INTERNATIONAL STANDARD

ISO 8772

Second edition
2006-09-15

Plastics piping systems for non-pressure underground drainage and sewerage — Polyethylene (PE)

Systèmes de canalisations en plastique pour les branchements et les collecteurs d'assainissement enterrés sans pression — Polyéthylène (PE)

Reference number
ISO 8772:2006(E)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 8772 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 8772:1991), which has been technically revised.

Plastics piping systems for non-pressure underground drainage and sewerage — Polyethylene (PE)

1 Scope

This International Standard specifies the requirements for polyethylene (PE) pipes, fittings and piping systems intended for use for non-pressure underground drainage and sewerage for the conveyance of soil and waste discharge of domestic and industrial origin, as well as surface water.

It covers buried pipework, as well as piping systems buried within the building structure.

In the case of industrial discharge, it is necessary that the chemical and temperature resistance be taken into account, but this will need to be done separately.

This International Standard is applicable to PE pipes with or without an integral socket.

NOTE Fittings can be manufactured by injection-moulding or fabricated from pipes and/or mouldings.

This International Standard is applicable to PE pipes and fittings for the following types of joints:

— elastomeric ring seal joints;

— butt-fused joints;

— electrofusion joints;

— mechanical joints.

This International Standard also specifies the test parameters for the test methods referred to herein.

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.

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

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

ISO 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

ISO 1167-2, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 2: Preparation of pipe test pieces*

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

ISO 2505:2005, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters*

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

ISO 4065, *Thermoplastics pipes — Universal wall thickness table*

ISO 4435, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U)*

ISO 9624, *Thermoplastics pipes for fluids under pressure — Mating dimensions of flange adapters and loose backing flanges*

ISO 9969, *Thermoplastics pipes — Determination of ring stiffness*

ISO/TR 10837, *Determination of the thermal stability of polyethylene (PE) for use in gas pipes and fittings*

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 12061, *Plastics piping systems — Thermoplastics fittings — Test method for impact resistance*

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

3 Symbols and abbreviated terms

For the purposes of this document, the following symbols and abbreviated terms apply.

NOTE The symbols are illustrated in Figures 1 to 22.

3.1 Symbols

A length of engagement

C depth of sealing zone

d_e outside diameter

d_{em} mean outside diameter

d_n nominal outside diameter

d_{sm} mean inside diameter of socket

e_m mean wall thickness

e_n nominal wall thickness

e_2 wall thickness of socket

e_3 wall thickness in groove area

L_1 length of spigot

l effective length of pipe

M length of spigot of plug

R radius of swept fittings

Z_d design length (Z_d length)

α_n nominal angle of fitting

3.2 Abbreviated terms

CT close tolerance

DN nominal size

DN/OD nominal size, outside diameter-related

MFR melt mass-flow rate

OIT oxidation induction time

PE polyethylene

S pipe series S

SDR standard dimension ratio

SN nominal ring stiffness

4 Material

4.1 Base material

The base material shall be polyethylene (PE), to which are added those additives needed to facilitate the manufacture of pipes and fittings conforming to the requirements of this International Standard.

The reference density of the base material (resin) shall be at least 930 kg/m^3 when determined according to ISO 1183-1.

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 International Standard is permitted. External reprocessable material and recyclable material shall not be used.

4.3 Melt mass-flow rate

Pipes and fittings shall be made from PE materials with an MFR lying in the range

0,2 g/10 min $\leqslant$ MFR (190/5) $\leqslant$ 1,4 g/10 min

when tested in accordance with ISO 1133:2005, using conditions T (temperature: 190 °C; loading mass: 5 kg).

4.4 Resistance to internal pressure (long-term behaviour)

When determined in accordance with the test methods as specified in Table 1, using the indicated parameters, the material shall have the characteristic conforming to the requirement given in Table 1.

The material shall be tested in the form of a pipe.

Table 1 — Material characteristics (long-term behaviour)

Characteristic	Requirement	Test parameters		Test methods
Resistance to internal pressure	No failure during the test period	End caps Test temperature Orientation Number of test pieces Circumferential (hoop) stress Conditioning period Type of test Test period	Type a or b 80 °C Free 3 4 MPa 1 h Water-in-water 165 h	ISO 1167-1 ISO 1167-2
Resistance to internal pressure	No failure during the test period	End caps Test temperature Orientation Number of test pieces Circumferential (hoop) stress Conditioning period Type of test Test period	Type a or b 80 °C Free 3 2,8 MPa 1 h Water-in-water 1 000 h	ISO 1167-1 ISO 1167-2

4.5 Thermal stability

When tested in accordance with ISO/TR 10837 using a test temperature of 200 °C, the oxidation induction time (OIT) of the material used for pipes or fittings shall not be less than 20 min.

4.6 Fusion compatibility

Materials fulfilling the long-term behaviour requirements given in 4.4 and having an MFR (190/5) within the range given in 4.3 shall be considered to be compatible for fusion to each other.

4.7 Sealing ring retaining means

Sealing rings may be retained using means made from polymers other than PE.

5 General characteristics

5.1 Appearance

When viewed without magnification, pipes and fittings shall meet the following requirements:

— the internal and external surfaces shall be smooth, clean and free from grooving, blistering, impurities, pores and any other surface irregularity likely to prevent conformity with this International Standard;

— pipe ends shall be cleanly cut and the ends of pipes and fittings shall be square to their axis.

NOTE Electrofusion fittings can feature exposed metallic components.

5.2 Colour

The pipes and fittings shall be coloured through the whole wall.

The colour should preferably be black or as agreed between manufacturer and purchaser.

A deviating colour for a co-extruded inner layer is permitted, provided the material of this layer conforms to Clause 4.

6 Geometrical characteristics

6.1 General

All dimensions shall be measured in accordance with ISO 3126.

The figures given in this International Standard are schematic sketches only, indicating the relevant dimensions. They do not necessarily represent manufactured components. The dimensions given shall be conformed with, however.

6.2 Dimensions of pipes

6.2.1 Outside diameter

The mean outside diameter, d_{em}, shall be in accordance with Table 2.

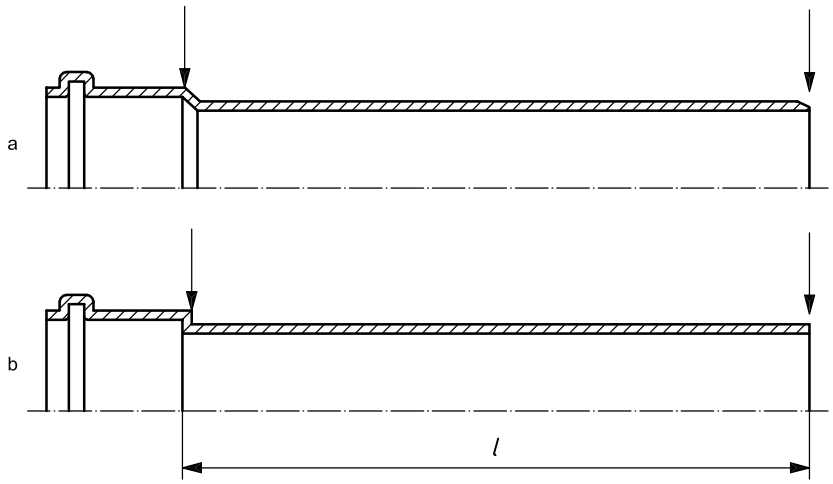
Table 2 — Mean outside diameters

Dimensions in millimetres

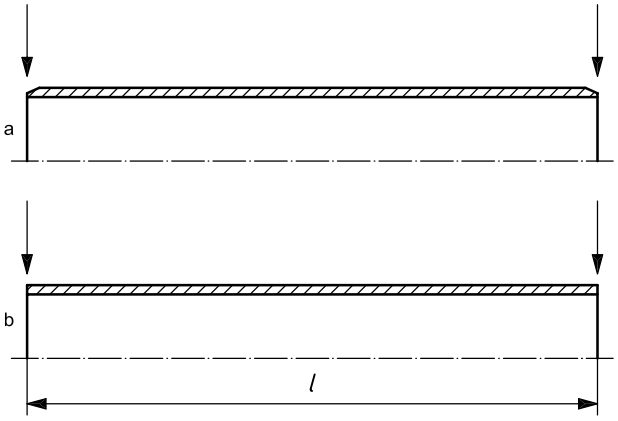
Nominal size DN/OD	Nominal outside diameter	Mean outside diameter	
	d_n	$d_{em,min}$	$d_{em,max}$
110	110	110,0	111,0
125	125	125,0	126,2
160	160	160,0	161,5
200	200	200,0	201,8
250	250	250,0	252,3
315	315	315,0	317,9
355	355	355,0	358,2
400	400	400,0	403,6
450	450	450,0	454,1
500	500	500,0	504,5
630	630	630,0	635,7
800	800	800,0	807,2
1 000	1 000	1 000,0	1 009,0
1 200	1 200	1 200,0	1 210,8
1 400	1 400	1 400,0	1 412,6
1 600	1 600	1 600,0	1 614,4
1 800	1 800	1 800,0	1 816,2
2 000	2 000	2 000,0	2 018,0

6.2.2 Effective length of pipes

The effective length, l, of a pipe, shall be not less than that declared by the manufacturer when measured as shown in Figure 1.



a) Single-socket pipe with ring seal



b) Plain-ended pipe

Key

l effective length of pipe

a With chamfer.

b Without chamfer.

Figure 1 — Effective length of pipes

6.2.3 Wall thicknesses

The wall thickness, e, shall be in accordance with Table 3, where a maximum wall thickness at any point of $1{,}25e_{min}$ is permitted, provided that the mean wall thickness, e_m, is less than or equal to the specified $e_{m,max}$.

Table 3 — Wall thicknesses

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter	Wall thickness					
		SN 2 [a] SDR 33 [c]		SN 4 SDR 26 [c]		SN 8 SDR 21 [c]	
	d_n	e_{min} [b]	$e_{m,max}$	e_{min} [b]	$e_{m,max}$	e_{min} [b]	$e_{m,max}$
110	110	—	—	4,2	4,9	5,3	6,1
125	125	—	—	4,8	5,5	6,0	6,9
160	160	4,9	5,6	6,2	7,1	7,7	8,7
200	200	6,2	7,1	7,7	8,7	9,6	10,8
250	250	7,7	8,7	9,6	10,8	11,9	13,3
315	315	9,7	10,9	12,1	13,6	15,0	16,8
355	355	10,9	12,2	13,6	15,2	16,9	19,7
400	400	12,3	13,8	15,3	17,1	19,1	22,2
450	450	13,8	15,4	17,2	20,0	21,5	24,8
500	500	15,3	17,1	19,1	22,2	23,9	27,4
630	630	19,3	22,5	24,1	28,0	30,0	34,7
800	800	24,5	28,4	30,6	35,4	38,1	44,1
1 000	1 000	30,6	35,4	38,2	44,2	47,7	55,1
1 200	1 200	36,7	42,4	45,9	53,0	57,2	66,0
1 400	1 400	42,9	49,6	53,5	61,8	66,7	73,5
1 600	1 600	49,0	56,6	61,2	70,6	76,2	84,0
1 800	1 800	54,5	60,1	69,1	76,2	85,7	94,4
2 000	2 000	60,6	66,8	76,9	84,7	95,2	104,9

NOTE For components conforming to this International Standard, the standard dimension ratio, SDR, and the values of the pipe series S specified in Table 3 are calculated from the equation SDR = 2S + 1 and are related as follows:

SDR 33 corresponds to S 16;

SDR 26 corresponds to S 12,5;

SDR 21 corresponds to S 10.

[a] SN 2 is applicable for buried installations outside the building structure only. Respect the verifications to be carried out for the structural design of the piping and the installation conditions.

[b] The e_{min} values are according to ISO 4065.

[c] The standard dimension ratios (SDR) are defined in ISO 4065.

6.3 Dimensions of fittings

6.3.1 Outside diameter

The mean outside diameter, d_{em}, of the spigot shall conform to Table 2 or to Table 4, as applicable.

6.3.2 Outside diameter for spigots with close tolerances (Type CT)

For the purposes of this International Standard, in addition to the dimensions and tolerances given in Table 2 for spigot ends of fittings, tolerances that are in accordance with EN 1401-1 are permitted.

If these tolerances, classified as close tolerances (CT), are required, the mean outside diameter, d_{em}, of the spigot and the tolerances shall be in accordance with Table 4.

Table 4 — Mean outside diameters for spigots with close tolerances type CT

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter	Mean outside diameter	
	d_n	$d_{em,min}$	$d_{em,max}$
200	200	200,0	200,5
250	250	250,0	250,5
315	315	315,0	315,6
355	355	355,0	355,7
400	400	400,0	400,7
450	450	450,0	450,8
500	500	500,0	500,9
630	630	630,0	631,1
Spigot ends of fittings with mean outside diameters in accordance with this table may be used with pipes and fittings conforming to ISO 4435, provided that the socket(s) for these pipes and fittings are intended for use with elastomeric ring seal joints.			
NOTE Spigot ends of fittings with mean outside diameters in accordance with this table are normally injection-moulded or machined.			

6.3.3 Design length

The design length, Z_d, shall be declared by the manufacturer.

NOTE 1 The design length (see the dimension Z_d in Figures 8 to 12, Figures 15 to 20 and Figure 22) are intended to assist in the design of moulds and are not intended for quality control purposes.

NOTE 2 ISO 265-1 can be used as a guideline.

6.3.4 Wall thickness

The minimum wall thickness, e_{min}, of the body or the spigot of a fitting shall be in accordance with Table 3, except that a reduction of 5 % resulting from core shift is permitted. In that case, the average of two opposite wall thicknesses shall be greater than or equal to the values given in Table 3.

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

The wall thickness of fabricated fittings, except for spigot and socket, may be changed locally by the fabrication process, provided that the minimum wall thickness of the body conforms to $e_{3,min}$ as given in Table 6 for the size and pipe series concerned.

6.4 Dimensions of sockets and spigots

6.4.1 Elastomeric ring seal sockets and spigots

6.4.1.1 Diameter and length

The diameters and lengths of elastomeric ring seal sockets and lengths of spigots shall conform to Table 5 (see Figures 2, 3, 4 or 5, as applicable).

Where sealing rings are firmly retained, the dimensions for the minimum value for A and the maximum value for C shall be measured to the effective sealing point (see Figure 4) as specified by the manufacturer. This point shall give a full sealing action.

Different designs of elastomeric ring seal sockets are permitted, provided the joints conform to the requirements given in Table 12.

Table 5 — Socket diameters and lengths of sockets and spigots

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter	Socket			Spigot
	d_n	$d_{sm,min}$	A_{min} [a]	C_{max}	$L_{1,min}$
110	110	111,1	40	40	62
125	125	126,3	43	43	68
160	160	161,6	50	50	82
200	200	201,9	58	58	98
250	250	252,4	68	68	118
315	315	318,0	81	81	144
355	355	358,3	89	89	160
400	400	403,7	98	98	178
450	450	454,2	108	108	198
500	500	504,6	118	118	218
630	630	635,8	144	144	270

[a] The socket is designed for an effective length of pipe of 6 m.

For sockets and spigots that have a nominal outside diameter greater than 630 mm, the values of $d_{sm,min}$, A_{min}, C_{max} and $L_{1,min}$, expressed in millimetres, shall be calculated using the following equations:

$$d_{sm,min} = 1{,}0092 d_n;$$

$$A_{min} = 0{,}2 d_n + 18;$$

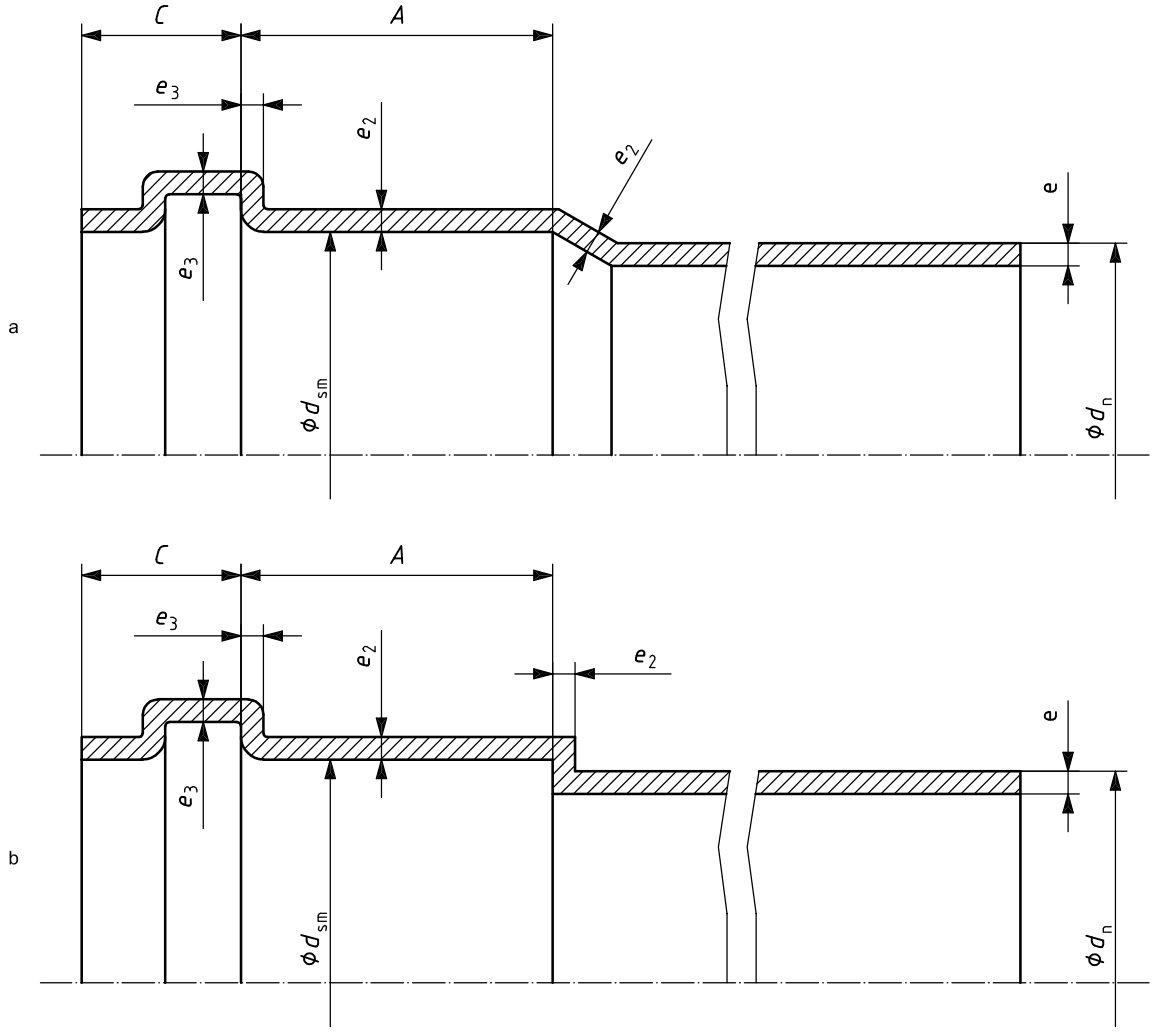
$$C_{max} = 0{,}2 d_n + 18;$$

$$L_{1,min} = 0{,}4 d_n + 18.$$

For pipe lengths longer than 6 m, the length of engagement, A, in the socket, expressed in millimetres, shall be calculated from the equation:

$$A = 0{,}2 d_n + 3l$$

where l is the pipe length, in metres.



a Ring seal socket with chamfer.

b Ring seal socket without chamfer.

Figure 2 — Dimensions of sockets for elastomeric ring seal joints

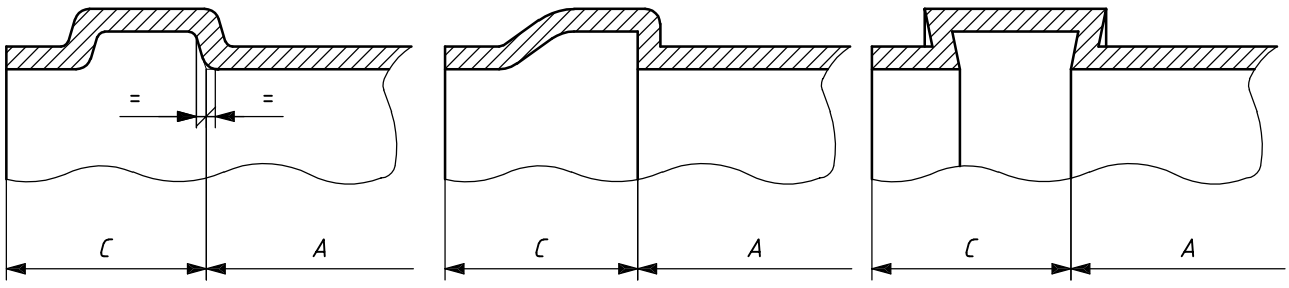


Figure 3 — Typical groove designs for elastomeric ring seal sockets

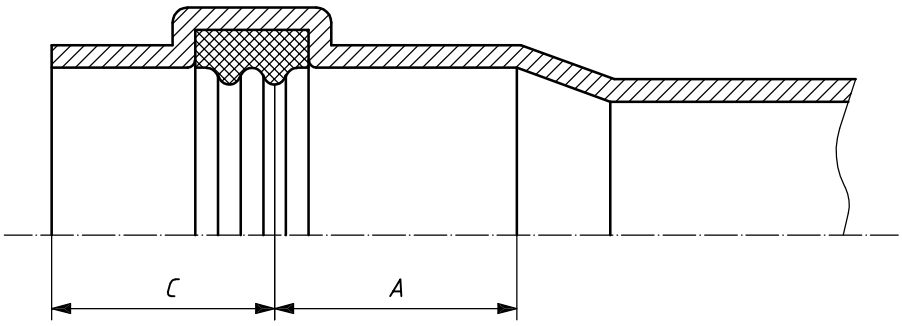


Figure 4 — Example for measuring effective sealing point

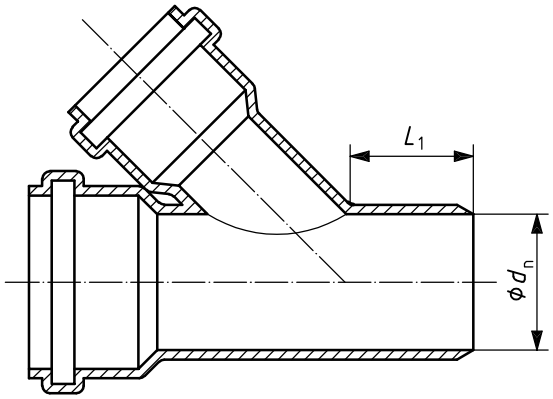


Figure 5 — Spigot lengths

6.4.1.2 Wall thickness of sockets

The wall thicknesses of sockets, e_2 and e_3 (see Figure 2), except the socket mouth, shall be in accordance with Table 6.

A reduction of 5 % of e_2 and e_3 resulting from core shift is permitted. In that case, the average of two opposite wall thicknesses shall be greater than or equal to the applicable values given in Table 6.

Table 6 — Wall thicknesses of sockets

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter	Wall thickness					
		SN 2 [a] SDR 33 [b]		SN 4 SDR 26 [b]		SN 8 SDR 21 [b]	
	d_n	$e_{2,min}$	$e_{3,min}$	$e_{2,min}$	$e_{3,min}$	$e_{2,min}$	$e_{3,min}$
110	110	—	—	3,8	3,2	4,8	4,0
125	125	—	—	4,4	3,6	5,4	4,5
160	160	4,5	3,7	5,6	4,7	7,0	5,8
200	200	5,6	4,7	7,0	5,8	8,7	7,2
250	250	7,0	5,8	8,7	7,2	10,8	9,0
315	315	8,8	7,3	10,9	9,1	13,5	11,3
355	355	9,9	8,2	12,3	10,2	15,3	12,7
⩾ 400	⩾ 400	11,1	9,3	13,8	11,5	17,2	14,4

[a] SN 2 is applicable for buried installations outside the building structure only. Respect the verifications to be carried out for the structural design of the piping and the installation conditions.

[b] The standard dimension ratios (SDR) are defined in ISO 4065.

Where a sealing ring is located by means of a retaining cap or ring (see Figure 6), the wall thickness in this area shall be calculated by the addition of the wall thickness of the socket and the wall thickness of the retaining ring or cap at corresponding places in the same cross-section plane.

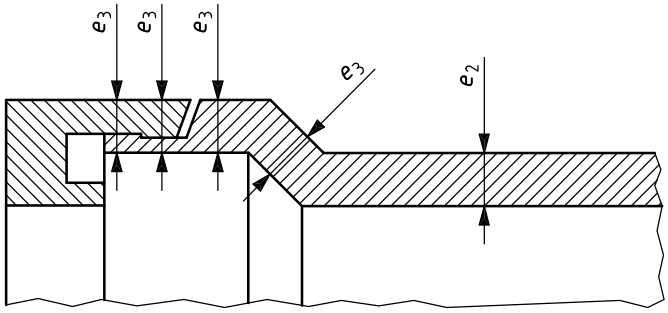


Figure 6 — Example for calculation of wall thickness of sockets with retaining cap

6.4.2 Butt-fusion spigot ends

The mean outside diameter, d_{em}, and wall thickness, e, of spigots intended for butt-fusion shall conform to the diameters and corresponding pipe size and series as given in Tables 2 and 3, respectively.

6.4.3 Electrofusion sockets

The dimensions of electrofusion sockets shall conform to the values given in Table 7 (see Figure 7).

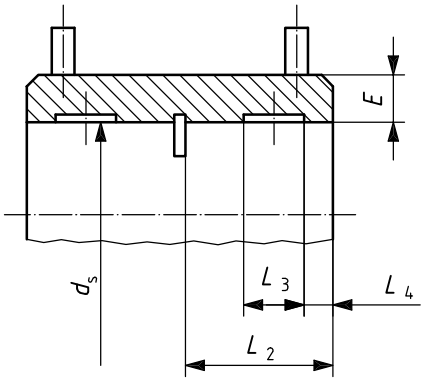


Figure 7 — Electrofusion socket

Table 7 — Dimensions of electrofusion sockets

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter d_n	Mean inside diameter d_{sm}	Minimum depth of penetration $L_{2,min}$	Minimum length of fusion zone $L_{3,min}$	Minimum unheated entrance length $L_{4,min}$	Wall thickness E
110	110	a	28	15	5	b
125	125		28	15	5	
160	160		28	15	5	
200	200		50	25	5	
250	250		60	25	5	
315	315		70	25	5	
355	355		100	25	8	
400	400		100	25	8	
450	450		100	25	8	
500	500		100	25	8	
630	630		120	30	8	
800	800		120	30	12	
1 000	1 000		120	35	12	

[a] The mean inside diameter, d_{sm}, of the socket shall be measured in a plane which is parallel to the plane of the socket mouth at a distance of L_4 + 0,5L_3. The mean inside diameter of a socket shall be specified by the manufacturer in such a way that after assembling and fusion of the pipes and fittings the joints conform to the requirements of Clause 9.

[b] The wall thickness, E, of the electrofusion socket shall be at least equal to the minimum wall thickness for the corresponding pipe size and series in accordance with Table 3.

6.4.4 Flange joints

Flange joints consisting of butt-fused stub end(s), flange adaptors and matching flanges in accordance with ISO 9624 are permitted for pipe systems covered by this International Standard. Normally, flange adaptors of the lowest available pressure class are preferred.

6.5 Types of fittings

This International Standard is applicable to the following generic types of fittings. Other designs of fitting are permitted.

a) Bends (see Figures 8, 9, 10, 11 or 12):

   — unswept and swept angle (see ISO 265-1);

   — spigot/socket and socket/socket;

   — butt-fused from segments;

   — heat formed without socket/with socket butt-fused on.

   The nominal angle, α, may be selected from the following: 15°, 30°, 45° and 87°30′ to 90°.

b) Couplers and slip couplers (see Figures 13 and 14).

c) Reducers (see Figure 15).

d) Branches and reducing branches (see Figures 16, 17, 18 or 19):

— unswept and swept angle (see ISO 265-1);

— spigot/socket and socket/socket.

The nominal angle, α, may be selected from the following: 45° and 87°30′ to 90°.

e) Branches with flange and collar (see Figure 20).

f) Plugs (see Figure 21):

— minimum length of spigot, M = (C_{max} + 10) mm (see Table 5).

g) Push-fit sockets for butt-fusion pipe end (see Figure 22).

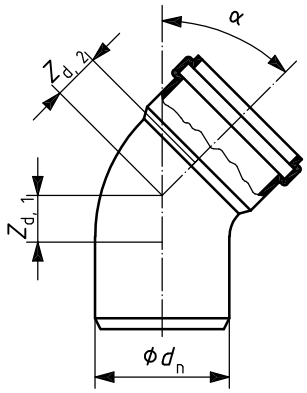


Figure 8 — Bend with single socket (unswept)

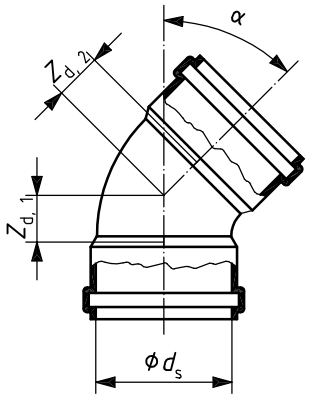


Figure 9 — Bend with all sockets (unswept)

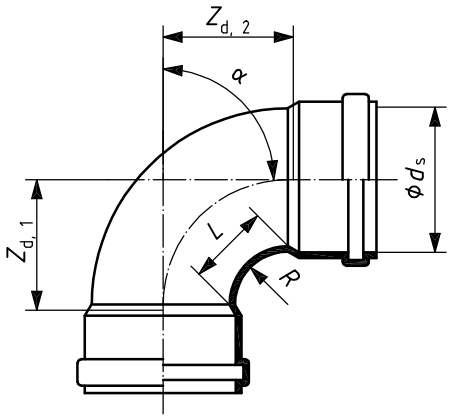


Figure 10 — Bend with all sockets (swept)

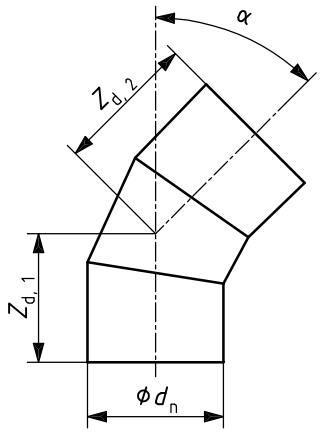


Figure 11 — Bend for butt-fusion, butt-fused from segments

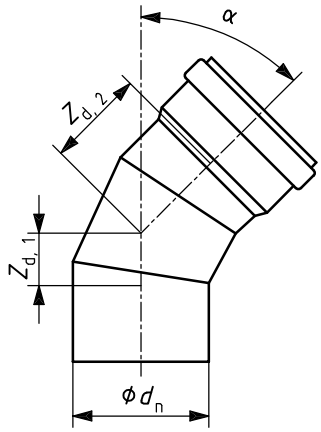


Figure 12 — Bend with socket and spigot end, butt-fused from segments

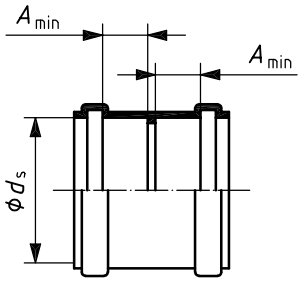


Figure 13 — Coupler

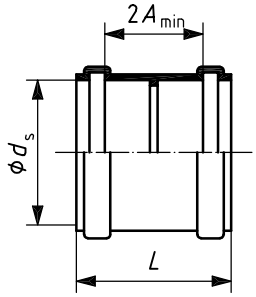


Figure 14 — Slip coupler

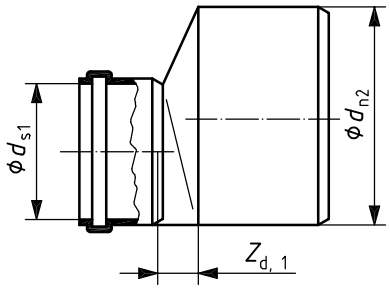


Figure 15 — Reducer

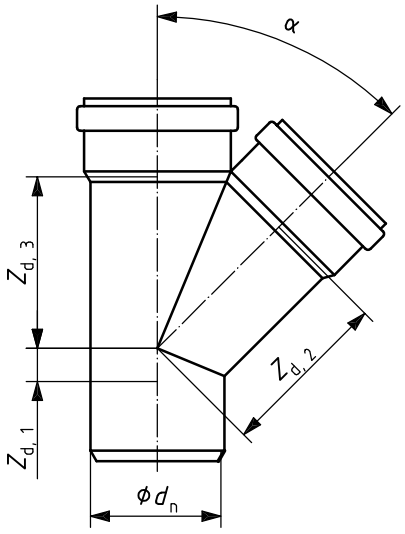


Figure 16 — Branch (unswept)

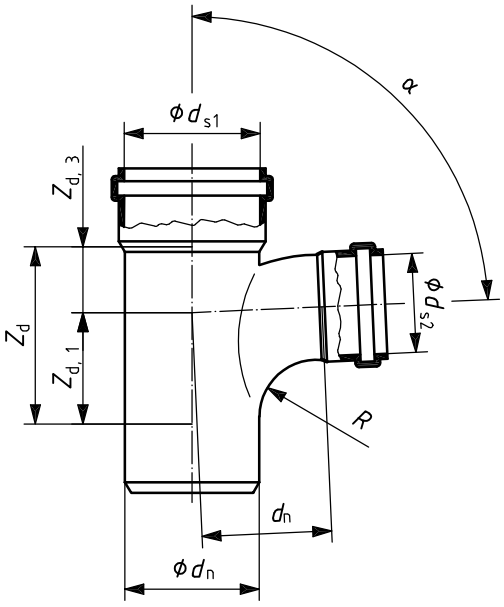


Figure 17 — Reducing branch (swept)

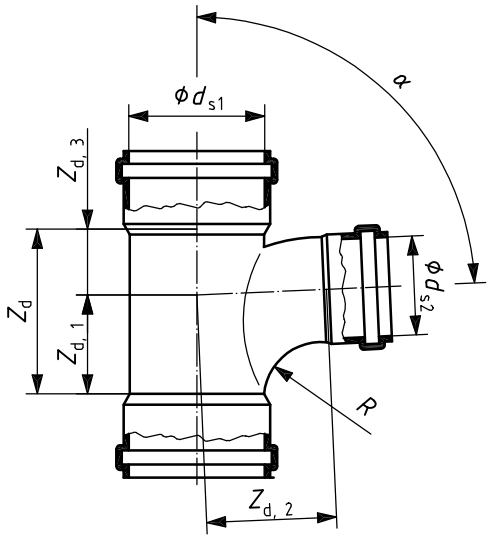


Figure 18 — All-socket reducing branch (swept)

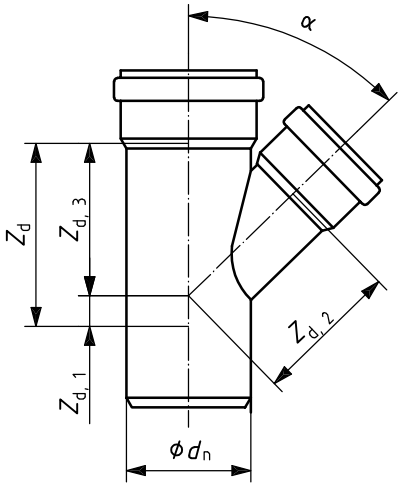


Figure 19 — Reducing branch

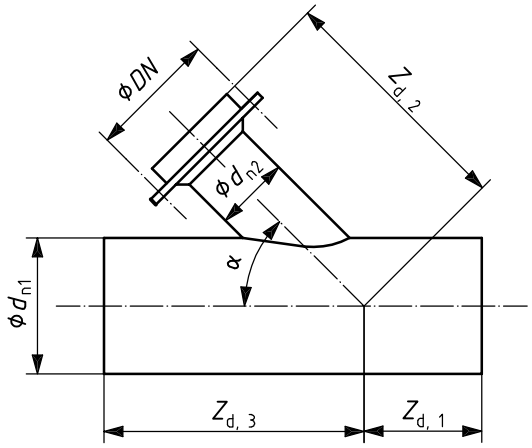


Figure 20 — Branch for butt-fusion with flange and collar

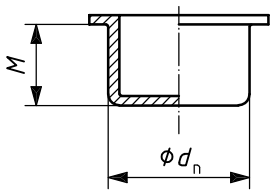


Figure 21 — Plug

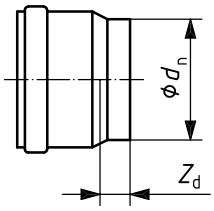


Figure 22 — Push-fit socket for butt-fusion to pipe end

7 Mechanical characteristics

7.1 Mechanical characteristics of pipes

When determined in accordance with the test method as specified in Table 8 using the indicated parameters, the pipe shall have the mechanical characteristic conforming to the requirements given in Table 8.

Table 8 — Mechanical characteristics of pipes

Characteristic	Requirements	Test parameters		Test method
Ring stiffness	SDR 33: $\geqslant$ 2 kN/m^2 SDR 26: $\geqslant$ 4 kN/m^2 SDR 21: $\geqslant$ 8 kN/m^2	Test temperature	(23 $\pm$ 2) °C	ISO 9969
		Deflection	3 %	
		Deflection speed for:		
		110 mm $< d_n \leqslant$ 200 mm	5 mm/min	
		200 mm $< d_n \leqslant$ 400 mm	10 mm/min	
		400 mm $< d_n \leqslant$ 800 mm	20 mm/min	
		$d_n >$ 800 mm	0,03d_i [a] mm/min	
		Tolerance on test speed	$\pm$ 5 %	

[a] d_i is determined according to ISO 9969.

7.2 Mechanical characteristics of fittings

When determined in accordance with the test method as specified in Table 9 using the indicated parameters, the fitting shall have mechanical characteristics conforming to the requirements given in Table 9.

Table 9 — Mechanical characteristics of fittings

Characteristic	Requirement	Test parameters		Test method
Flexibility or mechanical strength [a]	No sign of splitting, cracking, separation and/or leakage	Test period Minimum displacement [b] Minimum moment [b] for: [DN] $\leqslant$ 250 [DN] $>$ 250	15 min 170 mm $0{,}15 \times [DN]^3 \times 10^{-6}$ kN·m $0{,}01 \times$ [DN] kN·m	ISO 12256
Impact strength (drop test) [c]	No damage	Conditioning and test temperature Drop height for: d_n = 110 mm d_n = 160 mm d_n = 200 mm d_n = 250 mm Point of impact	0 °C 1 000 mm 1 000 mm 500 mm 500 mm Mouth of socket	EN 12061

[a] Only for fabricated fittings made from more than one piece. A sealing ring retaining means is not considered as a piece.

[b] Choose between minimum displacement and minimum moment, as applicable.

[c] Only for fittings where the sealing ring is located by means of a retaining ring or cap.

8 Physical characteristics

8.1 Physical characteristics of pipes

When determined in accordance with the test methods as specified in Table 10 using the indicated parameters, the pipe shall have physical characteristics conforming to the requirements given in Table 10.

Table 10 — Physical characteristics of pipes

Characteristic	Requirement	Test parameters		Test method
Longitudinal reversion	$\leqslant$ 3 % The pipe shall exhibit no bubbles or cracks	Test temperature Immersion time	110 °C 30 min	ISO 2505:2005, Method A (liquid) [a]
		Test temperature Immersion time for: $e \leqslant$ 8 mm 8 mm $< e \leqslant$ 16 mm $e >$ 16 mm	110 °C 60 min 120 min 240 min	ISO 2505:2005, Method B (air) [a]
Melt mass-flow rate (MFR value)	Permitted maximum change by processing the compound into pipe: 0,25 g/10 min	Test temperature Test period Load	190 °C 10 min 5 kg	ISO 1133:2005, conditions T

[a] Choose either Method A or Method B and its corresponding parameters, as applicable.

8.2 Physical characteristics of fittings

When determined in accordance with the test method as specified in Table 11 using the indicated parameters, the fitting or mouldings used for fabricated fittings shall have physical characteristics conforming to the requirements given in Table 11.

For fittings manufactured from pipes, the pipes used for such fabricating shall conform to the requirements given in Tables 8 and 10.

Table 11 — Physical characteristics of fittings

Characteristic	Requirements	Test parameters		Test method
Effects of heating [a]	The depth of cracks, delamination or blisters shall not be more than 20 % of the wall thickness around the injection point(s). No part of the weld line shall open to a depth more than 20 % of the wall thickness.	Test temperature Heating time for: $e \leqslant 8$ mm 8 mm $< e \leqslant$ 16 mm $e >$ 16 mm	110 °C 60 min 120 min 240 min	ISO 580:2005, Method A air oven [a]
[a] Mouldings used for fabricated fittings may be tested individually.				

9 Performance requirements

When determined in accordance with the test methods as specified in Table 12 using the indicated parameters, the fitness-for-purpose characteristics of the joints and system shall conform to the requirements given in Table 12.

Table 12 — Fitness-for-purpose characteristics of system

Characteristic	Requirements	Test parameters		Test method
Tightness of elastomeric sealing ring joints and electrofusion joints		Test temperature Spigot deflection Socket deflection	(23 ± 5) °C 10 % 5 %	EN 1277:2003, condition B
	No leakage	Water pressure	5 kPa (0,05 bar)	
	No leakage	Water pressure	50 kPa (0,5 bar)	
	$\leqslant -$ 27 kPa (– 0,27 bar)	Air pressure	– 30 kPa (– 0,3 bar)	
Tightness of elastomeric sealing ring joints and electrofusion joints		Test temperature Angular deflection for: $d_n \leqslant$ 315 mm 315 mm $< d_n \leqslant$ 630 mm $d_n >$ 630 mm	(23 ± 5) °C 2° 1,5° 1°	EN 1277:2003, condition D
	No leakage	Water pressure	5 kPa (0,05 bar)	
	No leakage	Water pressure	50 kPa (0,5 bar)	
	$\leqslant -$ 27 kPa (– 0,27 bar)	Air pressure	– 30 kPa (– 0,3 bar)	

10 Sealing rings

Sealing rings shall not have any detrimental effects on the properties of the pipe or fitting and shall not cause the test assembly to fail to conform to the requirements of Table 12.

For further requirements for rubber sealing rings for drainage purpose, see ISO 4633.

11 Marking

11.1 General

Marking elements shall be labelled or printed or formed directly on the pipe or fitting and/or labelled or printed on the packaging.

Marking on a pipe or fitting shall not initiate cracks or other types of defects likely to prevent conformity to the requirements of this International Standard.

11.2 Minimum required marking of pipes

The minimum required marking of pipes shall be in accordance with Table 13.

Pipes shall be marked at intervals of maximum 1 m, at least once per pipe.

Table 13 — Minimum required marking of pipes

Information	Marking or symbol
Number of this International Standard	ISO 8772
Manufacturer's name and/or trademark	XXX
Nominal size	e.g. DN 200
Minimum wall thickness or SDR series	e.g. 7,7 or SDR 26
Nominal ring stiffness	e.g. SN 4
Material	PE
Manufacturer's information	[a]

[a] To ensure traceability, the following details shall be given:

— the production period (year and month), in figures or in code;

— a name or code for the production site if the manufacturer is producing in different sites.

11.3 Minimum required marking of fittings

The minimum required marking of fittings shall be in accordance with Table 14.

Table 14 — Minimum required marking of fittings

Information	Marking or symbol
Number of this International Standard	ISO 8772
Manufacturer's name and/or trademark	XXX
Nominal size	e.g. DN 200
Nominal angle	e.g. 45°
Minimum wall thickness or SDR series	e.g. 7,7 or SDR 26
Material	PE
Symbol for close tolerance on outside spigot diameter, when applicable	CT
Manufacturer's information	[a]

[a] To ensure traceability, the following details shall be given:

— the production period (year and month), in figures or in code;

— a name or code for the production site if the manufacturer is producing in different sites.

Bibliography

[1] ISO 265-1, *Pipes and fittings of plastics materials — Fittings for domestic and industrial waste pipes — Basic dimensions: Metric series — Part 1: Unplasticized poly(vinyl chloride) (PVC-U)*

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

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

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

ICS 23.040.20; 23.040.45; 91.140.80; 93.030

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