);

b) increased testing detail for mechanical saddles (Annex B).

This European Standard is a supplementary standard for System Standards for plastics piping systems of a particular material for a specified application. There are a number of such System Standards.

System Standards are based on the results of the work being undertaken in ISO/TC 138 “Plastics pipes, fittings and valves for the transport of fluids”, which is a Technical Committee of the International Organisation for Standardisation (ISO).

They are supported by separate standards on test methods and by European Standards for thermoplastic underground drainage and sewerage systems, to which references are made throughout the System Standard.

The System Standards are consistent with general standards on functional requirements and on recommended practice for installation.

This European Standard consists of the following parts: under the general title *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE)*:

— *Part 1: Specifications for ancillary fittings including shallow inspection chambers* (this standard);

— *Part 2: Specifications for manholes and inspection chambers in traffic areas and deep underground installations*;

— *Part 3: Guidance for the assessment of conformity* (a Technical Specification is under preparation).

This document includes a bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the definitions and requirements for ancillary fittings of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP), and polyethylene (PE) intended to be used in non-pressure underground drainage and sewerage systems, conforming to EN 476:

a) outside the building structure (application area code “U”), reflected in the marking of products by “U”, and

b) both buried in ground within the building structure (application area code “D”) and outside the building structure (application area code “U”), reflected in the marking of products by “UD”.

It also specifies the test parameters for the test methods referred in this standard.

The ancillary fittings covered by this standard are the following:

— sealed access fittings;

— rodding point covers;

— rodding tees;

— mechanical saddles;

— inspection chambers for shallow non-roadway applications to a maximum depth of 1,25 m.

NOTE 1 Inspection chambers as defined in 6.1.3 of EN 476:1997 have a riser with a DN/ID less than 800 mm.

NOTE 2 Deep inspection chambers and manholes for application area U are specified in Part 2 of this standard.

The fittings can be manufactured by various methods e.g. injection moulding, rotational moulding, spiral winding or fabricated from components made to other standards.

The jointing can be with:

— elastomeric ring seal joint;

— cemented joint for PVC-U;

— welded joint for PP and PE.

NOTE 3 Pipes, fittings and other components conforming to any of the plastics products standards listed in Clause 2 can be used with ancillary fittings conforming to this standard, provided they conform to the requirements for joint dimensions given in Clause 6 and to the requirements of Table 6.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 295-3:1991, *Vitrified clay pipes and fittings and pipe joints for drains and sewers — Part 3: Test methods*

EN 476:1997, *General requirements for components used in discharge pipes, drains and sewers for gravity systems*

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

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

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

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

EN 728, *Plastics piping and ducting systems – Polyolefin pipes and fittings – Determination of oxidation induction time*

EN 922, *Plastics piping and ducting systems — Pipes and fittings of unplasticized poly(vinylchloride)(PVC-U) — Specimen preparation for determination of the viscosity number and calculation of the K-value*

EN 1053, *Plastics piping systems — Thermoplastics piping systems for non-pressure applications — Test method for watertightness*

EN 1055:1996, *Plastics piping systems — Thermoplastics piping systems for soil and waste discharge inside buildings — Test method for resistance to elevated temperature cycling*

EN 1253-1:2003*, Gullies for buildings — Part 1: Requirements*

EN 1253-2:2003*, Gullies for buildings — Part 2: Test methods*

EN 1277:2003, *Plastics piping systems — Thermoplastics piping systems for buried non-pressure applications — Test methods for leaktightness of elastomeric sealing ring type joints*

EN 1401-1:2009, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: Specifications for pipes, fittings and the system*

EN 1852-1:2009, *Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene (PP) — Part 1: Specifications for pipes, fittings and the system*

EN 12256*, Plastics piping systems — Thermoplastics fittings — Test method for mechanical strength or flexibility of fabricated fittings*

EN 12666-1:2005, *Plastics piping systems for non-pressure underground drainage and sewerage — Polyethylene (PE) — Part 1: Specifications for pipes, fittings and the system*

EN 13476-1:2007, *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 1: General requirements and performance characteristics*

EN 13476-2:2007, *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 2: Specifications for pipes and fittings with smooth internal and external surface and the system, Type A*

EN 13476-3:2007+A1:2009, *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 3: Specifications for pipes and fittings with smooth internal and profiled external surface and the system, Type B*

EN 14680, *Adhesives for non-pressure thermoplastic piping systems — Specifications*

EN 14758-1:2005+A1:2009, *Plastics piping systems for non-pressure underground drainage and sewerage — With mineral modifiers (PP-MD) — Part 1: Specifications for pipes, fittings and the system*

EN 14830, *Thermoplastics inspection chamber and manhole bases — Test methods for buckling resistance*

EN 14982, *Plastics piping and ducting systems — Thermoplastics shafts or risers for inspection chambers and manholes — Determination of ring stiffness*

EN ISO 580:2005, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating (ISO 580:2005)*

EN ISO 1043-1:2001, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics (ISO 1043-1:2001)*

EN ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of the thermoplastics (ISO 1133:2005)*

EN ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method (ISO 1183-1:2004)*

EN ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method (ISO 1183-2:2004)*

EN ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions (ISO 3126:2005)*

3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the terms, definitions and abbreviations given in EN 1401-1:2009, EN 1852-1:2009, EN 12666-1:2005, EN 13476-1:2007, EN 13476-2:2007, EN 13476-3:2007+A1:2009, EN 14758-1:2005+A1:2009, EN ISO 1043-1:2001 and the following apply.

3.1 Terms and definitions

3.1.1
sealed access fitting
fitting that permits entry into the system for rodding or inspection and that has a sealed cover

3.1.2
rodding point cover
fitting which is installed at ground level with a removable cover that permits the introduction of equipment for inspection and the clearance of blockages, and the riser shafts connected to which do not exceed 200 mm outside diameter and are not less than 100 mm inside diameter

3.1.3
rodding tee
fitting which is installed in a drainage or sewerage system that connects to a rodding point at ground level by means of a vertical shaft that permits the introduction of equipment for the clearance of blockages, and also equipment for the inspection of the connecting pipe work in one or more directions, and the riser shafts connected to which do not exceed 200 mm outside diameter and are not less than 100 mm inside diameter

3.1.4
mechanical saddle
fitting that enables a branch connection to be made to buried drainage/sewerage systems of larger diameter by cutting a hole in the larger pipe and is retained in position by mechanical means

3.1.5
inspection chamber – shallow
drainage and sewerage fitting:

— which is used for connecting drainage or sewerage installations and/or for changing the direction of drainage/sewerage runs,

— which has a maximum depth from invert of drain to top of riser of 1,25 m and terminates at ground level, thus permitting the introduction of cleaning, inspection and test equipment and the removal of debris,

— which does not provide access for personnel,

— and the riser shafts connected to which have a minimum outside diameter of 200 mm and have a maximum inside diameter of less than 800 mm

3.1.6
structured-wall ancillary fittings
fittings which have an optimised design with regard to material usage to achieve the relevant performance requirements

3.1.7
reformulated material
recyclable / reprocessable material that has been reformulated, by the use of additives and processing techniques, to meet an agreed specification

NOTE Typically the additives used would be stabilizers, pigments, etc., the reformulated material taking the form of homogeneous pellets, granules, powder, etc. with the produced batch having consistent physical properties.

3.1.8
standard dimension ratio - SDR
numerical designation of a pipe series, which is a convenient round number, approximately equal to the dimension ratio of the nominal outside diameter, d_n, and the nominal wall thickness, e_n

3.2 Abbreviations

DN/ID : nominal size, inside diameter related

DN/OD : nominal size , outside diameter related

PVC-U : unplasticized poly(vinyl chloride)

PE : polyethylene

PP : polypropylene

PP-MD : polypropylene with incorporated mineral modifiers

4 Material

4.1 General

The material shall conform to EN 1401-1, EN 1852-1, EN 12666-1, EN 13476-1, EN 13476-2, EN 13476-3, EN 14758-1 as applicable.

4.1.1 Reprocessable and recyclable materials

The use of manufacturers own rework material and external reprocessable and recyclable material and their dosing levels shall be as specified in the standards listed in 4.1.

4.1.2 Reformulated material

Shallow inspection chambers may be manufactured from reformulated material provided that these materials are maintained within the specification limits given in Annex A.

4.1.3 Components from other standards

Plastics components, fabricated or otherwise, are permitted to be utilised as sub components of the final assembly provided that they have been manufactured in accordance with EN 1401-1, EN 1852-1, EN 12666-1, EN 13476-1, EN 13476-2, EN 13476-3 and EN 14758-1. Components of other than plastics materials should conform to relevant EN for these materials.

4.2 Sealing ring retaining components

It is permitted that sealing rings are retained using components made from materials other than the actual pipe or fitting PVC-U, PP or PE.

4.3 Sealing rings

The sealing ring material shall conform to EN 681-1, EN 681-2, EN 681-3 or EN 681-4 as applicable.

The sealing ring shall have no detrimental effects on the properties of the components and shall not cause the test assembly to fail the performance requirements given in Clause 10.

4.4 Adhesives for PVC-U

The adhesive or solvent cement shall conform to EN 14680.

The adhesive shall have no detrimental effects on the properties of the components and shall not cause the test assembly to fail the performance requirements given in Clause 10.

5 General characteristics

5.1 General

When viewed without magnification the following requirements apply:

a) the internal and external surfaces of ancillary fittings shall be smooth, clean and free from grooving, blistering, visible impurities or pores and any other surface irregularity likely to prevent their conformity with this standard;

b) ancillary fittings ends shall be cleanly cut and square with the axis of the ends and within any cutting zone recommended by the manufacturer.

5.2 Assemblies

Any combination of products manufactured from the materials listed in 4.1 may be used for the manufacture of assemblies.

5.3 Colour

Ancillary fittings if manufactured in layers shall have their surface layers coloured throughout. The outside layer of ancillary fittings should preferably be black, orange-brown (approximately RAL 8023 [1]) or dusty grey (approximately RAL 7037 [1]). Other colours may be used.

6 Geometrical characteristics

6.1 General

For the purpose of specifying dimensions the nominal diameter of ancillary fittings shall be that of the pipe which can be connected to its outlet except that in the case of mechanical saddles the size of the main pipe and branch

connection shall be used. All dimensions shall be measured in accordance with EN ISO 3126. Geometrical characteristics supplementary to those specified in this standard shall be declared by the manufacturer but shall conform to the minima specified in EN 476.

6.2 Dimensions

6.2.1 Design lengths

The design lengths shall be declared by the manufacturer. The requirements of bends formed in the base of pre-formed inspection chambers shall conform to the requirements of EN 476.

NOTE The design lengths (Z-lengths) are intended to assist in the design of moulds and are not intended to be used for quality control purposes. ISO 265-1 [2] can be used as a guideline.

6.2.2 Preferred angles of bends and branches

The preferred angles of bends and branches should conform to 4.3.1 of EN 476:1997. Other angles are permitted.

6.2.3 Wall thicknesses of bodies and spigots

The wall thickness of ancillary fitting components including spigots for pipe connections shall not be less than those specified in EN 1401-1, EN 1852-1, EN 12666-1, EN 13476-1, EN 13476-2, EN 13476-3, EN 14758-1 for a fitting or component of the same material and nominal diameter.

Chamber bases, including the first 300 mm of any integral riser, shall be sized as per nominal size of the riser. All separate riser components and integral risers above the first 300 mm shall have a minimum wall thickness for the size as the lowest stiffness class of the above standards.

6.2.4 Diameters and length of engagement (A_{min}) of sockets, wall thickness of sockets for pipe connections and length of spigots

The diameters and lengths and wall thicknesses of sockets intended for jointing to pipes to other standards and the length of moulded spigots shall not be less than those specified in EN 1401-1, EN 1852-1, EN 12666-1, EN 13476-1, EN 13476-2, EN 13476-3 and EN 14758-1 for a fitting of the same material and nominal diameter.

6.3 Additional requirements

6.3.1 Inspection chambers

The internal dimensions of inspection chambers shall conform to 3.1.5 and to the minima specified in EN 476:1997 (see Figure 5.)

Dimensions of inspection chamber riser shafts and dimensions of their connecting sockets on inspection chamber bodies shall be declared by the manufacturer.

6.3.2 Access fittings

Circular openings in access fittings shall have a minimum diameter greater than 50 % of the internal diameter of the fitting subject to a minimum of 90 mm.

Rectangular access fittings shall have minimum opening dimensions of 150 mm and 90 mm measured on their longitudinal and transverse centre lines.

NOTE 1 The performance of the access opening can be measured with the length of a 50 mm diameter rigid cylinder capable of passing through the opening and the outlet of the access fitting, when connected to SDR 41 pipe spigots or sockets (where the access fitting has been designed for use with a non interchangeable pipe then the pipe for which it was designed should be used). The preferred lengths of the rigid cylinder in millimetres should be: 160, 200, 250, 315, 400, 500, 630 which

simulates the maximum length of rodding, jetting and C.C.T.V. equipment used for maintenance and inspection. The preferred length is declared by the manufacturer.

NOTE 2 National regulations or practices can require larger openings in some circumstances.

7 Types of ancillary fittings

This standard is applicable for the following types of ancillary fittings; other designs of ancillary fittings for the same application are permitted:

a) Sealed access fittings (see Figure 1);

b) Rodding point covers (see Figure 2);

c) Rodding tees (see Figure 3);

d) Mechanical saddles (see Figure 4);

e) Inspection chambers shallow (see Figure 5).

NOTE 1 Preferred nominal angles for mechanical saddle branches are 45° and 90°.

NOTE 2 The figures are schematic sketches only to indicate the design. They do not necessarily represent the manufactured components. The following figures are examples of ancillary fittings, other designs are possible which can be required to conform to national requirements and/or local practice.

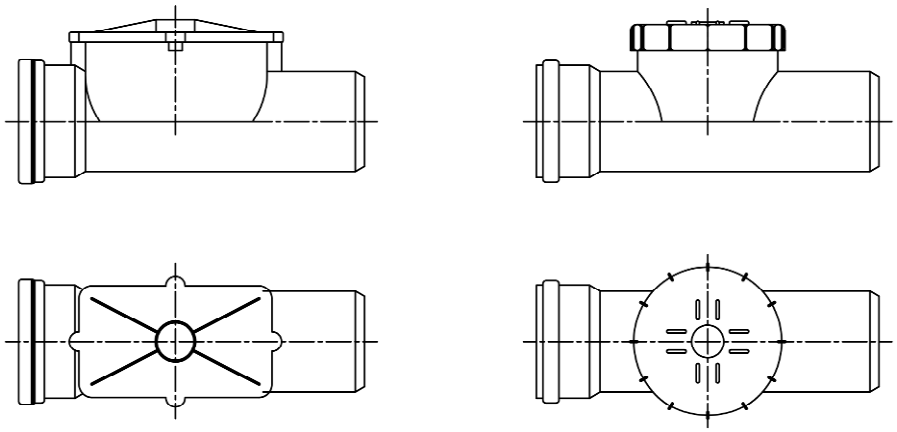


Figure 1 — Examples of sealed access fittings

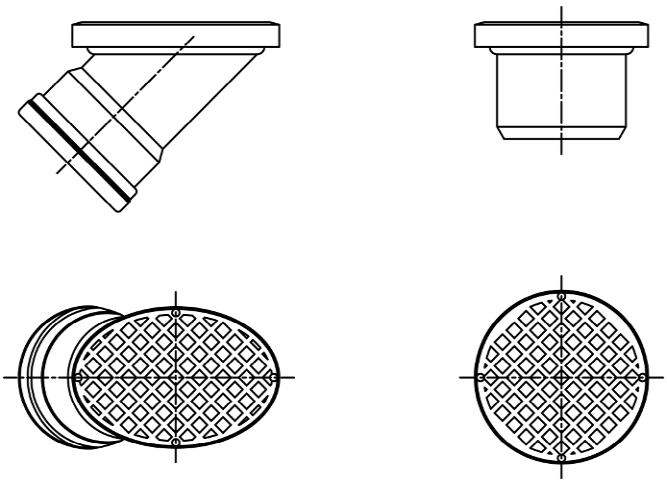


Figure 2 — Examples of rodding point covers

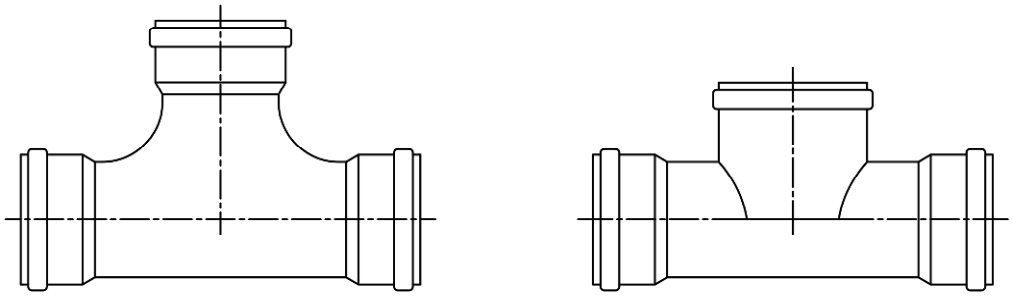


Figure 3 — Examples of rodding tees

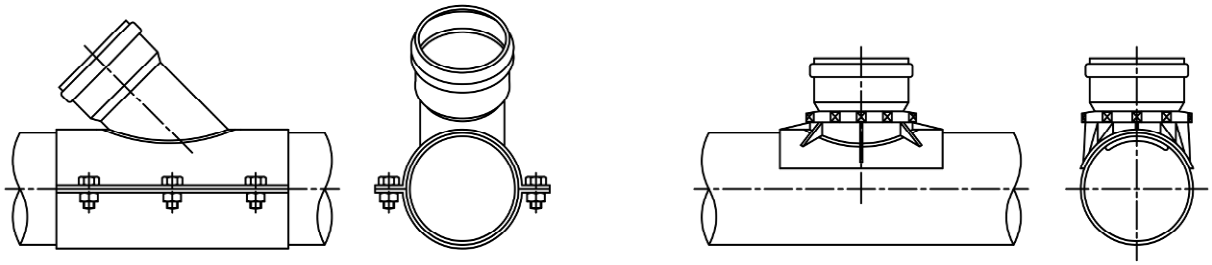


Figure 4 — Examples of mechanical saddles connected to an existing installed pipe

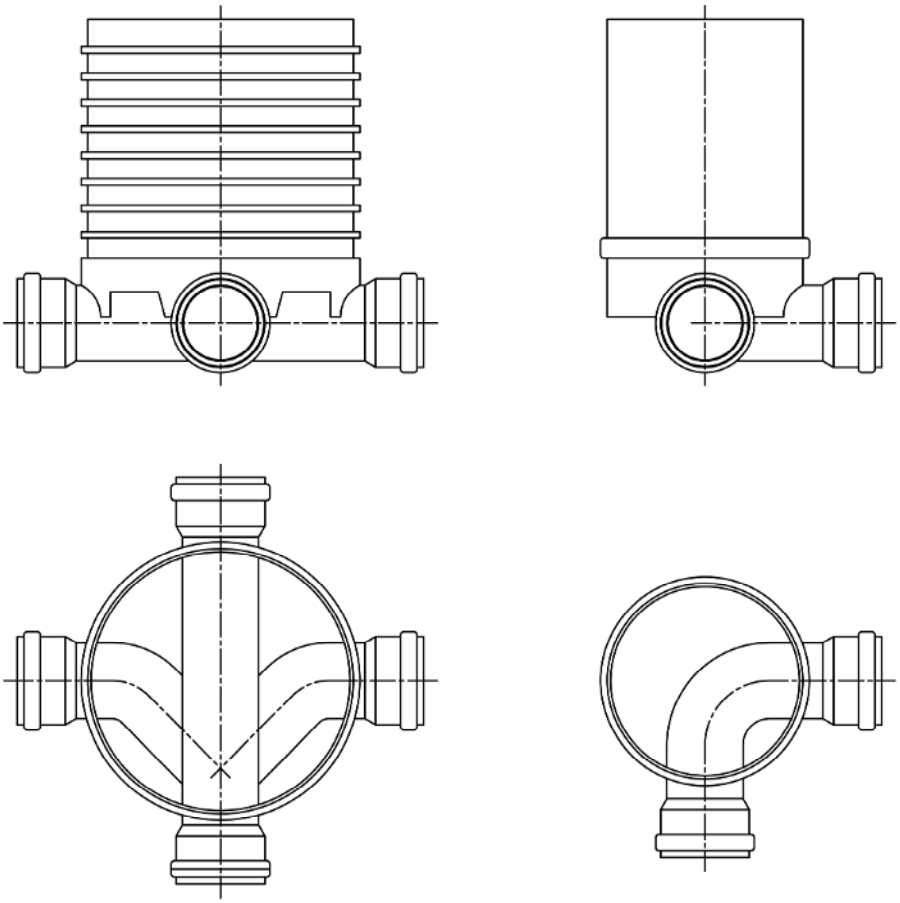


Figure 5 — Examples of shallow inspection chambers

8 Physical characteristics

When tested in accordance with the test method detailed in Table 1 any injection moulded PVC-U components shall conform to the requirements of Table 1.

Table 1 – Physical characteristics of PVC-U injection moulded components

Test parameters		Test method	Requirement
Characteristic	Value		
Effect of heating [a]	Test temperature (150 ± 2) °C Heating time	Method A of EN ISO 580:2005 – air Shall conform to EN ISO 580	[b]

[a] Large test pieces may be cut to fit the oven.

[b]
1) Within a radius of 15 times the wall thickness around the injection point(s) the depth of cracks, delamination or blisters shall not exceed 50 % of the wall thickness at that point.
2) Within a radius of 10 times the wall thickness from the diaphragm zone the depth of cracks, delamination or blisters shall not exceed 50 % of the wall thickness at that point.
3) Within a radius of 10 times the wall thickness from the ring gate the length of cracks, running through the overall thickness of the wall shall not exceed 50 % of the wall thickness at that point.
4) The weld line shall not have opened more than 50 % of the wall thickness at that line.
5) In other parts of the surface the depths of cracks and delaminations shall not exceed 30 % of the wall thickness at that point. Blisters shall not exceed a length of 10 times the wall thickness.

9 Mechanical characteristics

When tested with the test methods as specified in Tables 2, 3, 4 and 5, as applicable, using the indicated parameters, the ancillary fittings shall have mechanical characteristics conforming to the requirements given in Tables 2, 3, 4 and 5 respectively. The test temperature shall always be taken as (23 ± 2) °C unless otherwise specified.

Table 2 — Mechanical characteristics of inspection chambers shallow

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Stiffness of riser shaft [a]	No cracking, stiffness ≥ 0,7 kN/m^2	Shall conform to EN 14982		EN 14982
Vacuum requirement for resistance of inspection chambers to ground and water pressure when installed	No damage to the structure that could be deemed to impair its function [b]	Test temperature Test period Internal negative pressure	(23 ± 2) °C 100 h −0,3 bar	EN 14830
Resistance to vertical loading [c]	Deflection of horizontal dimensions not to exceed 6 %. Deflection of cover shall conform to Clause 4 of EN 1253-1:2003 No cracking	Force for class L	15 kN	Clause 4 of EN 1253-2:2003

[a] Only for separate riser shafts of shallow inspection chambers.

[b] The test assembly shall include at least the entire base unit of the inspection chamber. The negative pressure shall be maintained by external means throughout the 100 h test period prior to the pipe joints being subjected to the negative pressure part of the tightness tests as described in Table 6.

[c] Load applied via the cover and frame to the top of the riser fitted to a base with the unit buried in accordance with manufacturers instructions to a depth of 600 mm (the box load apparatus described in EN 1437 [3] is a suitable means of testing). Two pieces of SN 4 pipe 0,5 m long should be fitted to the inlet and outlet joints of the main channel. On completion of the test and before dismantling the unit should be checked for watertightness as described in Table 6 and EN 476:1997.

Table 3 — Mechanical characteristics of mechanical saddles assembled on pipe

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Resistance to vertical load [a]	No splitting cracking the vertical pipe shall not pass the pipe stop	Load Test period	15 kN 5 minutes	Load to be applied to the top of the riser pipe in accordance with Annex B
Mechanical strength of saddle assembled to pipe. [b c]	No sign of splitting cracking separation or leakage with the assembly filled with water (0,1 bar at inlet)	Test period Minimum moment for inlet pipe:	15 min 0,15 kNm	EN 12256 and Annex B

[a] This test is only required for 90° saddles installed vertically. It is necessary to insert two blocks inside the horizontal pipe located on each side of the mechanical saddle whilst testing to prevent the collapse of the pipe. These blocks should have such dimensions that the pipe is deflected less than 5 % of the inside diameter. The assembly is supported on a V block or a compacted sand or gravel bed.

[b] The assembly shall be in accordance with the manufacturers instructions.

[c] The force or displacement as applied shall be applied firstly in the longitudinal direction and subsequently in the transverse direction.

Table 4 — Mechanical characteristics of plastics rodding point covers

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Resistance to vertical loading [a]	Maximum permitted set 0,4 % of clear opening size	Force for [b]: class L class M	 15 kN 125 kN	EN 1253-2:2003

[a] Only for rodding points designed to withstand the load transferred through the sealed access cover.

[b] Class L: areas with light vehicular traffic, class M: areas with vehicular traffic, as classified in EN 1253-1:2003

Table 5 — Mechanical characteristics of fabricated fittings

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Flexibility or mechanical strength [a]	No sign of splitting cracking separation and/or leakage	Test period Minimum flexibility	15 min 170 mm	EN 12256
		OR		
		Test period Minimum moment for: DN $\leq$ 250 DN $>$ 250	15 min $0{,}15 \times [DN]^3 \times 10^{-6}$ kN•m $0{,}01 \times [DN]$ kN•m	
Leaktightness[b]	No visible sign of leakage	Test period Test pressure	15 min 0,5 bar	EN 1053

[a] Only for fabricated fittings made from more than one piece where a sealing retaining means or a separate cover are not considered as a piece. This requirement also applies to any fusion or adhesive jointing during the manufacture of inspection chambers.

[b] This test is not required if the fabrication is manufactured using calibrated welding machinery or certificated personnel.

10 Performance requirements

When tested in accordance with the test methods as specified in Table 6 using the indicated parameters, the joints and the system shall have characteristics conforming to the requirements given in Table 6.

Table 6 — Fitness for purpose characteristics of ancillary fittings

Characteristic	Requirements	Test parameters		Test method
		Characteristic	Value	
Tightness of elastomeric sealing ring joints to pipes [a]		Temperature Spigot deflection Socket deflection	(23 ± 5) °C 10 % 5 %	EN 1277:2003 Condition B
	No leakage	Water pressure	0,05 bar	
	No leakage	Water pressure	0,5 bar	
	≤ –0,27 bar	Air pressure	–0,3 bar	
Tightness of elastomeric sealing ring joints to pipes [a]		Temperature Joint deflection: $d_e \leq 315$ $315 < d_e \leq 630$ $630 < d_e$	(23 ± 2) °C 2° 1,5° 1°	EN 1277:2003 Condition C
	No leakage	Water pressure	0,05 bar	
	No leakage	Water pressure	0,5 bar	
	≤ –0,27 bar	Air pressure	–0,3 bar	
Elevated temperature cycling [b]	No leakage	Shall conform to EN 1055		EN 1055:1996 Test arrangement B) (Figure 2 of EN 1055:1996)
Tightness [c d]	No leakage ≤ –0,27 bar	Temperature Water pressure Air pressure Duration	(23 ± 5) °C 0,5 bar –0,3 bar 15 min	EN 1277:2003 Condition A and Annex B All joints sealed and anchored
Watertightness [e]	No leakage	Temperature Time Inspection chamber assembly filled with water to within 25 mm of chamber top	(23 ± 5) °C 15 min	Subclause 9.6.4 of EN 476:1997
Shear resistance [f]	No visible sign of leakage or cracking	Time Force	15 min 25 × [DN pipe] N	Clause 18 of EN 295-3:1991

[a] Test required for horizontal ring seal socket connections to flexible pipes as found on all products including inspection chambers and rodding tees (excluding rigid pipe connections). Where it is not practical due to fitting design to deflect the socket, the spigot or pipe should be deflected by 5 % instead of the test method as described. When the joint being tested is a standard joint design found in other components of the manufacturers system the test may be carried out using these other components.

[b] Test required for ancillary fittings intended for application area code UD. Inspection chambers must be supported vertically on a suitable base, the assembly must be capable of being sealed for pressure testing.

[c] Test required for sealed covers and for rigid pipe connections.

[d] Saddles should be tested with the main pipe deflected by 10 % (or 5 % if the main pipe has an DN/OD > 500 mm) measured 50 mm from saddle flange as described in Annex B.

[e] Test required for riser shaft joints of inspection chambers.

[f] Test required for connections to rigid pipes.

11 Marking

11.1 General

Marking elements shall be printed or formed directly on the fitting or be on a label in such a way that, after storage, handling, and installation, the required legibility is maintained.

Two levels of legibility of the marking on fittings are specified for the individual marking aspects given in Table 7. The required legibility of marking is coded as follows:

— a: durable in use;

— b: legible at least until the system is installed.

NOTE The manufacturer is not responsible for marking being made illegible due to actions during installation and use such as painting, scratching, covering of the components or by use of e.g. detergents on the components unless agreed with, or specified by the manufacturer.

Marking shall not initiate cracks or other types of defects, which adversely influence the performance of the fitting.

Marking by indentation reducing the wall thickness less than 0,25 mm shall be deemed to conform to this clause without infringing the requirements for the wall thickness specified in this standard.

The size of the marking shall be such that the marking is legible without magnification.

11.2 Minimum required marking, ancillary fittings

The marking shall conform to Table 7.

Table 7 — Minimum required marking of ancillary fittings

Aspect	Marking or symbols	Legibility code
— Number of this standard	EN 13598-1	b
— Application area code	U or UD, as applicable	b
— Manufacturer's name and/or trade mark	xxx	a
— Nominal size(s)	e.g. 250 x 160	b
— Only for saddles the individual manufacturers pipe size that the saddle is intended for or the relevant pipe EN and pipe SN.	e.g. 250 (EN 1401 / EN 1852) SN 8 x angle of inlet (if other than 90°)	b
— Material(s) [a]	Either PVC-U or PVC, PP, PE, PP-MD	a
— Manufacturer's information	[b]	b

[a] All separately delivered components intended for site assembly shall be marked with the material identification. Prefabricated components should also be marked with the material identification of the major sub components.

[b] For providing traceability the following details shall be given:
— the production period year in figures or in code;
— a name or code for the production site if the manufacturer is producing in different sites, nationally and/or internationally.

11.3 Additional marking

Ancillary fittings conforming to this standard, which conform also to other standards, may additionally be marked with the required marking of those standards.

Ancillary fittings conforming to this standard which are third party certified may be marked accordingly.

Annex A
(normative)

Reformulated material characteristics used for shallow inspection chambers

The reformulated material requirements for shallow inspection chambers (4.1.2) are specified in Table A.1.

The declared characteristics as specified by the manufacturer of the reformulated material and the tolerance variation of these characteristics shall be as specified in Table A.1.

NOTE These characteristics together with the manufacturer's Quality Plan dimensions provide the means to carry out the assessment of conformity as detailed in factory production and control procedures.

Table A.1 — Reformulated material characteristics

Characteristic	Test method	Requirement	Roto-moulded		Injection-moulded [a]			
			PE	PP	PE	PP [b]	PP-MD [c]	PVC
Density [d]	EN ISO 1183-1 or EN ISO 1183-2	Max. deviation from declared value [kg/m^3]	± 25	± 25	± 25	± 25	± 25	± 25
Oxidation induction time at 200 °C (measured on product)	EN 728	Declared value	≥ 10	≥ 8	≥ 10	≥ 8	≥ 8	NA
K-value	EN 922	Declared min. value	NA	NA	NA	NA	NA	55
MFR	EN ISO 1133 [e]	Max. upper deviation from declared value	Y > 1,5: +20% Y ≤ 1,5: +0,3 g/10 min	Y > 1,5: +20% Y ≤ 1,5: +0,3 g/10 min	Y > 1,5: +20% Y ≤ 1,5: +0,3 g/10 min	Y > 1,5: +20% Y ≤ 1,5: +0,3g/10 min	Y > 1,5: +20% Y ≤ 1,5: +0,3g/10 min	NA
		Lower deviation	Free	Free	Free	Free	Free	

a This includes both conventional and low pressure moulding materials.

b For low pressure injection-moulded components, (typically with melt pressures of less than 140 bar) the max upper deviation can be 100 % for MFR < 2,0.

c For PP-MD, the PP base material shall have an OIT of 8 minimum.

d Any method of EN ISO 1183-1 and EN ISO 1183-2 may be used, provided the result of the determination is accompanied with a reference to the method used for the determination. In case of dispute, the immersion method given in EN ISO 1183-1 shall be used. Density is not applicable to low pressure moulding.

e For PE: 190 °C, 5kg - condition T. For PP: 230 °C, 2,16 kg - condition M. For PE roto-moulding: 190 °C, 2,16 kg – condition D.

NOTE "NA" denotes "Not applicable".

Annex B
(normative)

Testing techniques to be used when testing saddles

B.1 General

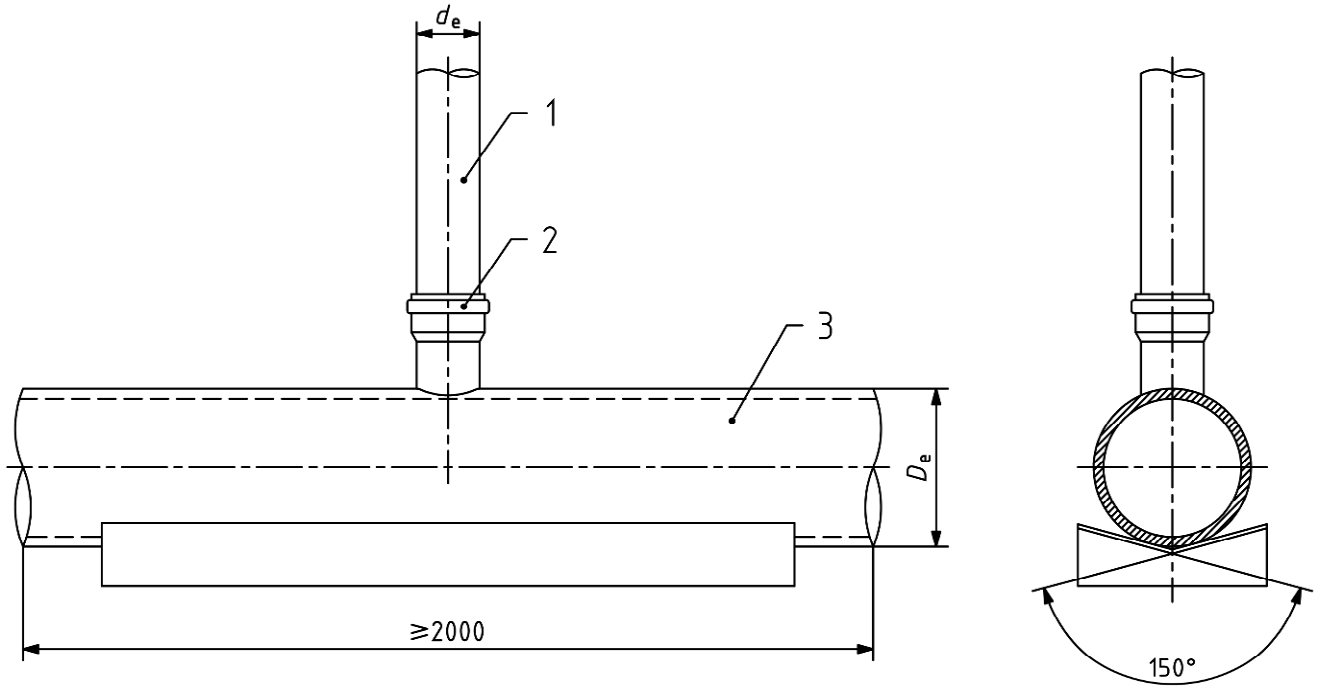
The saddle shall be installed according the installation instructions of the supplier, on to a PP, PE or PVC main pipe class SN2, SN 4, SN8 and SN16 as applicable which fulfils the requirements of EN 13476 (all parts) or EN 1401 or EN 1852 or EN 12666 or EN 14758. The total length of the main pipe shall be 8 x DN or 2m whichever is the greater. An inlet pipe (highest available stiffness class) shall be installed in the mechanical saddle. The end of the inlet pipe within the saddle shall be cut square and clean.

B.2 Test equipment

In addition to that specified by the test method, equipment as schematically described in Figures B.1, B.2, B.3 and B.4 is required.

Execute all tests starting with the arrangement described in Figure B.1.

Dimensions in millimetres

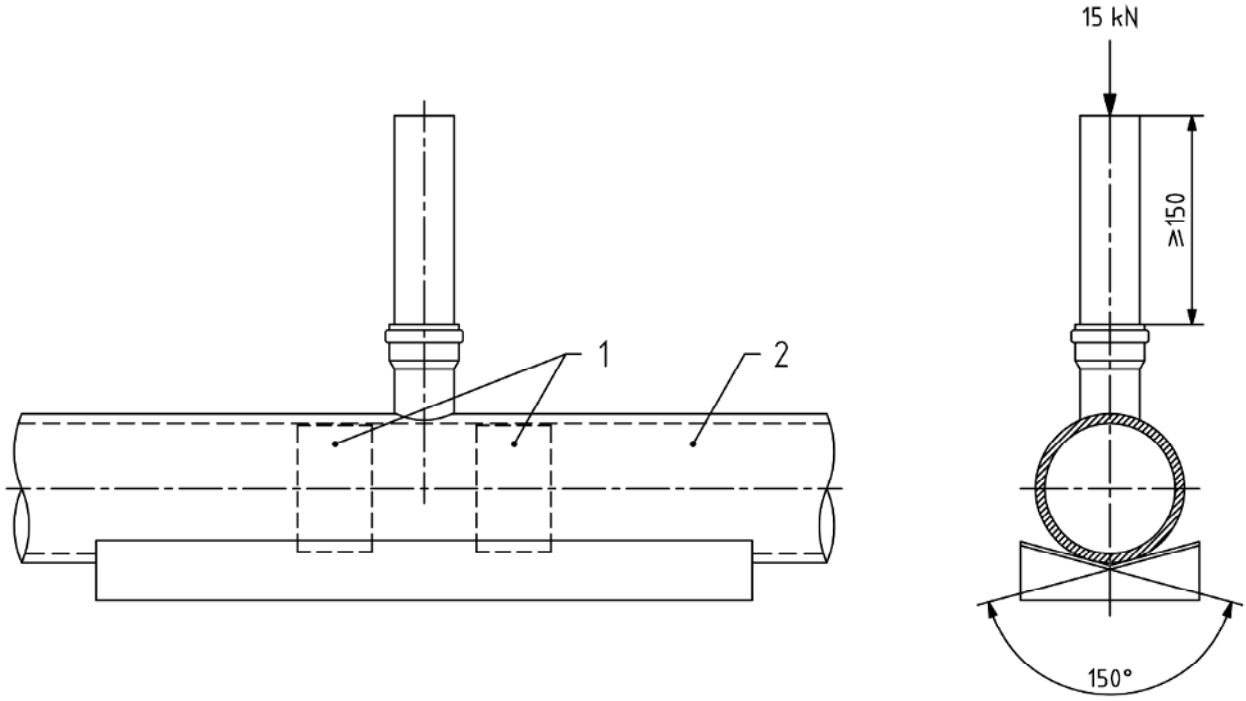


Key

1 down pipe
2 saddle
3 main pipe

Figure B.1 — Principal arrangement

Dimensions in millimetres



Key

1 internal support
2 main pipe

Figure B.2 — Resistance to vertical loading

B.3 Procedures

B.3.1 Resistance to vertical load – Table 3 – pipe stop test

Support the main pipe internally, if necessary, next to the mechanical saddle in such a way that the main pipe cannot deform more than 5 % of the diameter. The internal support shall be installed directly next to the parts of the mechanical saddle exposed within the main pipe — see Figure B.2.

Place the load of 15 kN on top of the inlet pipe. Evenly apply the load within a maximum period of 90 seconds. Hold the load for a period of 300 seconds.

Unload the inlet pipe directly and check, during and after the test if the assembly fulfils the requirements.

NOTE If the mechanical saddle is intended for use with a settlement device or construction e.g. a temporary flexible end stop, the test as described in Figure B.2 should incorporate the settlement device or construction. All other tests are carried out without the settlement device or construction.

B.3.2 Mechanical strength – Table 3

Substitute the inlet pipe of the test described in B.1 by an inlet pipe of 1 000mm length — see Figure B.3.

Substitute the mechanical saddle used in the last test by a new one with an unused settlement device or construction if applicable.

Fix the main pipe to the horizontal support at the stated distance.

Provide the main pipe with end-caps.

Install anchoring devices to prevent the components pushing apart under the effects of internal water pressure.

Fill the test piece with water up to one meter above the pipe crown.

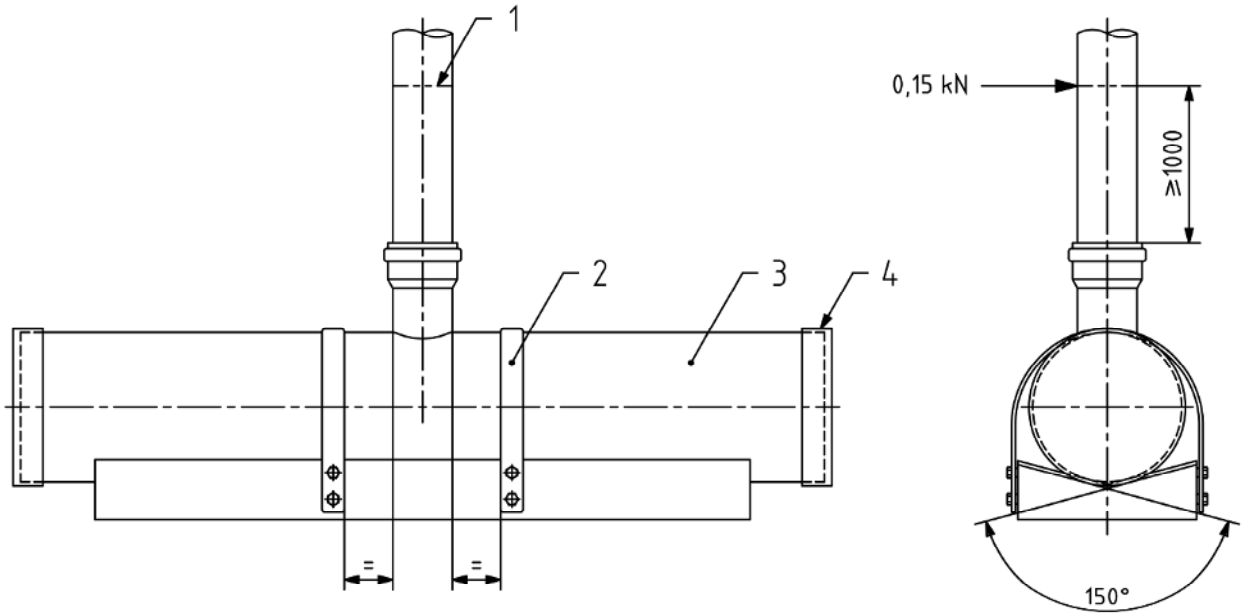
Apply a horizontal load of 0,15 kN to the inlet pipe along the axis of the main pipe at a distance of 1 000 mm above the crown of the main pipe.

The load should be applied evenly over a period of 90 seconds. Hold the load for the testing time of 300 seconds.

Repeat the test with the load applied at 90° to the axis of the main pipe.

Remove the load and check to ensure that the assembly meets the test requirements.

Dimensions in millimetres



Key

1 water level
2 main pipe fixation
3 main pipe
4 end caps

Figure B.3 — Mechanical strength

B.3.3 Tightness under deformation – Table 6

If necessary, substitute the inlet pipe of the test carried out as described in B.3.2 above for a shorter one. Provide the inlet pipe with an end cap.

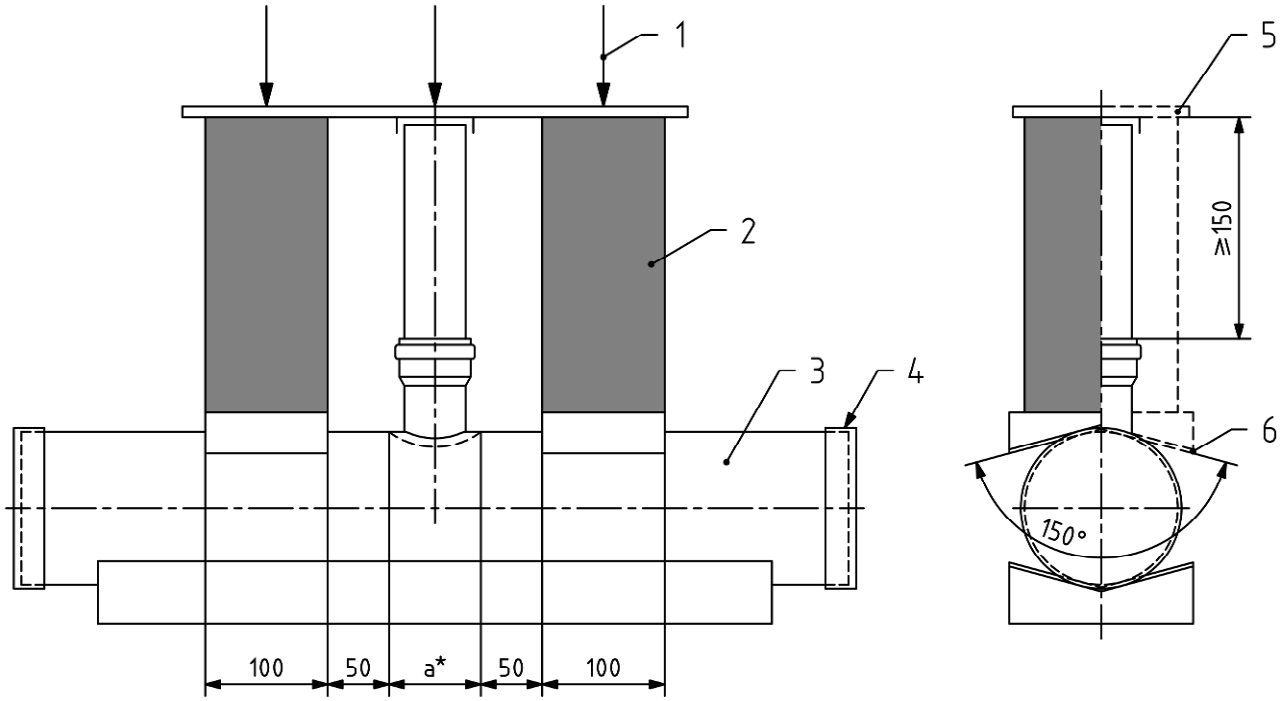
Install anchoring devices to prevent the components pushing apart under the effects of internal water pressure.

Vertically load the main pipe as shown in Figure B.4 until a deformation of 10 % is achieved (5 % if the main pipe is > 500 mm).

Test the assembly against the test parameters as described in Table 6.

Remove the load and check to ensure that the assembly meets the test requirements.

Dimensions in millimetres



* a is the width of the saddle flange.

Key

1 test load
2 fill blocks
3 main pipe

Figure B.4 — Tightness under deformation

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[1] RAL 840-HR, *Colour register*

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[3] EN 1437:2002, *Plastics piping systems — Piping systems for underground drainage and sewerage — Test method for resistance to combined temperature cycling and external loading*

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