
**Plastics piping systems for soil
and waste discharge (low and high
temperature) inside buildings —
Styrene copolymer blends (SAN + PVC)**

*Systèmes de canalisations en plastique pour l'évacuation des
eaux-vannes et des eaux usées (à basse et à haute température) à
l'intérieur des bâtiments — Mélanges de copolymères de styrène (SAN
+ PVC)*

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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).

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 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 19220:2004), which has been technically revised.

The main changes compared to the previous edition are as follows:

- references to EN standards have been changed to references to ISO standards;
- Introduction has been deleted.

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.

Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings — Styrene copolymer blends (SAN + PVC)

1 Scope

This document specifies the requirements for solid-wall styrene copolymer blend (SAN + PVC) pipes and fittings for soil and waste discharge (low and high temperature) above ground inside buildings, and for the system itself. It does not include buried pipework.

It also specifies the test parameters for the test methods referred to within this document.

This document is applicable to SAN + PVC pipes and fittings, as well as assemblies of such pipes and fittings, intended to be used for the following purposes:

- a) soil and waste discharge pipework for the conveyance of domestic waste waters (low and high temperature);
- b) ventilation pipework associated with a);
- c) rainwater pipework inside the building.

This document is applicable to pipes and fittings designed for jointing by means of elastomeric sealing rings, solvent cementing or integral dual-purpose sockets, i.e. for elastomeric ring seal joints and/or for solvent cement joints.

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 2505, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters*

ISO 2507-1, *Thermoplastics pipes and fittings — Vicat softening temperature — Part 1: General test method*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 3127, *Thermoplastics pipes — Determination of resistance to external blows — Round-the-clock method*

ISO 4633, *Rubber seals — Joint rings for water supply, drainage and sewerage pipelines — Specification for materials*

ISO 8361-1, *Thermoplastics pipes and fittings — Water absorption — Part 1: General test method*

ISO 13254, *Thermoplastics piping systems for non-pressure applications — Test method for watertightness*

ISO 13255, *Thermoplastics piping systems for soil and waste discharge inside buildings — Test method for airtightness of joints*

ISO 13257, *Thermoplastics piping systems for non-pressure applications — Test method for resistance to elevated temperature cycling*

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

EN 1411, *Plastics piping and ducting systems - Thermoplastics pipes - Determination of resistance to external blows by the staircase method*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological 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/>

3.1 Symbols

d_e	outside diameter (at any point)
d_{em}	mean outside diameter
d_n	nominal outside diameter
d_s	inside diameter of the socket
d_{sm}	mean inside diameter of the socket
DN	nominal size
DN/OD	nominal size (outside-diameter related)
e	wall thickness (at any point)
e_m	mean wall thickness (e_s)
e_s	wall thickness of the socket
e_g	wall thickness at the groove
l_{sz}	depth of sealing zone
l_{eff}	effective insertion depth
L_c	length of solvent cement socket
L_e	length of engagement
L_l	length of lead-in
L_p	effective length of a pipe
L_{sp}	length of spigot
L_z	design length (z-length) of a fitting
R	radius of swept fittings z
α	nominal angle of a fitting
H_{50}	drop height for 50 % failure

3.2 Abbreviated terms

PVC	poly (vinyl chloride)
SAN	styrene-acrylonitrile
SAN + PVC	styrene copolymer blends
TIR	true impact rate
VST	vicat softening temperature

4 Material

4.1 SAN + PVC compound

The compound for pipes and fittings shall be a styrene copolymer blend consisting of SAN and PVC to which may be added those additives that are needed to facilitate the manufacture of components conforming to the requirements of this document.

Other additives may be used in order to conform to national requirements on fire regulations.

Fabricated fittings or parts of fabricated fittings shall be made from pipes and/or mouldings conforming to this document, except for the requirements for wall thickness of fabricated fittings and/or mouldings made from SAN + PVC, which conform to the respective material, mechanical and physical characteristics as required in this document.

NOTE Material conforming to this requirement generally contains 40 % to 60 % of SAN.

4.2 Reprocessable and recyclable material

In addition to virgin material, the use of reprocessable material obtained during the production and testing of products conforming to this document is permitted. External reprocessable or recyclable material shall not be used.

4.3 Sealing ring retaining means

Sealing rings may be retained using means made from plastics other than SAN + PVC, provided the joints conform to the requirements given in [Clause 9](#).

4.4 Fire behaviour

No specific requirements are set by this document for fire behaviour. Attention is drawn to the need to acknowledge any relevant national regulations in this respect.

5 General characteristics

5.1 Appearance

When viewed without magnification, the following requirements shall be met:

- the internal and external surfaces of pipes and fittings shall be smooth, clean and free from grooving, blistering, impurities, pores or any other surface irregularity likely to prevent conformity of pipes and fittings to this document;
- each end of a pipe or fitting shall be cleanly cut, if applicable, and shall be square to its axis.

5.2 Colour

Pipes and fittings shall be uniformly coloured over the whole wall.

The recommended colour for pipes and fittings is grey or black.

[Annex A](#) gives information on additional characteristics.

6 Geometrical characteristics

6.1 General

All dimensions shall be measured in accordance with ISO 3126.

The figures given in this document are schematic sketches only, to indicate the relevant dimensions. They do not necessarily represent manufactured components. However, the dimensions given shall be conformed to.

6.2 Dimensions of pipes

6.2.1 Outside diameters

The mean outside diameter, d_{em} , shall conform to [Table 1](#) or [Table 2](#), as applicable

Table 1 — Mean outside diameters (metric series)
(standards.iteh.ai)

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter d_n	Mean outside diameter d_{em}	
		min.	max.
32	32	32,0	32,3
40	40	40,0	40,3
50	50	50,0	50,3
63	63	63,0	63,3
75	75	75,0	75,4
80	80	80,0	80,4
90	90	90,0	90,4
100	100	100,0	100,4
110	110	110,0	110,4
125	125	125,0	125,4
160	160	160,0	160,5

Table 2 — Mean outside diameters (series based on inch dimensions)

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter d_n	Mean outside diameter d_{em}	
		min.	max.
36	36	36,1	36,5
43	43	42,7	43,1
55	55	55,7	56,1

6.2.2 Effective length of pipes

The effective length of a pipe, L_p , shall not be less than that declared by the manufacturer and shall be measured as shown in [Figure 1](#). For pipes with sockets, the effective length is considered to be the distance between the pipe ends minus the socket length. For practical reasons, this length is measured to the outside of the socket.

6.2.3 Chamfering

If a chamfer is applied, the angle of chamfering shall be between 15° and 45° to the axis of the pipe (see [Figure 3](#)). When pipes without chamfer are used, the pipe ends shall be deburred.

The remaining wall thickness of the end of the pipe shall be at least 1/3 of e_{min} .

6.2.4 Wall thickness

The wall thickness, e , shall conform to [Table 3](#) or [Table 4](#), as applicable, but for the metric series a maximum wall thickness at any point of up to 1,25 e_{min} is permitted, provided that the mean wall thickness, e_m , is less than or equal to the specified $e_{m,max}$.

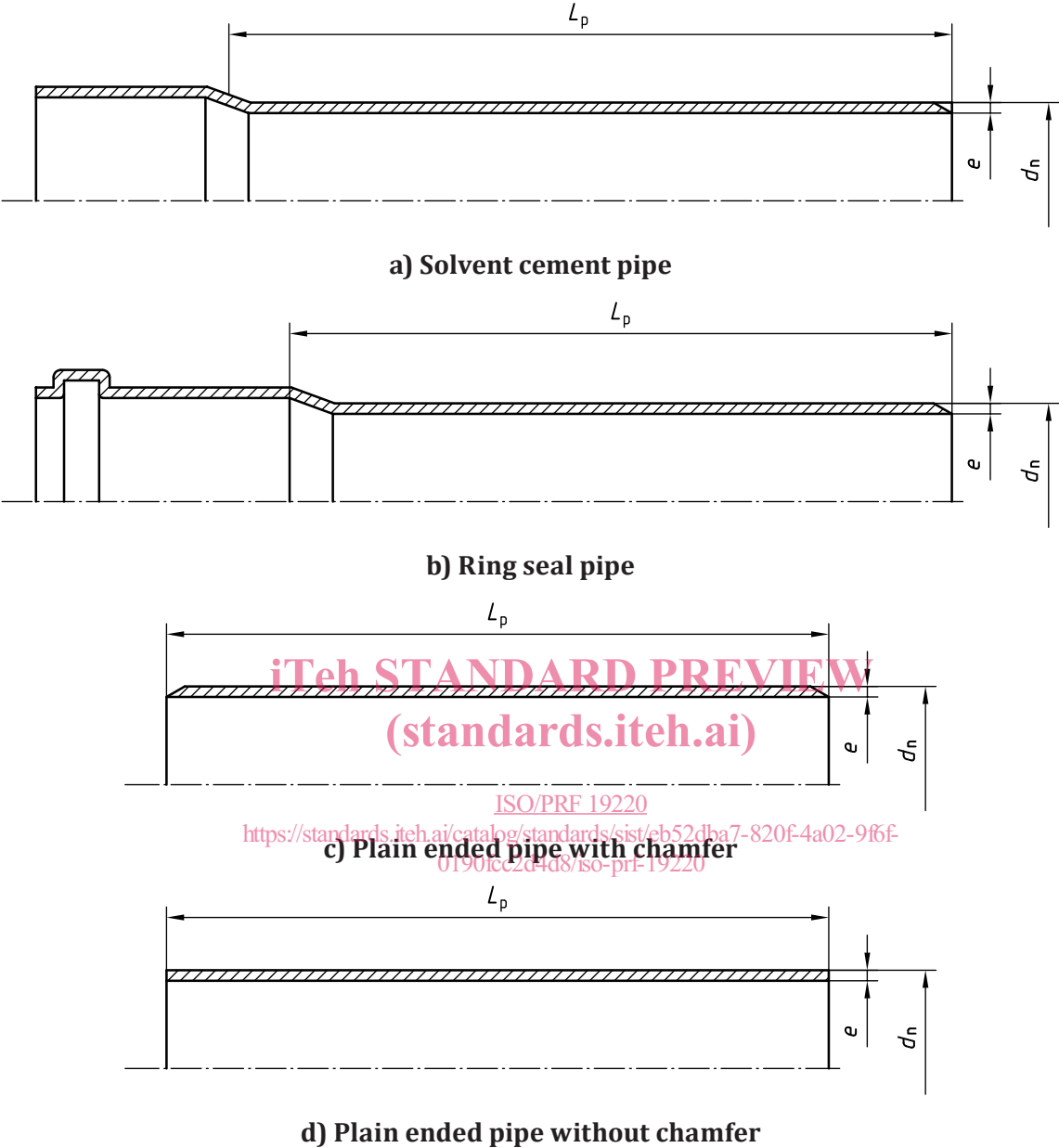


Figure 1 — Effective lengths of pipes

Table 3 — Wall thicknesses (metric series)

Dimensions in millimetres

Nominal size	Nominal outside diameter	Wall thickness			
		Pipe series			
		S 25 ^a		S 16,7 ^a	
DN/OD	d _n	e _{min}	e _{m,max}	e _{min}	e _{m,max}
32	32	1,8	2,2	2,2	2,7
40	40	1,8	2,2	2,2	2,7
50	50	1,8	2,2	2,2	2,7

^a Pipe series are defined in ISO 4065.

Table 3 (continued)

Nominal size DN/OD	Nominal outside diameter d_n	Wall thickness			
		Pipe series			
		S 25 ^a		S 16,7 ^a	
		e_{\min}	e_{\max}	e_{\min}	e_{\max}
63	63	1,8	2,2	2,2	2,7
75	75	1,8	2,2	2,5	3
80	80	1,8	2,2	2,6	3,1
90	90	1,8	2,2	2,7	3,3
100	100	2	2,5	3	3,6
110	110	2,2	2,7	3,2	3,8
125	125	2,5	3	3,7	4,3
160	160	3,2	3,8	4,7	5,3

^a Pipe series are defined in ISO 4065.

Table 4 — Wall thicknesses (series based on inch dimensions)

Dimensions in millimetres

Nominal size	Nominal outside diameter	Wall thickness	
DN/OD	d_n	e_{\min}	e_{\max}
36	36	1,8	2,2
43	43	1,9	2,3
55	55	2	2,4

6.3 Dimensions of fittings

6.3.1 Outside diameters

The mean outside diameter, d_{em} , of the spigot end shall conform to Table 1 or Table 2, as applicable.

6.3.2 z-lengths

The design length(s) [z-length(s)] of fittings (see Figures 8 to 21) shall be as given by the manufacturer.

NOTE The z-length(s) of a fitting are intended to assist in the design of moulds and are not intended to be used for quality control purposes. ISO 265-1 can be used as a guideline.

6.3.3 Wall thickness

The minimum wall thickness, e_{\min} , of the body or the spigot end of a fitting shall conform to Table 3 or Table 4, as applicable, except that a reduction of 5 % resulting from core shifting is permitted. In such cases, the average of two opposite wall thicknesses shall be equal to or greater than the values given in Table 3 or Table 4, as applicable.

Where a fitting or adaptor provides a transition between two nominal sizes, the wall thickness of each connecting part shall conform to the requirements for the applicable nominal size. In such cases, the wall thickness of the fitting body is permitted to change gradually from the one wall thickness to the other.

Where a sealing ring is located by means of a retaining cap or ring (see [Figure 2](#)), the wall thickness in this area shall be calculated by addition of the wall thickness of the socket and the wall thickness of the retaining cap or ring at the corresponding places in the same cross-sectional plane.

The wall thicknesses of fabricated fittings, except for spigot ends and sockets, may be changed locally to suit the fabrication process, provided that the minimum wall thickness of the body conforms to the minimum value of e_g as given in [Table 8](#) or [Table 9](#), as applicable.

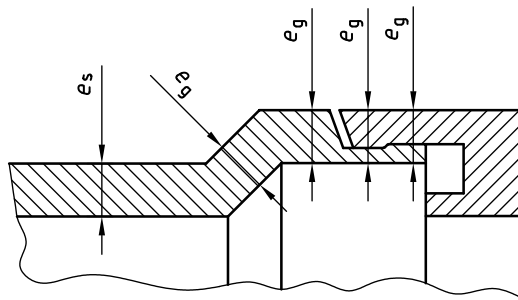


Figure 2 — Example of calculation of wall thickness of socket with retaining cap

6.4 Dimensions of sockets and pipe ends

6.4.1 Classification and designation of sockets

6.4.1.1 General

Sockets shall be classified according to the type of joint for which they are intended, as indicated in [6.4.1.2](#) to [6.4.1.4](#).

6.4.1.2 Ring seal sockets

The lengths of ring seal sockets of type N and type L and of spigot ends are designed for pipes of different lengths:

- **Type N** (normal): This socket type (see [Figure 4](#)) may be used as an expansion joint system. If this socket type is part of a fixed joint system (i.e. a system which does not in itself allow for expansion and contraction), it shall be used in conjunction with a type L (long) socket as specified in this document. The values for the length of engagement, L_e , given in [Table 5](#) or [Table 6](#), as applicable, are related to a pipe length of 3 m.
- **Type L** (long): This socket type (see [Figure 5](#)) may be used as an expansion joint in fixed joint systems (i.e. systems which do not in themselves allow for expansion and contraction), whether jointed by a ring seal or solvent cement or for use with sockets of type N, as applicable, where the length of pipe exceeds the maximum given for these types.

6.4.1.3 Solvent cement sockets

The classification includes the following type:

- **Type CS** (short type for solvent cement joints): This socket type (see [Figure 7](#)) may be used where jointing is carried out under controlled conditions.

6.4.1.4 Dual-purpose sockets

This socket type (see [Figure 4](#)) is intended to be used for a connection made either using a sealing ring or using solvent cement applied after removal of the sealing ring, if any.