SLOVENSKI STANDARD
SIST-TP CEN/TR 1046:2014

01-februar-2014

Nadomešča:
SIST ENV 1046:2002
SIST ENV 1401-3:2002
SIST-TS CEN/TS 14758-3:2006
SIST-TS CEN/TS 1852-3:2003
SIST-TS CEN/TS 1852-3:2003/A1:2005

Cevni in kanalski sistemi iz plastomernih materialov - Sistemi zunaj stavb za transport vode ali kanalizacije - Postopki za vgradnjo pod zemljo

Thermoplastics piping and ducting systems - Systems outside building structures for the conveyance of water or sewage - Practices for underground installation

Thermoplastische Rohrleitungs- und Schutzrohr-Systeme - Systeme außerhalb der Gebäudestruktur zum Transport von Wasser oder Abwasser - Verfahren zur unterirdischen Verlegung

Systèmes de canalisations et de gaines en plastique - Système d'adduction d'eau ou d'assainissement à l'extérieur de la structure des bâtiments - Pratiques pour la pose en aérien et en enterré

Ta slovenski standard je istoveten z: **CEN/TR 1046:2013**

ICS:

23.040.20	Cevi iz polimernih materialov	Plastics pipes
93.025	Zunanji sistemi za prevajanje vode	External water conveyance systems
93.030	Zunanji sistemi za odpadno vodo	External sewage systems

SIST-TP CEN/TR 1046:2014 **en,fr,de**

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 1046

December 2013

ICS 23.040.01

Supersedes CEN/TS 14758-3:2006, CEN/TS 1852-3:2003, ENV 1046:2001, ENV 1401-3:2001

English Version

Thermoplastics piping and ducting systems - Systems outside building structures for the conveyance of water or sewage - Practices for underground installation

Systèmes de canalisations et de gaines en matières thermoplastiques - Systèmes d'adduction d'eau ou d'assainissement à l'extérieur de la structure des bâtiments - Pratiques pour la pose en enterré

Thermoplastische Rohrleitungs- und Schutzrohr-Systeme - Systeme außerhalb der Gebäudestruktur zum Transport von Wasser oder Abwasser - Verfahren zur unterirdischen Verlegung

This Technical Report was approved by CEN on 9 March 2013. It has been drawn up by the Technical Committee CEN/TC 155.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Ref. No. CEN/TR 1046:2013 E

Contents

Page

Foreword

This document (CEN/TR 1046:2013) has been prepared by Technical Committee CEN/TC 155 “Plastics Piping Systems and Ducting Systems”, the secretariat of which is held by NEN.

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

This document supersedes ENV 1046:2001, ENV 1401-3:2001, CEN/TS 1852-3:2003 and CEN/TS 14758-3:2006.

This Technical Report is based on the results of the work being 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) (see Bibliography), modified as necessary to be applicable to piping systems of any thermoplastics materials and any relevant application.

Introduction

This Technical Report contains guidance for installation procedures for thermoplastics piping systems and their components intended to be used below ground for pressure and non-pressure applications outside building structures. It is intended to be used in conjunction with general standards for installation recommendations, for example those issued by CEN/TC 164 “Water supply” and CEN/TC 165 “Waste water engineering” as stated in EN 805 and EN 1610 respectively.

NOTE Guidelines for installation of pipelines made out of thermosetting materials can be found in the ISO 10465 series [11, 12, 13].

This Technical Report is based on the results from research with full-scale trials undertaken by the thermoplastics pipes industry and expressed in CEN/TS 15223.

This Technical Report is a guidance document only. It provides a set of general guidelines which gives best practices for installation of thermoplastics piping and ducting systems outside building structures underground.

This Technical Report includes recommendations for the pipe surround and backfilling procedures but not road base and road sub-base details. Attention is drawn to any national regulations which may cover these or other aspects of installation.

This Technical Report does not cover matters relating to renovation of existing pipeline systems using lining techniques, or replacement of existing pipeline systems using trenchless techniques.

This Technical Report is intended to be used by authorities, design engineers, installation contractors and manufacturers.

In this Technical Report, much of the guidance is expressed as requirements, e.g. by use of “shall” or by instructions in the imperative. It is strongly recommended that these be followed whenever applicable.

Other guidance is presented for consideration as a matter of judgement in each case, e.g. by use of “should”.

1 Scope

This Technical Report is applicable to the installation of thermoplastics piping systems to be used for the conveyance of water or sewage under gravity and pressure conditions underground. It is intended to be used for pipes of nominal size up to and including DN 1600.

Wherever the term “pipe” is used in this Technical Report, it also serves to cover any “fittings”, “ancillary” products and “components” if not otherwise specified.

NOTE 1 This document does not apply to pipelines for gas supply (see EN 12007–2, *Gas infrastructure - Pipelines for maximum operating pressure up to and including 16 bar - Part 2: Specific functional requirements for polyethylene (MOP up to and including 10 bar*).

NOTE 2 It is assumed that additional recommendations and/or requirements are detailed in the individual materials voluntary product standards. Instances where this is expected to apply include those indicated in this Technical Report as follows:

a) any special transportation requirements (see 5.2);

b) maximum storage height (see 5.2 and 5.4);

c) maximum storage period in direct sunlight (see 5.4);

d) any climatic conditions requiring special storage (see 5.4);

e) limiting initial and/or long-term deflections (see 6.1.1 and 6.1.2);

f) information on mole ploughing and boring (see and 6.2), if applicable;

g) selection of appropriate jointing system (see Clause 7);

h) recommended radii of curvature for cold bending (see 8.1);

i) permitted rates of loss of water under test (see 9.2.1);

j) if applicable the relationship between SDR and stiffness.

Requirements and instructions concerning commissioning of systems can be found in EN 805 and EN 1610 and the relevant national and/or local regulations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 476, *General requirements for components used in drains and sewers*

EN 681 (all parts), *Elastomeric seals - Materials requirements for pipe joint seals used in water and drainage applications*

EN 805, *Water supply - Requirements for systems and components outside buildings*

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

CEN/TS 15223, *Plastics piping systems - Validated design parameters of buried thermoplastics piping systems*

3 Terms and definitions

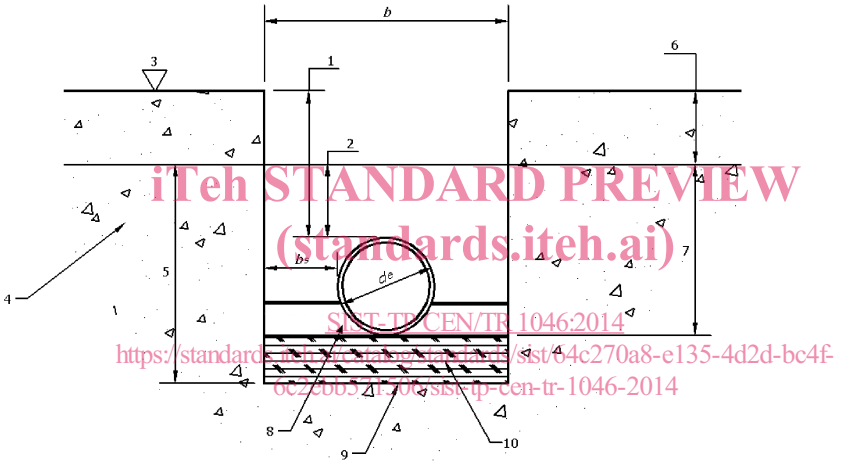
For the purposes of this document, the following terms and definitions apply.

3.1
deflection
deviation of the circle cross section of the pipe (in percent)

3.2
average deflection
measured average deflection over the inspected length of the pipeline (in percent)

3.3
trench
excavation of the soil for the underground embedment of the pipeline

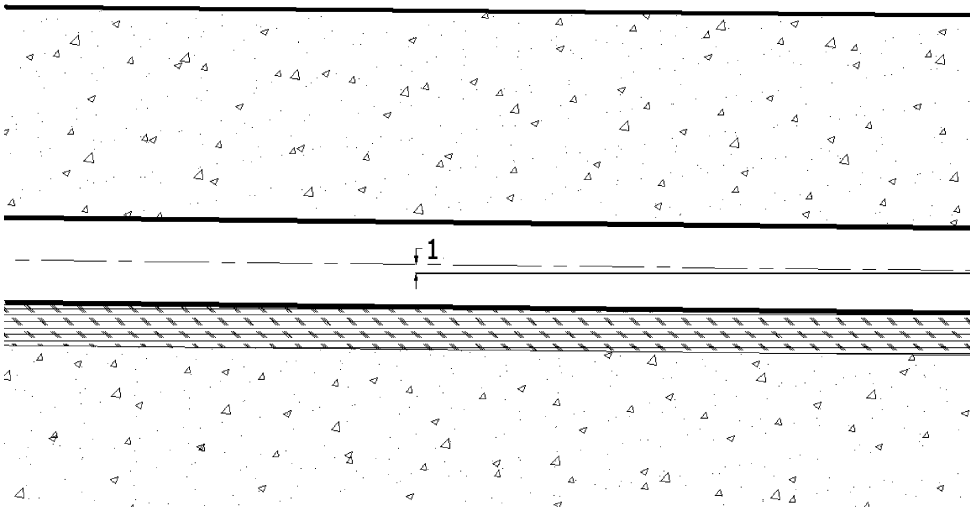
Note 1 to entry: See Figure 1 for an illustration of the meaning and limits of the terms used in this Technical Report.



Key

b	width of the cross section
b_S	horizontal clearance between the pipe or fitting and the trench sidewall or an adjacent pipe or fitting
d_e	external diameter of a pipe
1	depth of cover above the pipe
2	height of embedment above the pipe 100 mm to 300 mm
3	ground surface
4	native soil
5	embedment
6	main backfil
7	pipe zone
8	upper bedding (according EN 1610, also known as haunch zone, of which the height is 1/3 of the pipe diameter)
9	trench bottom
10	lower bedding (according EN 1610)

Figure 1 — Trench cross-section showing terminology



Key

1 slope (0/00, m/km, mm/m)

Figure 2 — Trench axial-section showing slope of the pipeline

4 Symbols and abbreviations

For the purposes of this Technical Report, the following symbols apply:

b	width of a trench cross-section (see Figure 1);
b_S	horizontal clearance between the pipe or fitting and the trench sidewall or an adjacent pipe or fitting (see Figure 1, Figure 7 and Table 4);
d_e	(mean) external diameter of a pipe (see Figure 1 and Figure 8);
DN/OD	nominal outside diameter of a pipe and associated fittings (see Table 4);
e	pipe wall thickness;
M	compaction classification: Moderate (see Figure 9 and Table 7);
N	compaction classification: Not (see Figure 9 and Table 7);
S	initial specific stiffness (see Table 3);
SN	stiffness number or classification (see Table 3);
SDR	standard dimension ratio (see Table 3)
W	compaction classification: Well (see Figure 9 and Table 7);

5 Transport, handling and storage at depots and sites

5.1 General

Thermoplastics pipes may be supplied in straight lengths or coiled forms (either free standing or on drums).

Attention is drawn to the need for consideration of personnel safety during the transport, handling and storage, especially in wet and cold weather conditions. Particular care should be exercised when decoiling coiled pipes as considerable forces can be released.

Additional information should be given in the System Standards, if applicable.

For additional explanations, see Figure 3 to Figure 5 which deal with transport, handling and storage.

5.2 Transportation of pipes

When transporting pipes or pipe package, vehicles should be used. The bed shall be free from nails and other projections. When practicable, pipes should rest uniformly on the vehicle.

Secure the pipes or pipe package effectively before transporting. When pipes are transported in bundles, the bundles should be secured effectively and off loaded as described hereunder.

When loading socketed pipes, the pipes should be stacked on the vehicle so that the sockets do not take loads.

The largest diameter pipes should be placed on the bed of the vehicle.

Care should be taken to avoid positioning the pipes near to any exhaust systems or any other potential hazards such as diesel oil.

Pipes should be inspected by the purchaser or his representative for damage and compliance with the order during unloading at the destination.

When pipes and/or fittings require special transportation practices, the manufacturer shall notify the customer of the procedures to be used.

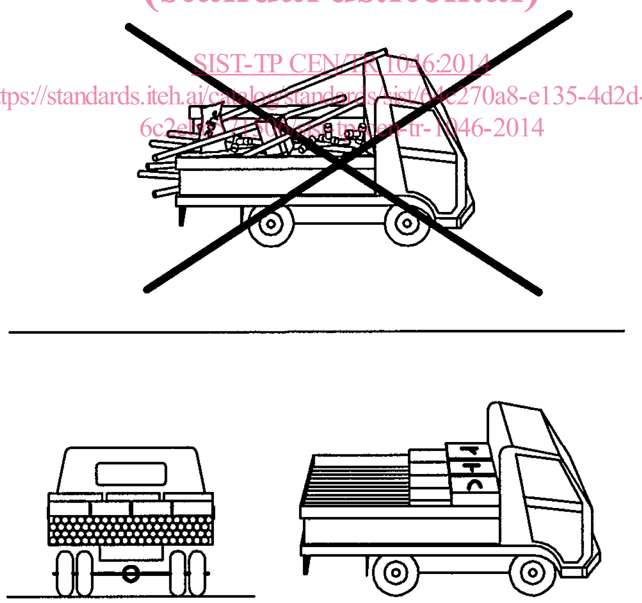


Figure 3 — Transport

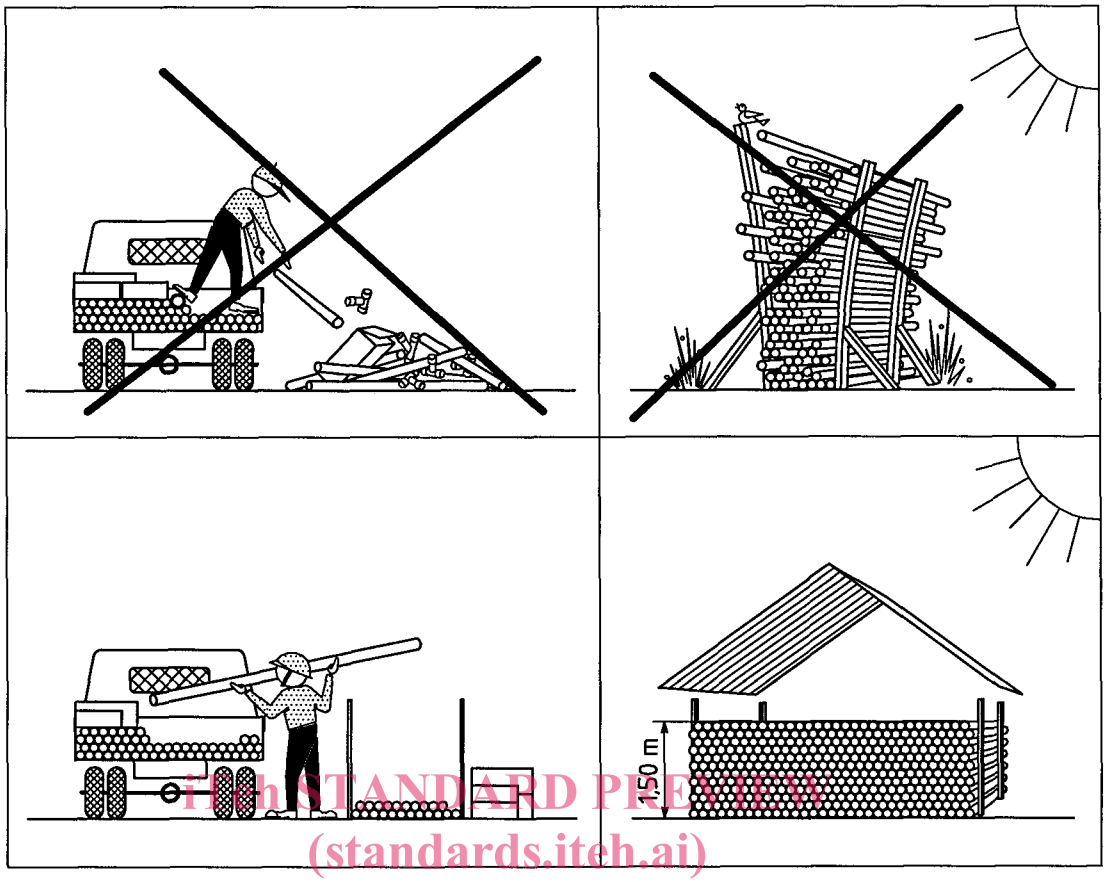


Figure 4 — Handling and storage

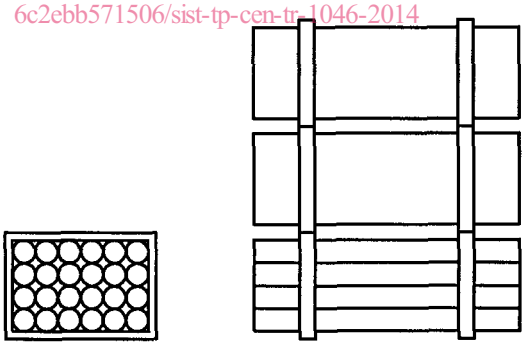


Figure 5 — Preferred pipe packaging

NOTE Attention is drawn to the need to conform to national and/or local transport regulations.

5.3 Handling

When handling the pipes, care shall be taken to prevent damage.

When pipes are to be handled individually, they should be lifted, lowered and carried in a controlled fashion and should never be thrown, dropped or dragged (see Figure 4).

It is preferable to use fabric slings or rope to lift the pipe or pipe bundle. Metal bars, slings, hooks or chains will damage the pipe if they are used incorrectly. When loading or unloading pipes, pipe bundles with forklift

equipment, only forklift trucks with smooth or suitably protected forks should be used. Care should be taken to ensure that forks do not strike the pipe when lifting.

The impact resistance of thermoplastics pipes is reduced at low temperatures; under these conditions, take more care during handling. Where cold conditions are expected, the advice of the manufacturer should be sought.

When loosening a coil, personnel should be aware of potential danger in the operation.

5.4 Storage

Although thermoplastics pipes are light, durable and resilient, take reasonable precautions during storage.

When it is intended to store pipes or coils on site in stacks, the manufacturer's advice regarding correct practice should be sought.

Stack the pipes or coils on reasonably flat surfaces free from sharp objects, stones or projections in order to avoid localized deformation or damage to the pipes. For the maximum stacking height, see the manufacturer's technical documentation.

Where pipes are supplied with end caps, plugs or wrappings, these should be removed prior to jointing.

Do not place pipes or rubber seals in close proximity to fuels, solvents, oils, greases, paints or heat sources.

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) limit the height of the stacks of pipes;

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

c) 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.

If pipes are supplied in a bundle or in other packaging, the restraints and/or packaging should be removed as late as possible prior to installation.

6 Installation

6.1 Pipes in trenches

6.1.1 Behaviour of flexible pipes under load

The behaviour of a pipe, when subject to a load, depends upon whether it is flexible, semi-rigid or rigid (see EN 476). Thermoplastics pipes are flexible. When loaded, a flexible pipe deflects and presses into the surrounding material without fracture. This generates a reaction in the surrounding material 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. Hence, flexible pipes rely on the bedding and side-fill materials for their load-bearing properties.

The level of deflection reached by a buried pipe depends on the properties of the surrounding material and to a much lesser extent on the stiffness of the pipe but not on its strength properties. Therefore, for flexible pipes, the crushing strength test and design procedures applied to rigid pipes are not appropriate.

When a flexible pipe is installed and backfilled it will be deflected. This is called the initial deflection. The pipe continues slowly to have an increase in deflection but reaches a limiting value within a reasonable period of time. The use of the installation procedures detailed in this Technical Report will minimize the levels of both the initial and final deflections. If the pipeline is pressurized then a reduction in the amount of deflection will occur. A more detailed description of this behaviour is given in Annex B.

6.1.2 Limiting deflection

There are several methods of structural design (see EN 1295-1:1997 [1]) that are used to estimate the deflection of a pipe under load but, though they are capable of being in reasonable agreement, they do not give exactly the same answers for a given condition. The values calculated are usually the expected average deflections.

Pipes made from different materials have different limiting deflection levels. For the applicable maximum permissible initial and, if appropriate, long-term deflection see Table 1, Figure 6, Annex B and the relevant System Standard. If this document is followed, it is expected that the deflections will be less than the limiting values given in Table 1 or the relevant System Standards.

Table 1 — Recommended allowable average deflection for thermoplastic pipes for gravity applications

Way of installation	Recommended allowable average deflection	Remark
Installation according to this Technical Report	≤ 8 % [a]	Based on measured deflection values short after installation, at commissioning
NOTE 1 Thermoplastics pipes allow high deflection because of the huge strain-ability of these materials. Strain-ability and pipe wall stability are checked in the ring flexibility test during which the pipes are deformed up to 30 % deflection. NOTE 2 For pressure applications after pressurization a re-rounding effect takes place. NOTE 3 For long-term deflection see Annex B.		
[a] At commissioning, local initial maximum deflection in pipelines may be allowed for PVC-U ≤ 10 % and for PE and PP ≤ 12 %.		

Where it can be expected that a product covered by the System Standard may be delivered with some distortion, e.g. pipes delivered in coils, then this should be stated. The average deflection is to be assumed to be in addition to this distortion.

6.1.3 Design considerations

6.1.3.1 General

If it is essential to determine the soil conditions that relate to trench construction and pipe installation prior to construction; the native soil and the backfill material shall be classified in accordance with Annex A. The classification shall be used to choose a suitable pipe stiffness in accordance with 6.1.3.2.

NOTE The classification will also indicate the areas of suitable materials for pipe zone backfill, so that importation of material may be minimized. Native materials conforming to Table A.1 are all suitable as backfill in the pipe zone. If backfill materials have to be imported, it is suggested that group 1 or 2 materials are used.