
Cevni sistemi iz polimernih materialov za obnovo podzemnih omrežij za odvodnjavanje in kanalizacijo - Obratovanje brez tlaka (vodi s prosto gladino) – 3. del: Oblaganje s tesno prilagodljivimi cevmi

Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks - Part 3: Lining with close-fit pipes

Kunststoff-Rohrleitungssysteme für die Renovierung von erdverlegten drucklosen Entwässerungsnetzen (Freispegelleitungen) - Teil 3: Close-Fit-Lining

Systemes de canalisations plastiques pour la rénovation des réseaux d'assainissement enterrés sans pression - Partie 3: Tubage par tuyau continu sans espace annulaire

Ta slovenski standard je istoveten z: EN 13566-3:2002

ICS:

23.040.20	Cevi iz polimernih materialov	Plastics pipes
93.030	Zunanji sistemi za odpadno vodo	External sewage systems

SIST EN 13566-3:2003

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EUROPEAN STANDARD

EN 13566-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2002

ICS 93.030

English version

Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks - Part 3: Lining with close-fit pipes

Rénovation des réseaux d'assainissement gravitaires enterrés par canalisations plastiques - Partie 3: Tubage par tuyau continu sans espace annulaire

Kunststoff-Rohrleitungssysteme für die Renovierung von erdverlegten drucklosen Entwässerungsnetzen (Freispiegelleitungen) - Teil 3: Close-Fit-Lining

This European Standard was approved by CEN on 4 November 2002.

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

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EN 13566-3:2002 (E)

Foreword

This document EN 13566-3:2002 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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by December 2004.

This standard is a Part of a System Standard for plastics piping systems of various materials used for renovation of existing pipelines in a specified application area. System Standards for renovation dealing with the following applications are either available or in preparation:

- **Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks [this application];**
- Plastics piping systems for renovation of underground water supply networks;
- Plastics piping systems for renovation of underground gas supply networks;
- Plastics piping systems for renovation of underground pressure drainage and sewerage networks;
- Plastics piping systems for renovation of industrial pipe systems.

These System Standards are distinguished from those for conventionally installed plastics piping systems by setting requirements for certain characteristics in the as-installed condition, after site processing. This is in addition to specifying requirements for system components as manufactured.

The system standard EN 13566 comprise six parts, as follows:

- Part 1: General
- Part 2: Lining with continuous pipes
- Part 3: Lining with close-fit pipes (this standard)
- Part 4: Lining with cured-in-place pipes
- Part 5: Lining with discrete pipes
- Part 7: Lining with spirally-wound pipes

The requirements for any given renovation technique family are covered by *Part 1: General*, applied in conjunction with the relevant other Part. For example, for the requirements relating to *Lining with close-fit pipes*, it is necessary to refer to both Parts 1 and 3. Complementary information is contained in ISO/TR 11295 ^[1] and a supporting standard, EN 13689 ^[2], listed in the bibliography.

A consistent structure of clause headings has been adopted for all parts to facilitate direct comparisons across renovation technique families.

Figure 1 shows the common Part and clause structure and the relationship between EN 13566 and the system standards for other applications.

Annex A of this document is informative. Annex B is normative.

This document includes a bibliography.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

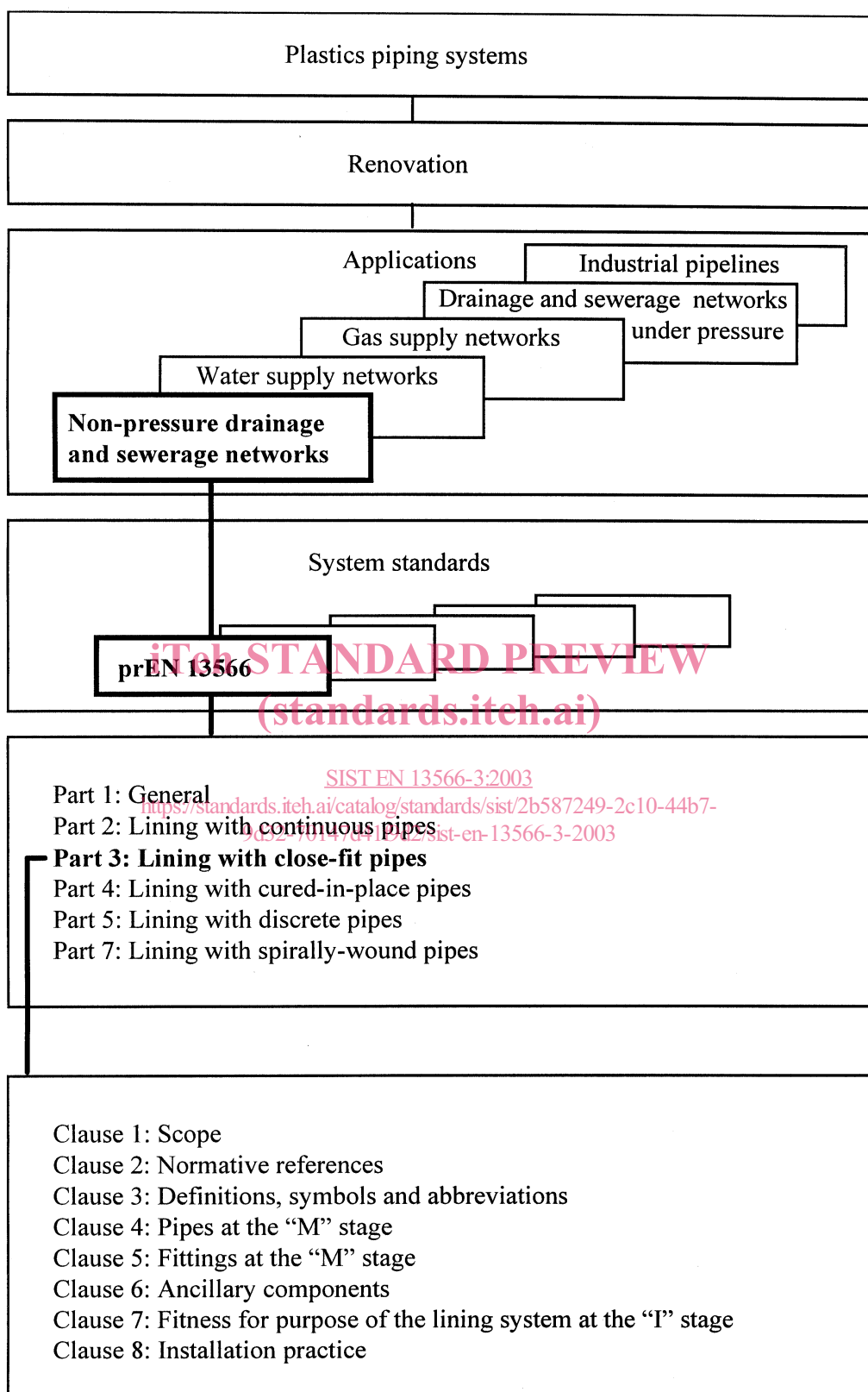


Figure 1 — Format of the renovation system standards

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1 Scope

This Part 3 of EN 13566, read in conjunction with EN 13566-1:2002, specifies requirements and test methods for close-fit lining systems intended to be used for the renovation of non-pressure drainage and sewerage networks.

It covers pipes and fittings made of polyethylene (PE) or unplasticized poly(vinyl chloride) (PVC-U).

It is applicable to the plastic lining system only. It does not cover the requirements for the existing pipeline.

2 Normative references

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

EN 727, *Plastics piping and ducting systems — Thermoplastics pipes and fittings — Determination of Vicat softening temperature (VST)*.

EN 1401-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: Specifications for pipes, fittings and the system*.

prEN 12666-1:1996, *Plastics piping systems for non-pressure underground drainage and sewerage — Polyethylene (PE) — Part 1: Specifications for pipes, fittings and the system*.

EN 13566-1:2002, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 1: General*.

EN ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:1993 including Corr 1:1994)*.

EN ISO 899-1:1996, *Plastics — Determination of creep behaviour — Part 1: Tensile creep (ISO 899-1:1993)*.

prEN ISO 3126, *Plastics piping systems — Plastics piping components — Measurement and determination of dimensions (ISO/DIS 3126:1999)*.

EN ISO 6259-1, *Thermoplastics pipes - Determination of tensile properties - Part 1: General test method (ISO 6259-1:1997)*.

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

EN ISO 9969, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969:1994)*.

ISO 13953, *Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*.

3 Terms and definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13566-1:2002 together with the following apply.

3.1.1**close-fit**

situation of the outside of the installed liner relative to the inside of the existing pipeline, which may either be an interference fit or include a small annular gap resulting from shrinkage and tolerances only

3.1.2**close-fit pipe**

continuous lining pipe of thermoplastic material reshaped or otherwise expanded after insertion to achieve a close fit to the existing pipeline

3.1.3**melt mass-flow rate**

value relating the viscosity of the molten material at a specified temperature and rate of shear

3.2 Symbols and abbreviations

For the purpose of this standard, the symbols and abbreviations given in EN 13566-1:2002 apply, together with the following:

$e_{m,max}$: maximum mean wall thickness

MFR : melt mass-flow rate

OIT : oxidation induction time

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4 Pipes at the "M" stage**4.1 Materials**

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4.1.1 General

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The material shall be either polyethylene (PE) or unplasticized poly(vinyl chloride) (PVC-U), to which are added those additives that are needed to facilitate the manufacture and/or installation of pipes conforming to this standard.

4.1.2 Virgin material

Virgin material, as defined in EN 13566-1:2002, may be used without limitations.

Fusion compatibility shall conform to 4.6 of prEN 12666-1:1996.

4.1.3 Reprocessable material and recyclable material**4.1.3.1 Reprocessable material**

Own reprocessable material may be used, provided that it is derived from the same compound, as used for the relevant production.

External reprocessable material shall not be used.

4.1.3.2 Recyclable material

Recyclable material shall not be used.

4.2 General characteristics

When viewed without magnification the internal and external surfaces of the pipe shall be smooth, clean and free from scoring, cavities and other defects, which would prevent conformity to this standard.

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4.3 Material characteristics

When tested in accordance with the methods given in Table 1 or Table 2, as applicable, the pipe shall conform to the requirements given in the table.

Table 1 — Material characteristics of PE pipes

Characteristic	Requirement	Test parameters		Test method
		Parameter	Value	
Density	Shall conform to prEN 12666-1			
Longitudinal tensile stress at yield point	> 15 MPa	Speed of testing for $e < 12$ mm $e > 12$ mm	(100 ± 10) mm/min (25 ± 2,5) mm/min	EN ISO 6259-1
Elongation at break	> 350 %	Test piece shape and initial gauge length	Shall conform to Specimen type 1B in accordance with EN ISO 527-2	
Thermal stability (OIT)	Shall conform to prEN 12666-1			
Melt mass-flow rate				
Resistance to internal pressure (long-term behaviour)				
Resistance to circumferential tensile stress ^a	No failure during the test period	Shall conform to annex B		
^a Applies to folded pipes only, see annex B				

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Table 2 — Material characteristics of PVC-U pipes

Characteristic	Requirement	Test parameters		Test method
		Parameter	Value	
E-modulus (tensile)	Declared value ^{a b} but not less than 1200 MPa	Speed of testing Test piece shape and initial gauge length	(5 ± 0,5) mm/min Specimen type 1B	EN ISO 527-2
Longitudinal tensile strength	Declared value ^a but not less than 20 MPa	Speed of testing	(5 ± 0,5) mm/min	EN ISO 6259-1
Elongation at break	Declared value ^a but not less than 70 %	Test piece shape and initial gauge length	Specimen type 1B in accordance with EN ISO 527-2:	
Impact strength	Shall conform to EN 1401-1			
^a Some PVC-U close-fit pipe products have declared values considerably higher than the minima specified.				
^b The declared value of E-modulus will determine the relationship between ring stiffness and SDR (see 7.4 and 7.5)				

4.4 Geometric characteristics

The pipe diameter, wall thickness and shape in the "M" stage depend on the specific close-fit lining technique. "M" stage dimensions needed to obtain specified "I" stage dimensions (see 7.4) shall be declared, with their tolerances, by the manufacturer.

NOTE In the case of factory-folded pipes, variations in wall thickness in one cross-sectional area may be present at the "M" stage.

4.5 Mechanical characteristics

No mechanical requirements of pipes at the "M" stage apply.

4.6 Physical characteristics

When tested in accordance with the methods given in Table 3 or Table 4, as applicable, the pipe shall conform to the requirements given in the table.

Table 3 — Physical characteristics of PE pipes

Characteristic	Requirement	Test parameters	Test method
Longitudinal reversion	$\leq 3,5 \%$ The pipe shall exhibit no bubbles or cracks	Shall conform to prEN 12666-1	

Table 4 — Physical characteristics of PVC-U pipes

Characteristic	Requirement	Test parameters	Test method
Vicat softening temperature	Declared value ^a but not less than 55 °C	Shall conform to EN 727	
Longitudinal reversion	Shall conform to EN 1401-1		
Degree of gelation	Shall conform to EN 1401-1		
^a Some PVC-U close-fit pipe products have declared value considerably higher than the minimum specified. Where the measured value of Vicat softening temperature is less than 70 °C the ability to resist sewer operating temperatures is restricted.			

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4.7 Jointing

When tested in accordance with the methods given in Table 5, the butt fusion joints between PE pipes shall conform to the requirements given in this table.

Table 5 — Jointing characteristics of PE pipes

Characteristic	Requirement	Test parameters	Test method
Failure mode	Ductile failure	Shall conform to ISO 13953	

4.8 Marking

Pipes shall be marked according to 4.8 of EN 13566-1:2002.

The nominal size shall be marked as: DN-OD

NOTE: In addition PE pipes can be marked with the following optional information: MFR

5 Fittings

Fittings shall be either polyethylene (PE) conforming to prEN 12666-1 or unplasticized poly(vinyl chloride) (PVC-U) conforming to EN 1401-1.

6 Ancillary components

This standard does not make reference to any ancillary components.