BS EN 1852-1:2018+A1:2022

BSI Standards Publication

# Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene (PP)

Part 1: Specifications for pipes, fittings and the system

Documents
Document Sharing Hub

Full document details: BS EN 1852-1:2018+A1:2022

# National foreword

This British Standard is the UK implementation of EN 1852-1:2018+A1:2022. It supersedes BS EN 1852-1:2018, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by ▌A1⟩ ⟨A1▌.

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

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

**Contractual and legal considerations**

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2022
Published by BSI Standards Limited 2022

ISBN 978 0 539 19287 2

ICS 23.040.05; 93.030

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2018.

**Amendments/corrigenda issued since publication**

| Date | Text affected |
|---|---|
| 30 November 2022 | Implementation of CEN amendment A1:2022 |

AVA Documents
Document Sharing Hub

Full document details: BS EN 1852-1:2018+A1:2022

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 1852-1:2018+A1

October 2022

ICS 23.040.05

Supersedes EN 1852-1:2018

English Version

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

Systèmes de canalisations en plastique pour les branchements et les collecteurs d'assainissement enterrés sans pression - Polypropylène (PP) - Partie 1: Spécifications pour tubes, raccords et le système

Kunststoff-Rohrleitungssysteme für erdverlegte drucklose Abwasserkanäle und -leitungen - Polypropylen (PP) - Teil 1: Anforderungen an Rohre, Formstücke und das Rohrleitungssystem

This European Standard was approved by CEN on 20 November 2017 and includes Amendment 1 approved by CEN on 28 June 2022.

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

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

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

© 2022 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 1852-1:2018+A1:2022 E

Documents
Document Sharing Hub

Full document details: BS EN 1852-1:2018+A1:2022

# Contents

Page

European foreword ... 4
1 Scope ... 5
2 Normative references ... 5
3 Terms and definitions ... 7
4 Symbols and abbreviations ... 9
4.1 Symbols ... 9
4.2 Abbreviations ... 10
5 Material ... 10
5.1 PP final compound ... 10
5.2 Utilization of non-virgin material ... 10
5.3 Melt mass-flow rate ... 10
5.4 Resistance to internal pressure ... 11
5.5 Thermal stability (OIT) ... 11
5.6 Sealing ring retaining means ... 11
6 General characteristics ... 12
6.1 Appearance ... 12
6.2 Colour ... 12
7 Geometrical characteristics ... 12
7.1 General ... 12
7.2 Dimensions of pipes ... 12
7.2.1 Outside diameters ... 12
7.2.2 Outside diameters with close tolerances (CT) ... 13
7.2.3 Length of pipes ... 14
7.2.4 Chamfering ... 15
7.2.5 Wall thicknesses ... 15
7.3 Dimensions of fittings ... 16
7.3.1 Outside diameters ... 16
7.3.2 Design lengths ... 16
7.3.3 Wall thicknesses ... 17
7.4 Dimensions of sockets and spigots ... 18
7.4.1 Diameters and lengths of elastomeric ring seal sockets and spigots ... 18
7.4.2 Wall thicknesses of sockets ... 21
7.5 Types of fittings ... 22
8 Mechanical characteristics ... 25
8.1 Mechanical characteristics of pipes ... 25
8.1.1 General requirements ... 25
8.1.2 Additional mechanical requirements ... 26
8.2 Mechanical characteristics of fittings ... 27
9 Physical characteristics ... 28
9.1 Physical characteristics of pipes ... 28
9.2 Physical characteristics of fittings ... 29



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022

10 Performance requirements ..... 30
11 Sealing rings ..... 31
12 Marking ..... 31
12.1 General ..... 31
12.2 Minimum required marking of pipes ..... 31
12.3 Minimum required marking of fittings ..... 32
12.4 Additional marking ..... 33
Annex A (normative) Utilization of non-virgin PP material ..... 34
A.1 Own reprocessed material from pipes and fittings ..... 34
A.2 External reprocessed and recycled materials with an agreed specification ..... 34
A.2.1 Material from PP pipes and fittings ..... 34
A.2.2 Material from PP products other than pipes and fittings ..... 35
Annex B (informative) General characteristics of PP pipes and fittings ..... 36
B.1 General ..... 36
B.2 Material characteristics ..... 36
B.3 Ring stiffness ..... 36
B.4 Chemical resistance ..... 37
B.5 Abrasion resistance ..... 37
B.6 Hydraulic roughness ..... 37
B.7 Diametric deflection ..... 37
Annex C (informative) Product standards of components that can be connected to components conforming to this standard ..... 38
Bibliography ..... 39



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022

## European foreword

This document (EN 1852-1:2018+A1:2022) has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2023, and conflicting national standards shall be withdrawn at the latest by April 2023.

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

This document includes Amendment 1 approved by CEN on 28 June 2022.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ▌A1⟩ ⟨A1▌.

▌A1⟩ This document supersedes EN 1852-1:2018. ⟨A1▌

The System Standards are 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).

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

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

EN 1852 consists of the following parts, under the general title *Plastics piping systems for non-pressure underground drainage and sewerage – Polypropylene (PP):*

— *Part 1: Specifications for pipes, fittings and the system* (the present standard)

— *Part 2: Guidance for the assessment of conformity* (CEN Technical Specification)

This part of EN 1852 includes Annex A (normative) "Utilization of non-virgin PP materials", Annex B (informative), "General characteristics of PP pipes and fittings" and Annex C (informative), "Product standards of components that can be connected to components conforming to this standard".

Plastics piping systems made of PP with mineral modifiers (PP-MD) are covered by EN 14758-1 [1].

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022

# 1 Scope

This part of EN 1852 specifies the requirements for solid wall pipes with smooth internal and external surfaces extruded from the same compound/formulation throughout the wall, fittings and the system of polypropylene (PP) piping systems intended for use for:

— non-pressure underground drainage and sewerage outside the building structure (application area code "U"), and

— non-pressure underground drainage and sewerage for both buried in ground within the building structure (application area code "D") and outside the building structure.

This is reflected in the marking of products by "U" and "UD".

This standard covers PP materials without mineral modifiers.

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

NOTE 1 Solid wall multilayer pipes with different formulation throughout the wall and foamed core pipes are covered by EN 13476-2 [1] (see also CEN ISO/TR 27165 [2]).

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

NOTE 2 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 or codes.

In conjunction with CEN/TS 1852-2, it 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 buried piping systems for non-pressure underground drainage and sewerage.

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

NOTE 3 Pipes, fittings and other components conforming to any of the plastics product standards listed in Annex C can be connected to pipes and fittings conforming to this standard, when they conform to the requirements for joint dimensions given in Clause 6 and to the requirements of Table 14.

# 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.

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

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

EN 12099, *Plastics piping systems — Polyethylene piping materials and components — Determination of volatile content*

EN ISO 472, *Plastics — Vocabulary (ISO 472)*

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



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022

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

EN ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method (ISO 1133-1)*

EN 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 1167-1)*

EN 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 1167-2)*

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

EN ISO 2505, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters (ISO 2505)*

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

EN ISO 3451-1, *Plastics — Determination of ash — Part 1: General methods (ISO 3451-1)*

EN ISO 9969:2016, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969:2016)*

EN ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT) (ISO 11357-6)*

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

EN ISO 11173, *Thermoplastics pipes — Determination of resistance to external blows — Staircase method (ISO 11173)*

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

EN ISO 13257:2017, *Thermoplastics piping systems for non-pressure applications — Test method for resistance to elevated temperature cycling (ISO 13257:2010)*

prEN ISO 13259, *Thermoplastics piping systems for underground non-pressure applications — Test method for leaktightness of elastomeric sealing ring type joints (ISO/DIS 13259)*

EN ISO 13263, *Thermoplastics piping systems for non-pressure underground drainage and sewerage — Thermoplastics fittings — Test method for impact strength (ISO 13263)*

EN ISO 13264, *Thermoplastics piping systems for non-pressure underground drainage and sewerage — Thermoplastics fittings — Test method for mechanical strength or flexibility of fabricated fittings (ISO 13264)*

ISO 4065:1996, *Thermoplastics pipes — Universal wall thickness table*



Documents
Document Sharing Hub

Full document details: BS EN 1852-1:2018+A1:2022

# 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN-ISO 472, EN-ISO 1043-1 and the following apply.

**3.1**
**application area code**
code used in the marking of pipes and fittings to indicate the application area for which they are intended, as follows:

U: application area code for the area more than 1 m from the building to which the buried piping system is connected;

D: application area code for the area under and within 1 m from the building where the pipes and the fittings are buried in ground and are connected to the soil and waste discharge system of the building

Note 1 to entry: In code D application areas, the existence of hot water discharge in addition to the external forces from the surroundings is usual.

**3.2**
**nominal size**
**DN/OD**
numerical designation of the size of a component, which is a convenient round number approximately equal to the manufacturing dimension of the outside diameter, in millimetres

**3.3**
**nominal outside diameter**
$d_n$
specified outside diameter, in millimetres, assigned to a nominal size DN/OD

**3.4**
**outside diameter**
$d_e$
value of the measurement of the outside diameter through its cross section at any point of a pipe or spigot end of a fitting, rounded up to the next greater 0,1 mm

**3.5**
**mean outside diameter**
$d_{em}$
value of the measurement of the outer circumference of a pipe or spigot end of a fitting in any cross section, divided by π (≈ 3,142), rounded to the next greater 0,1 mm

**3.6**
**mean inside diameter of a socket**
$d_{sm}$
arithmetical mean of a number of measurements of the inside diameter of a socket in the same cross section

**3.7**
**wall thickness**
$e$
value of the measurement of the wall thickness at any point around the circumference of a component



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022

**3.8**
**mean wall thickness**
**$e_m$**
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

**3.9**
**pipes series**
**S**
number for pipe designation (see ISO 4065:1996, 3.6)

**3.10**
**standard dimension ratio**
**SDR**
numerical designation of a pipe series, which is a convenient round number approximately equal to the ratio of the nominal outside diameter, $d_n$, and the minimum wall thickness, $e_{min}$

**3.11**
**nominal ring stiffness**
**SN**
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

**3.12**
**solid wall pipe**
pipe with smooth internal and external surface with same compound/formulation throughout the wall

**3.13**
**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 reprocessed or recycled material has been added

**3.14**
**own reprocessed 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

**3.15**
**external reprocessed material**
material comprising either one of the following forms:

a) material from rejected unused pipes or fittings or trimmings there from, 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



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022

**3.16**
**recycled 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

**3.17**
**mineral modified material (PP-MD)**
material to which has been added minerals during specific processing operation(s) which during such processing is well distributed in the material

# 4 Symbols and abbreviations

## 4.1 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 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

$M$ length of spigot of a plug

$R$ radius of swept fittings

$Z$ design length of (a part of) a fitting

$\alpha$ nominal angle of a fitting



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022

### 4.2 Abbreviations

| | |
|---|---|
| CT | close tolerance |
| DN | nominal size |
| DN/OD | nominal size, outside diameter related |
| MFR | melt mass-flow rate |
| OIT | oxidation induction time |
| PP | polypropylene |
| S | pipes series |
| SDR | standard dimension ratio |
| SN | nominal ring stiffness |
| TIR | true impact rate |

## 5 Material

### 5.1 PP final compound

The final compound for pipes and fittings shall be PP base material without added mineral modifiers, to which is added those additives that are needed to facilitate the manufacture of components, and with added non-virgin material (if applicable) conforming to the requirements of this standard.

NOTE PP-based materials with added mineral modifiers (PP-MD) are covered in EN 14758-1 [3].

Due to the use of additives and non-virgin material, which both can contain minerals, the maximum content of minerals in the final compound shall be ≤ 3,0 % by mass.

The content of the minerals (Ash residue) shall be tested in accordance with EN ISO 3451-1.

### 5.2 Utilization of non-virgin material

For the utilization of non-virgin PP materials, conditions and requirements are given in Annex A.

### 5.3 Melt mass-flow rate

Pipes and fittings shall be made from materials with an MFR as follows:

MFR (230/2,16) ≤ 1,5 g/10 min.

The MFR of the base material shall be tested in accordance with EN ISO 1133-1, using the test parameters: temperature 230 °C and loading mass 2,16 kg.

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.



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022

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

## 5.4 Resistance to internal pressure

When tested in accordance with the test method as specified in Table 1, using the indicated parameters, the material shall have characteristics conforming to the requirements given in Table 1.

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

**Table 1 — Material characteristics (long-term behaviour)**

| Characteristic | Requirements | Test parameters | | Test method |
|---|---|---|---|---|
| Resistance to internal pressure | No failure during the test period | End caps | Type A or type B | EN ISO 1167–1<br>EN ISO 1167-2 |
| | | Test temperature | 80 °C | |
| | | Orientation | free | |
| | | Number of test pieces | 3 | |
| | | Circumferential (hoop) stress | 4,2 MPa | |
| | | Conditioning period | 1 h | |
| | | Type of test | Water-in-water | |
| | | Test period | 140 h | |
| | | End caps | Types A or B | |
| | | Test temperature | 95 °C | |
| | | Orientation | free | |
| | | Number of test pieces | 3 | |
| | | Circumferential (hoop) stress | 2,5 MPa | |
| | | Conditioning period | 1 h | |
| | | Type of test | Water-in-water | |
| | | Test period | 1 000 h | |

## 5.5 Thermal stability (OIT)

The test shall be carried out in accordance with EN ISO 11357-6 using a test temperature of 200 °C. The oxidation induction time of the material shall not be less than 8 min.

## 5.6 Sealing ring retaining means

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



Documents
Document Sharing Hub
Full document details: BS EN 1852-1:2018+A1:2022