

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

The European Standard EN 1451-1:1998 has the status of a
British Standard

ICS 23.040.01; 83.140.30; 91.140.80

National foreword

This British Standard is the official English language version of EN 1451-1:1998. It supersedes BS 5254:1976 and, because the size range in EN 1451-1 also covers sizes used for waste pipes and fittings, it is one of a group of EN standards which each partially supersedes BS 5255:1989. Both BS 5254:1976 and BS 5255:1989 will be declared obsolescent with effect from 30 June 2001.

NOTE When first available, the ratified text of EN 1451-1:1998 gave a date of withdrawal for conflicting national standards of “June 1999”, but this was subsequently changed by resolution CEN/CS 006/1999 to 2001-06-30. In the UK this date is being applied to coordinate the change-over to European Standards for plastics piping systems for this application and any consequent revision, declaration of obsolescence or withdrawal of the corresponding British Standards which are being superseded.

Products conforming to BS EN 1451-1 will be compatible with those of the same size in accordance with BS 5254:1976. The nominal sizes DN/OD 34, 41 and 54 correspond exactly with the 1½, 1¾ and 2 sizes respectively in BS 5254:1976.

Since EN 1451-1:1998 does not cover all the piping components covered by or used in conjunction with products conforming to BS 5254 and/or BS 5255, see BS 4514:1983 and its planned revision for the UK requirements for the minimum opening dimensions of access fittings, design of swept fittings, for connectors to WC pans and stand-off dimensions of pipe and fitting clips.

The UK participation in its preparation was entrusted by Technical Committee PRI/61, Plastics piping systems and components, to Subcommittee PRI/61/1, Thermoplastics piping systems and components for non-pressure applications, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

The responsible UK committee gives the following advice concerning the selection of alternative test conditions provided in this standard.

a) Table 13, as referred to in 8.1, appears to present two alternative test conditions, i.e. method A or method B of EN 743:1994, without identifying where they apply or which is the reference method in case of dispute. Since these alternative test conditions might lead to conflicting results, users of this standard should declare or agree on a contractual basis which condition is to be the reference condition in case of dispute.

b) In Table 17, reference is made to a specific point of detail in the current edition of EN 921, i.e. “types a or b” end caps, and therefore:

- 1) the reference should be construed as relating to the current (1995) edition, as though the reference in Table 17 and hence also in clause 2 were dated accordingly;
- 2) since alternative test conditions are permitted which might lead to conflicting results, depending on the choice of end caps, users of this standard should declare or agree on a contractual basis which condition is to be the reference condition in case of dispute.

The responsible UK committee gives the following advice concerning the specification of piping components used with piping systems conforming to this British Standard but not detailed in EN 1451-1:1998.

This British Standard, having been prepared under the direction of the Sector Committee for Materials and Chemicals, was published under the authority of the Standards Committee on 15 February 2000

Amendments issued since publication

Amd. No.	Date	Comments
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c) See BS 4514:2001 for the UK requirements for the minimum opening dimensions of access fittings, design of swept fittings, connectors to WC pans, stand-off dimensions of pipe and fitting brackets and requirements for adaptors and plugs. Reference should also be made to the following design requirements of BS 4514:2001, **5.3.1, 5.3.3, 5.3.5, 5.3.7, 5.3.8, 5.3.9**, and Figures 6, 8 and 9.

Analogous provisions apply in Scotland and Northern Ireland.

d) For external installation, which is commonplace and remains allowed in the UK, EN 1451-1:1998 only requires that additional requirements depending on the climate be agreed between the manufacturer and the user (in clause 14: otherwise, in line with European practice, EN 1451-1:1998 only gives specific requirements for products for discharge systems intended to be installed within buildings.) If the product is to be installed externally, it may require protection by painting or some other means.

The responsible UK committee gives the following advice concerning the selection and installation of piping systems and components conforming to this British Standard.

e) The products should only be used in application area B, i.e. suspended from brackets above ground and installed in accordance with BS 5572 using the N socket variants as specified. EN 1451-1:1998 provides a choice of three series of pipe wall thickness. When installing piping in accordance with BS 5572 (or equivalent) in above-ground situations, it is strongly recommended that series S 16 is specified and used.

For external installation, see item d) of this foreword. The advice of the manufacturer of products conforming to BS EN 1451-1 should be sought accordingly.

f) In respect of fire regulations (see 4.4), The Building Regulations 1991, Approved Document B3, Section 10 requires that where PP pipe with an internal diameter greater than 40mm (1½") penetrates a fire wall, floor or enclosure the point of penetration is protected by a proprietary fire seal. This seal must be certificated by third-party testing to show that it is effective with PP pipes.

Analogous provisions apply in Scotland and Northern Ireland respectively.

g) For underground installations, see BS EN 1852-1 or equivalent product specifications for such situations and take account of current national installation practices, e.g. BS EN 1610 and BS EN 752.

Editorial note: Reference to regulations

In 4.4 the only "requirement" is that "pipes and fittings... shall conform to any relevant requirements on fire regulations". Since the authority for such requirements lies with national regulators and not with standards organizations, which do not have the power to waive regulations even should they so wish, this type of information in standards should be presented as a note, or as a statement in a foreword or introduction. As information it can refer in general or specific terms to the existence of current regulations/legislation/directives applicable to the products or the conditions of their use. The expression here as part of the normative text is inappropriate and should not be considered an acceptable precedent for other standards to follow.

Warning This British Standard, which is identical with EN 1451-1:1998, does not necessarily detail all the precautions necessary to meet the requirements of the Health and Safety at Work etc. Act 1974. Attention should be paid to any appropriate safety precautions and the test methods referred to in EN 1451-1 should be operated only by trained personnel.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 32, an inside back cover and a back cover.

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Descriptors: Plastic tubes, polypropylene, water pipelines, water removal, sewage, definitions, generalities

English version

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

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

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

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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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 the 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

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

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

A	length of engagement
B	length of lead-in
C	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
e	wall thickness
e_m	mean wall thickness
e_2	wall thickness of a socket
e_3	wall thickness in the groove area
l	effective length of a pipe
l_1	length of spigot
R	radius of swept fittings
z	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