DRAFT FOR DEVELOPMENT

DD CEN/TS 1852-3:2003
Incorporating Amendment No. 1

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

Part 3: Guidance for installation

ICS 23.040.01; 93.030

BSI British Standards

National foreword

This Draft for Development is the official English language version of CEN/TS 1852-3:2003, including amendment A1:2005.

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

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because it is a Technical Specification, adopted from a CEN/TS. It should be applied on this provisional basis, so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European standard. A review of this publication will be initiated 2 years after its publication by the European organization so that a decision can be taken on its status at the end of its 3-year life. Notification of the start of the review period will be made in an announcement in the appropriate issue of *Update Standards*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European standard, to extend the life of the Technical Specification or to withdraw it. Comments should be sent in writing to the Secretary of BSI Subcommittee PRI/88/1,Non-pressure applications, at British Standards House, 389 Chiswick High Road, London W4 4AL, giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

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

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.

Summary of pages

This document comprises a front cover, an inside front cover, the CEN/TS title page, pages 2 to 11 and a back cover.

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Amendments issued since publication

Amd. No.	Date	Comments
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ICS 23.040.01; 93.030

English version

Plastics piping systems for non-pressure underground drainage and sewerage - Polypropylene (PP) - Part 3: Guidance for installation

(includes amendment A1:2005)

This Technical Specification (CEN/TS) was approved by CEN on 23 November 2002 for provisional application. Amendment A1 was approved by CEN on 4 May 2005.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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Contents

Foreword

This document (CEN/TS 1852-3:2003) has been prepared by Technical Committee CEN/TC 155, "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

This Technical Specification is a Part of a System Standard for plastics piping systems of a particular material for a specified application. There are a number of such System Standards.

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).

They 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*

— *Part 1: Specifications for pipes, fittings and the system*

— *Part 2: Guidance for assessment of conformity (ENV)*

— *Part 3: Guidance for installation (this Technical Specification)*

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

Foreword to amendment A1

This document (CEN/TS 1852-3:2003/A1:2005) has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this CEN Technical Specification: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This Technical Specification, together with ENV 1046 and EN 1610, provides a material-specific set of guidelines for the installation of piping systems made of polypropylene (PP) in the field of non-pressure underground drainage and sewerage.

— - outside the building structure (application area code "U");

— - both buried in ground within the building structure (application area code "D") and outside the building.

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

2 Normative references

This Technical Specification 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 Technical Specification only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ENV 1046:2001, *Plastics piping and ducting systems — Systems outside building structures for the conveyance of water or sewage — Practices for installation above and below ground*

EN 1295-1, *Structural design of buried pipelines under various conditions of loading — Part 1: General requirements*

EN 1610:1997, *Construction and testing of drains and sewers*

EN ISO 178, *Plastics — Determination of flexural properties (ISO 178:2001)*

EN ISO 9967, *Plastics pipes — Determination of creep ratio (ISO 9967:1994)*

3 Choice of stiffness (SN) series

3.1 General

PP pipe is a flexible pipe.

When loaded a flexible pipe deflects and presses into the surrounding material. This generates a reaction in the surrounding materials which controls deflection of the pipe. The amount of deflection, which occurs is limited by the care exercised in the selection and laying of the bedding and side fill materials.

3.2 Pipes

3.2.1 Standard procedure

The choice of the stiffness (SN) series may be made:

— when the same class of pipe has previously proved to be satisfactory in the same condition;

— or based on local practice (place of installation, usual installation procedure and experience);

— or based on local regulation;

— or based on Tables 1 and 2 of ENV 1046:2001

— or based on structural design.

3.2.2 Structural design

If a static calculation is required, information on methods is given in EN 1295-1 and the following parameters apply:

— Flexural modulus: $E_{(1min)}$ 1250 MPa determined in accordance with EN ISO 178;

— Creep ratio: < 4 determined in accordance with EN ISO 9967;

— Deflection limits for calculation given in Table 1.

Table 1 — Deflection limits

Pipe series [a]	Initial deflection	Long term deflection
SN 2	0,08 d_n	0,10 d_n
SN 4 and SN 8	0,09 d_n	0,12 d_n
[a] See EN 1852-1:1997		

NOTE Deflection up to 15 % e.g. caused by soil movement, will not affect the proper functioning of the piping system.

3.3 Fittings

Fittings according to EN 1852-1:1997[1], because of their geometry, have a stiffness greater than the stiffness of the corresponding pipe. Therefore the following applies:

— fittings marked with S 16 may be used with pipes up to SN 8;

— fittings of DN 400 marked with S 20 may be used with pipes up to SN 4.

NOTE When fittings conforming to one of the product standards listed in Annex C of EN 1852-1:1997[1] are used in combination with pipes and fittings conforming to EN 1852-1:1997[1], the appropriate recommended practice for installation applies.

3.4 Application area code D

Only pipes and fittings marked “UD” should be installed in situations covered by application area D: buried in ground either within the building structure or not more than 1 m from the building structure.

4 Storage in sunlight

Storage in direct sunlight for long periods and/or high temperatures could cause deformations affecting the jointing.

To avoid this risk the following precautions are recommended:

a) to limit the height of the stacks of pipes;

b) to shield the stacks of pipes from continuous and direct sunlight and arrange to allow the free passage of air around the pipes;

c) to store the fittings in boxes or sacks manufactured so as to permit the free passage of air.

The fading of the colour caused by outside storage does not affect the mechanical properties of pipes and fittings made of PP.

5 Handling and installation at low temperature

Although the impact strength of PP pipes is reduced at low temperatures, experience has shown that even at substantially sub-zero temperatures, these products can be satisfactorily handled and laid, when adequate care is taken.

A special marking on PP pipes "❄" (ice crystal) shows that the pipe conforms to an additional impact test requirement for pipes intended to be installed at temperatures below -10 °C.

6 Push-fit joints (elastomeric sealings)

Jointing should be carried out according to the manufacturer's instructions. However, in the absence of such instructions, it is recommended that the following instructions are used:

a) spigot end shall be chamfered;

b) only sealing rings and lubricants supplied by the manufacturer of the pipe and/or fitting shall be used;

c) for pipes cut on site, the end to be jointed shall be cut square and chamfered to produce a finish equivalent to that of the pipes and fittings supplied by the manufacturer;

d) the pipe end, the socket and the ring groove shall be clean and the sealing ring shall be seated correctly into its location;

e) the lubricant shall be applied over the whole chamfered end. It shall not be aggressive to the PP or to the elastomeric seal;

f) the pipe shall be carefully aligned with the adjoining pipe socket and pushed to the required insertion depth;

g) when a lever is used on the pipe to push the joint, a block of wood should be inserted between the lever and the end of the pipe to prevent damage to the pipe.

7 Butt fusion joints

7.1 General

The butt fusion technique provides rigidly jointed pipework. The pipe or fitting ends to be fused are heated by means of a heating element, then pressed together with a given pressure.

NOTE The fused joints have physical and mechanical properties similar to those of the pipe material, since an interlacing of the material molecule chains occurs.

Only joint together by butt fusion those components, which are made of materials with melt mass-flow rate (MFR) within the same class or within adjacent classes, and which are MFR class marked on the component itself (for example: MFR B).

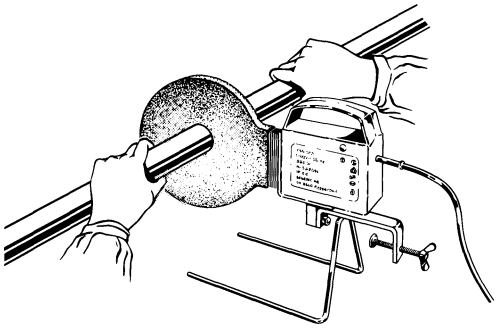
NOTE: Classes of MFR for PP materials (230/2,16) are as follows:

- Class A: $0 < [MFR] \leq 0{,}3$ g/10 min;
- Class B: $0{,}3 < [MFR] \leq 0{,}6$ g/10 min;
- Class C: $0{,}6 < [MFR] \leq 0{,}9$ g/10 min;
- Class D: $0{,}9 < [MFR] \leq 1{,}5$ g/10 min;

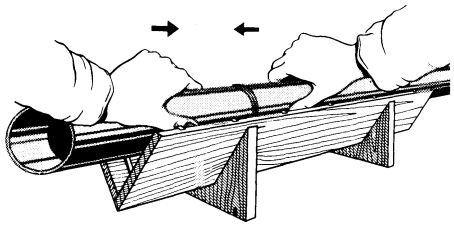
In all cases, follow the manufacturer’s instructions.

7.2 Jointing recommendations

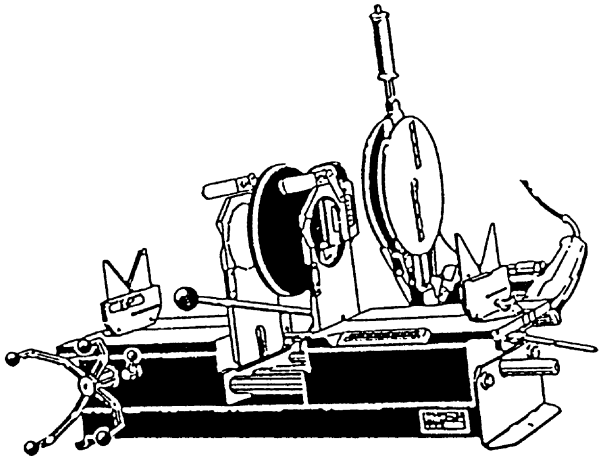
Carry out the fusion operation in a clean place, protected from frost and high humidity. Use fusion equipment, which in principle is as shown in Figure 1.



a) $d_n \leq 75$ mm



b) $d_n > 75$ mm



c)

Figure 1 — Typical butt fusion techniques

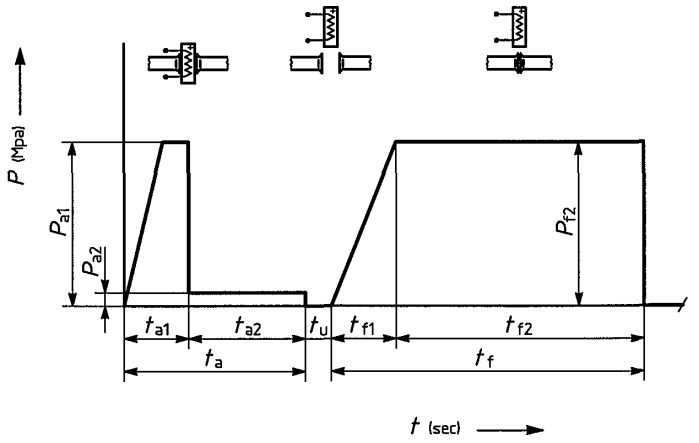
The method of butt fusion comprises three stages as follows.

a) Surface preparation

Check that the matching surfaces for assembly are cut square, without chamfer, and are free from defects.

b) Heating of surfaces

Before starting the fusion process, check the operation of the fusion machine. Raise the temperature of the heater according to the manufacturer's instructions, normally between 190 °C and 220 °C. Align the joint surfaces of the jointing components to be fused and insert the hot heating plate between them. Press the two parts together with the heating plate at a pressure in the fusion surface between 0,10 MPa and 0,20 MPa. Maintain the heating-up pressure until a bead of melt material is formed around the whole circumference of the parts to be fused. Manufacturer's instructions may include recommendation for parameters of the fusion operation as shown in Figure 2 including time intervals and related pressures together with the preferred ranges of temperature.



Key

P_{a1}, P_{a2}	(MPa)	Heating pressures, high and low
P_{f1}	(MPa)	Fusion pressure
t_{a1}, t_{a2}	(s)	Heating times with high and low pressures
t_a	(s)	Total heating time
t_{f1}	(s)	Pressure build-up time
t_{f2}	(s)	Cooling time
t_f	(s)	Total cooling time
t_u	(s)	Change-over time

Figure 2 — Parameters for fusion operation

c) Fusion

Remove the hot plate and press the heated surfaces together. Maintain the pressure according to the manufacturer's instructions and a correctly alignment of the two components until the fusion zone has cooled.

Specific parameters for fusing the parts together and for the cooling operation may be given in the manufacturer's instruction; see Figure 2.

NOTE Do not accelerate the cooling process by means of cold water or any other cooling equipment since this may impair the quality of the joint.

8 Maximum deviation from straightness

Pipes should normally be installed straight.

However, as PP pipes are flexible, the following deviation from straightness (see Figure 3) will not cause problems:

〚A1〛 d_n 200 mm: R 250 d_n;

d_n > 200 mm: R 400 d_n. 〚A1〛

Care may be necessary to avoid any extra stress on the socket joint itself.

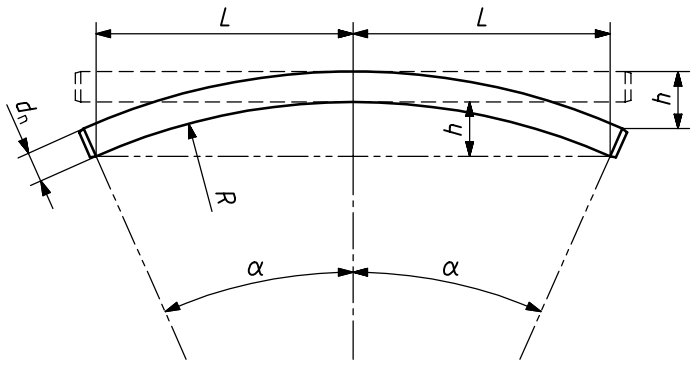
The greatest permitted angular deflection in the socket should be as follows:

2° for d_n 315 mm;

1,5° for 315 mm < d_n 630 mm;

1° for d_n > 630 mm.

Larger angular deflections are permitted in case of joints specifically designed for large angular deflections. In these cases the manufacturer shall declare the designed angular deflection.



NOTE Approximately $h \approx L^2/2R$ and $\alpha \approx L/R$.

Figure 3 — Parameters of deviation from straightness

9 Connection to rigid structures

Special fittings for this purpose are available. In such cases the manufacturer's instructions should be followed.

10 Repairs

Slip-couplers or purpose-designed special fittings are available from manufacturers for effecting repairs. Because designs vary, it is necessary to follow individual manufacturer's instructions. However, in the absence of such instructions, it is recommended that the following instructions are used:

a) the full extent of the damaged or failed section shall be identified and removed;

b) the cut pipe ends shall be square and shall be prepared for push-fit jointing as described in 6c);

c) repair, or slip-, couplings shall be placed in position. The replacement pipe length shall then be laid on the suitably prepared bed and the slip-couplings moved to their final positions (see Figure 4);

d) the embedment shall then be replaced to give compaction values approximately equal to those immediately adjacent to the repair.

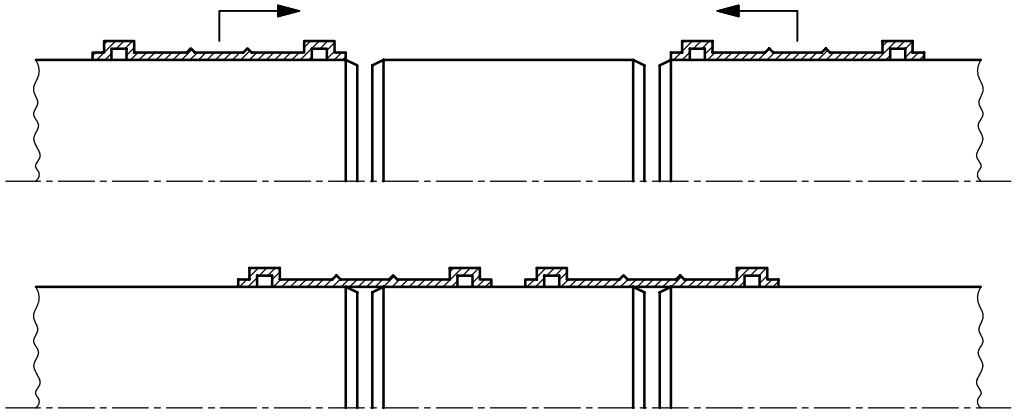


Figure 4 — Repairs using slip-couplers

11 Connection to existing pipes

For PP pipelines an additional connection can be made in a manner similar to that for making a repair when an appropriate fitting is used. Alternatively, a saddle connection may be made, in which case the manufacturer's instructions should be followed.

12 Testing on site

PP non-pressure pipelines shall be tested according to the procedures described in clause 13 of EN 1610:1997.

PP pipes are not porous, therefore it is possible to use more stringent parameters and requirements. In this case, the following are proposed:

a) testing with air:

testing method : LC;

test pressure : 100 mbar (10 kPa);

pressure drop : 5 mbar (0,5 kPa);

testing time : 3 minfor $d_n < 400$ mm;
0,01d_n minfor d_n 400 mm.

b) testing with water:

0,04 l/m^2 during 30 min for pipelines;

0,05 l/m^2 during 30 min for manholes and inspection chambers.

Bibliography

[1] EN 1852-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene (PP) — Part 1: Specifications for pipes, fittings and the system*

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