
Cevni sistemi iz polimernih materialov za nizko in visoko temperaturne odvodne sisteme v zgradbah - Polipropilen (PP) - 1. del: Specifikacije za cevi, fitinge in sistem

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) - Part 1: Specifications for pipes, fittings and the system

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Kunststoff-Rohrleitungssysteme zum Ableiten von Abwasser (niedriger und hoher Temperatur) innerhalb der Gebäudestruktur Polypropylen (PP) - Teil 1: Anforderungen an Rohre, Formstücke und das Rohrleitungssystem

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Systemes de canalisations en plastique pour l'évacuation des eaux-vannes et des eaux usées (a basse et a haute température) a l'intérieur de la structure des bâtiments - Polypropylene (PP) - Partie 1: spécifications pour tubes, raccords ainsi que pour le systeme

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Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) - Part 1: Specifications for pipes, fittings and the system

Systèmes de canalisations en plastique pour l'évacuation des eaux-vannes et des eaux usées (à basse et à haute température) à l'intérieur de la structure des bâtiments - Polypropylène (PP) - Partie 1: Spécifications pour tubes, raccords ainsi que pour le système

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This European Standard was approved by CEN on 1 June 1998.

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NNI.

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of an identical text or by endorsement, at the latest by June 1999, and conflicting national standards shall be withdrawn at the latest by June 1999.

This European Standard is one Part of EN 1451 for plastics piping systems in the field of soil and waste discharge (low and high temperature) within the building structure made of polypropylene (PP), which consists of the following parts:

Part 1: Specifications for pipes, fittings and the system
Part 7: Guidance for the assessment of conformity.

Following a decision of CEN/TC 155 after the CEN enquiry, this part 1 is the result of merging of the following parts of the draft standard prEN 1451:

Part 1: General (published for CEN enquiry as prEN 1451-1);
Part 2: Pipes (published for CEN enquiry as prEN 1451-2);
Part 3: Fittings (published for CEN enquiry as prEN 1451-3);
Part 5: Fitness for purpose of the system (published for CEN enquiry as prEN 1451-5).

Part 6: Recommended practice for installation (published for CEN enquiry as prEN 1451-6) is intended to be included in a merged document for the recommended practice for installation of plastics piping systems in the field of soil and waste discharge (low and high temperature) within the building structure. For this document the type of publication as European Prestandard (ENV) was approved by the CEN members.

For Part 7: Assessment of conformity (published for CEN enquiry as prEN 1451-7) the type of publication as European Prestandard (ENV) was approved by the CEN members.

This standard series is based on the results of the work undertaken in ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids", which is a Technical Committee of the International Organization for Standardization (ISO).

They are supported by separate standards on test methods to which references are made throughout the Standard.

This Part of EN 1451 includes the following annex:

– Annex A (informative): General characteristics of PP pipes and fittings

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the requirements for pipes, fittings and the system of polypropylene (PP) solid-wall piping systems in the field of soil and waste discharge (low and high temperature) inside buildings (marked with "B") and for soil and waste discharge systems for both inside buildings and buried in ground within the building structure (marked with "BD").

NOTE 1: The application area "inside buildings" according to this standard, applies to the interior area of the building only. The application area "within the building structure" conforms to the requirements for "inside buildings" according to prEN 12056-1.

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

This standard is applicable to PP pipes and fittings, their joints and to joints with components of other plastics and non-plastics materials 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 within the building structure.

It applies to pipes and fittings, marked with "B", which are intended to be used inside buildings and outside buildings fixed onto the wall.

It applies to pipes and fittings, marked with "BD", which are intended to be used for both inside buildings and buried in ground within the building structure.

NOTE 2: Only components marked with "BD" are generally to be used buried in ground within the building structure; these are required to have a nominal ring stiffness of at least SN 4 and a nominal outside diameter equal to or greater than 75 mm.

NOTE 3: Pipes and fittings of the pipe series S 20 are intended to be used for application area "B" only.

This standard is applicable to PP pipes and fittings of the following types:

- plain-ended;
- with integral elastomeric ring seal socket;
- for butt fusion joints;

whereby the fittings can be manufactured by injection-moulding or be fabricated from pipes and/or mouldings.

NOTE 4: Components conforming to any of the Product Standards listed in clause bibliography can be used with pipes and fittings conforming to this standard, provided they conform to the requirements for joint dimensions and to the functional requirements given in this standard.

This standard covers a range of nominal sizes, a range of pipe series and gives recommendations concerning colours.

NOTE 5: It is the responsibility of the purchaser or specifier to make the appropriate selection from these aspects, taking into account their particular requirements and any relevant national regulations and installation practices codes.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

prEN 496

Plastics piping systems – Plastics pipes and fittings – Measurements of dimensions and visual inspection of surfaces

EN 681-1

Elastomeric seals – Materials requirements for pipe joint seals used in water and drainage applications – Part 1: Vulcanized rubber

prEN 681-2

Elastomeric seals – Materials requirements for pipe joint seals used in water and drainage applications – Part 2: Thermoplastic elastomers

EN 728

Plastics piping and ducting systems - Polyolefin pipes and fittings - Determination of oxidation induction time

EN 743 : 1994

Plastics piping and ducting systems – Thermoplastics pipes – Determination of the longitudinal reversion

EN 744 : 1995

Plastics piping and ducting systems – Thermoplastics pipes – Test method for resistance to external blows by the round-the-clock method

EN 763 : 1994

Plastics piping and ducting systems – Injection-moulded thermoplastics fittings – Test method for visually assessing effects of heating

EN 921

Plastics piping systems – Thermoplastics pipes – Determination of resistance to internal pressure at constant temperature

EN 1053

Plastics piping systems – Thermoplastics piping systems for non-pressure applications – Test method for watertightness

EN 1054

Plastics piping systems – Thermoplastics piping systems for soil and waste discharge – Test method for airtightness of joints

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 1277 : 1996

Plastics piping systems – Thermoplastics piping systems for buried non-pressure applications – Test methods for leaktightness of elastomeric sealing ring type joints

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EN 1411 : 1996

Plastics piping and ducting systems – Thermoplastics pipes – Determination of resistance to external blows by the staircase method

prEN 1451-7

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure – Polypropylene (PP) – Part 7: Assessment of conformity

prEN 1989

Thermoplastics piping and ducting systems – Joints for buried non-pressure applications – Test method for long-term sealing performance of joints with thermoplastic elastomer (TPE) seals by estimating the sealing pressure

EN ISO 9969

Thermoplastics pipes – Determination of ring stiffness (ISO 9969 : 1994)

ISO 265-1 : 1988

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)

ISO 472 : 1988

Plastics – Vocabulary

ISO 1043-1 : 1997

Plastics – Symbols – Part 1: Basic polymers and their special characteristics

ISO 1133 : 1997

Plastics – Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics

ISO 4065 : 1996

Thermoplastics pipes – Universal wall thickness table

ISO 4440-1 : 1994

Thermoplastics pipes and fittings – Determination of melt mass-flow rate – Part 1: Test method

ISO 4440-2 : 1994

Thermoplastics pipes and fittings – Determination of melt mass-flow rate – Part 2: Test conditions

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3 Definitions, symbols and abbreviations

For the purposes of this standard, the following definitions, symbols and abbreviations apply.

3.1 Definitions

The definitions given in ISO 472 : 1988 and ISO 1043-1 : 1997 and the following apply:

3.1.1 application area code: A code used in the marking of pipes and fittings to indicate the permitted application area(s) for which they are intended as follows:

"B": code for the application area inside buildings and outside buildings fixed onto the wall;

"D": code for the application area under and within one metre from the building where the pipes and fittings are buried in ground.

"BD": code for the application area for both, code "B" and code "D" application areas.

NOTE: In code "BD" application areas the existence of external forces from the surroundings in addition to hot water discharge is usual.

3.1.2 nominal size DN: A numerical designation of the size of a component, which is approximately equal to the manufacturing dimension, in millimetres.

3.1.3 nominal size DN/OD: Nominal size, related to the outside diameter.

3.1.4 nominal outside diameter (d_n): The specified outside diameter, in millimetres, assigned to a nominal size DN/OD.

3.1.5 outside diameter (d_e): The measured outside diameter through its cross-section at any point of a pipe or spigot end of a fitting, rounded to the next greater 0,1 mm.

3.1.6 mean outside diameter (d_{em}): The measured outer circumference of a pipe or spigot end of a fitting in any cross-section square to the pipe axis, divided by π ($\approx 3,142$), rounded to the next greater 0,1 mm.

3.1.7 mean inside diameter of a socket (d_{sm}): The arithmetical mean of a number of measurements of the inside diameter of a socket in the same cross-section.

3.1.8 wall thickness (e): The measured wall thickness at any point around the circumference of a component.

3.1.9 mean wall thickness (e_m): The arithmetical mean of a number of measurements of the wall thickness, regularly spaced around the circumference and in the same cross-section of a component, including the measured minimum and the measured maximum values of the wall thickness in that cross-section.

3.1.10 pipe series S: A dimensionless number for pipe designation (see ISO 4065 : 1996).

3.1.11 nominal ring stiffness (SN): A numerical designation of the ring stiffness of a pipe or fitting, which is a convenient round number relative to the determined stiffness in kilonewtons per square metre (kN/m^2), indicating the minimum ring stiffness of a pipe or fitting.

3.1.12 copolymer: A polymer derived from more than one species of monomer.

3.1.13 homopolymer: A polymer derived from one species of monomer.

3.1.14 virgin material: Material in a form such as granules or powder that has not been subjected to use or processing other than that required for its manufacture and to which no reprocessible or recyclable material has been added.

3.1.15 own reprocessable material: Material prepared from rejected unused pipes or fittings, including trimmings from the production of pipes or fittings, that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer by a process such as moulding or extrusion, and for which the complete formulation is known.

3.1.16 external reprocessable material: Material comprising either one of the following forms:

- a) material from rejected unused pipes or fittings or trimmings therefrom, that will be reprocessed and that were originally processed by another manufacturer;
- b) material from the production of unused PP-products other than pipes and fittings, regardless of where they are manufactured.

3.1.17 recyclable material: Material comprising either one of the following forms:

- a) material from used pipes or fittings which have been cleaned and crushed or ground;
- b) material from used PP-products other than pipes or fittings which have been cleaned and crushed or ground.

3.2 Symbols

<i>A</i>	length of engagement
<i>B</i>	length of lead-in
<i>C</i>	depth of sealing zone
DN	nominal size
DN/OD	nominal size, outside diameter related
d_e	outside diameter
d_{em}	mean outside diameter
d_n	nominal outside diameter
d_s	inside diameter of a socket
d_{sm}	mean inside diameter of a socket
<i>e</i>	wall thickness
e_m	mean wall thickness
e_2	wall thickness of a socket
e_3	wall thickness in the groove area
<i>l</i>	effective length of a pipe
l_1	length of spigot
<i>R</i>	radius of swept fittings
<i>z</i>	z-lengths of a fitting
α	nominal angle of a fitting

3.3 Abbreviations

MFR	melt mass-flow rate
OIT	oxidation induction time
PP	polypropylene
PP-H	polypropylene homopolymer
TIR	true impact rate

4 Material

4.1 PP-compound

The compound for pipes and fittings shall be PP-base material (homopolymer or copolymer) to which are added those additives that are needed to facilitate the manufacture of components conforming to the requirements given in this standard.

In order to conform to national requirements on fire regulations other additives may be used.

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

4.2 Reprocessable and recyclable material

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

4.3 Melt mass-flow rate

The MFR of the base material shall be tested in accordance with ISO 1133 : 1997, condition M (test temperature: 230 °C, loading mass: 2,16 kg).

Pipes and fittings intended to be used for mechanical joints shall be made from materials with an MFR as follows:

$$\text{MFR (230/2,16)} \leq 3,0 \text{ g/10 min.}$$

Materials for pipes and fittings for butt fusion joints shall be designated by the following classes with regard to the MFR:

Class A:		MFR ≤ 0,3 g/10 min;
Class B:	0,3 g/10 min <	MFR ≤ 0,6 g/10 min;
Class C:	0,6 g/10 min <	MFR ≤ 0,9 g/10 min;
Class D:	0,9 g/10 min <	MFR ≤ 1,5 g/10 min.

Only pipes and fittings made from materials of the same or adjacent MFR-classes may be fused together.

4.4 Thermal stability

When tested in accordance with EN 728 using a test temperature of 200 °C, the oxidation induction time (OIT) of the material used for pipes and fittings intended for butt fusion shall not be less than 8 min.

4.5 Sealing ring retaining means

Sealing rings may be retained using means made from plastics other than PP, provided the joints conform to the requirements given in clause 9.

4.6 Fire behaviour

Pipes and fittings conforming to this standard shall conform to any relevant national requirements on fire regulations.

5 General characteristics

5.1 Appearance

When viewed without magnification the following requirements apply:

- the internal and external surfaces of pipes and fittings shall be smooth, clean and free from grooving, blistering, impurities and pores and any other surface irregularity likely to prevent their conformance to this standard.
- pipe ends shall be cleanly cut and the ends of pipes and fittings shall be square to each axis.

5.2 Colour

The pipes and fittings shall be uniformly coloured throughout their entire thickness. The colours of pipes and fittings should be preferably grey, black or white. Other colours may be used.

6 Geometrical characteristics

6.1 General

Dimensions shall be measured in accordance with prEN 496.

The figures are schematic sketches only, to indicate the relevant dimensions. They do not necessarily represent the manufactured components. The given dimensions shall be followed.

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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.

SIST EN 1451-1:1999
Table 1: Mean outside diameters
(metric series)

Nominal size DN/OD	Nominal outside diameter d_n	Dimensions in millimetres Mean outside diameter	
		$d_{em, min}$	$d_{em, max}$
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
200	200	200,0	200,6
250	250	250,0	250,8
315	315	315,0	316,0