SLOVENSKI STANDARD
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Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks - Part 2: Lining with continuous pipes

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Kunststoff-Rohrleitungssysteme für die Renovierung von erdverlegten drucklosen Entwässerungsnetzen (Freispiegelleitungen) - Teil 2: Rohrstrang-Lining

Systemes de canalisations plastiques pour la rénovation des réseaux d'assainissement enterrés sans pression - Partie 2 : Tubage par tuyau continu avec espace annulaire

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23.040.20	Cevi iz polimernih materialov	Plastics pipes
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Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks - Part 2: Lining with continuous pipes

Systèmes de canalisations plastiques pour la rénovation des réseaux d'assainissement enterrés sans pression - Partie 2 : Tubage par tuyau continu avec espace annulaire

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This European Standard was approved by CEN on 29 July 2004.

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, 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.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 13566-2:2005) 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 May 2006, and conflicting national standards shall be withdrawn at the latest by November 2007.

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 system standards for conventionally installed plastics piping systems by the requirement to verify certain characteristics in the "as installed" condition, after site processing. This is in addition to verification of characteristics of plastics piping systems "as manufactured".

System standard EN 13566 comprises six parts, as follows:

— Part 1: General

— **Part 2: Lining with continuous pipes (this standard)**

— Part 3: Lining with close-fit pipes

— Part 4: Lining with cured-in-place pipes

— Part 5: Lining with discrete pipes

— Part 7: Lining with spirally wound pipes

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 system standards for other applications.

Annex A of this document is informative. Annexes B, C and D are 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, 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.

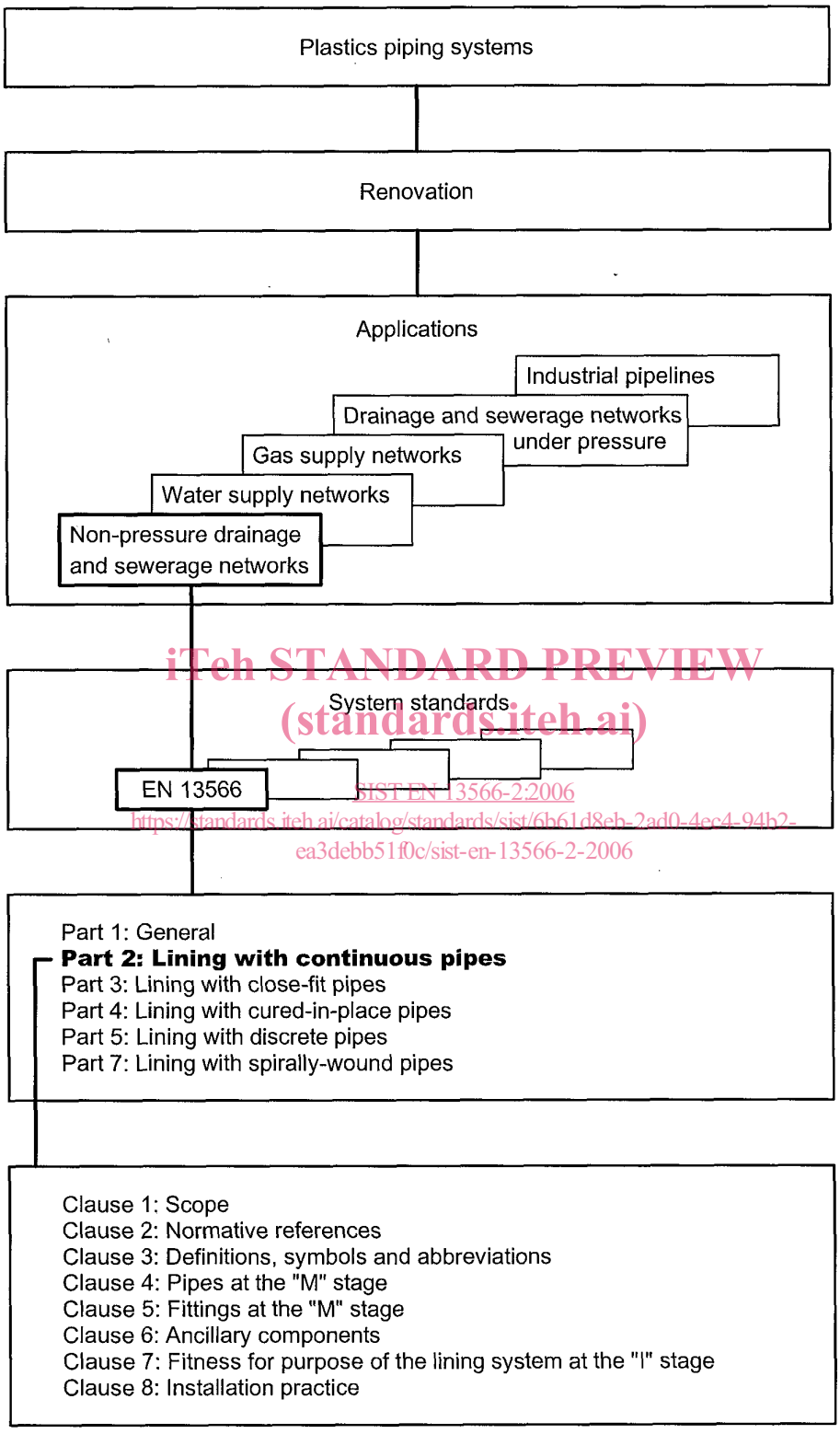

Figure 1 — Format of the renovation system standards.

Introduction

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

1 Scope

This Part 2 of EN 13566, read in conjunction with Part 1, specifies requirements and test methods for pipes and fittings which are part of plastics piping systems installed as continuous pipes in the renovation of non-pressure drainage and sewerage networks. It covers;

— homogeneous-wall (HW) pipes made of polyethylene (PE) or polypropylene (PP),

— structured-wall (SW) pipes of the corrugated double-wall type of construction as defined in Annex B,, whose structural layer(s) is (are) made of PE or PP,

— jointing of pipe lengths by means of butt fusion (HW) [1]) or electrofusion (SW),

— fabricated and injection-moulded fittings made of PE, PP and poly(vinyl chloride) (PVC-U).

NOTE The grouting procedure is outside the scope of this standard.

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 cited 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 version of the publication referred to applies (including amendments).

EN 728, *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time.*

EN 744, *Plastics piping and ducting systems — Thermoplastics pipes — Test method for resistance to external blows by the round-the-clock method.*

EN 921:1994, *Plastics piping systems — Thermoplastics pipes — Determination of resistance to internal pressure at constant temperature (with Corrigendum EN/AC 921:1995).*

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 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.*

EN 1446, *Plastics piping and ducting systems — Thermoplastics pipes — Determination of ring flexibility.*

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

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

prEN 13476-1, *Thermoplastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 1: Specifications for pipes, fittings and the system.*

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[1]) Continuous pipes are extruded in single lengths, or are assembled by fusing individual pipe lengths at the site of installation.

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 1133:1999, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:1997).*

EN ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions (ISO 3126:2005).*

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

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

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

EN ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method (ISO 1183-1:2004).*

ISO 6259-3, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes.*

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 and the following apply.

3.1.1
assembly
section of continuous pipe including any joints and/or fittings

3.1.2
maximum system diameter
diameter of the circle just circumscribing the system cross-section at its widest point

3.1.3
melt mass-flow rate
value relating to the viscosity of the molten material at a specified temperature and rate of shear

3.1.4
minimum bending radius
minimum bending radius at any point throughout the length of the pipe, measured to the longitudinal axis of the pipe

3.1.5
non-structural layer
material layer of structured-wall (SW) pipe where the contribution of the layer to the ring stiffness is not essential to satisfy the relevant class requirement (see Annex B)

3.1.6
structural layer
material layer of SW pipe which is not defined as non-structural

3.1.7
structured-wall
type of design of thermoplastic pipe or fitting which does not have a homogeneous wall of uniform thickness

3.1.8
out-of-roundness
the difference between the measured maximum and the measured minimum outside diameter in the same cross-sectional plane of the pipe.

3.2 Symbols and abbreviations

3.2.1 Symbols

For the purposes of this standard the following symbols apply:

F_a maximum allowed pulling force

e_c total wall thickness of structured-wall pipe

e_5 inner wall thickness of structured-wall pipes, see Annex B

$r_{min.}$ minimum bending radius

ε_e strain in the pipe wall due to longitudinal bending along its outer curvature

σ_y longitudinal tensile strength

3.2.2 Abbreviations

For the purposes of this standard the following abbreviations apply:

EPDM Ethylene-propylene-dimonomer

EVA Ethylene-vinyl-acetate

HW Homogeneous-wall

MFR Melt mass-flow rate

SEBS Styrene-ethylene-butadiene

SN ring stiffness

SW Structured-wall

TIR True impact rate

4 Pipes at the "M" stage

4.1 Materials

4.1.1 HW pipes

Pipes shall be of PE or PP conforming to the requirements of EN 12666-1 or EN 1852-1.

4.1.2 SW pipes

4.1.2.1 General

The material for the structural layer(s) shall be PE or PP, to which may be added only those additives needed to facilitate the manufacture of pipes conforming to this standard.

The material for a non-structural inner layer shall be PE, or compounds of PE with EPDM, EVA or SEBS.

4.1.2.2 Virgin material

The use of virgin material, as defined in EN 13566-1:2002, is permitted without limitation.

4.1.2.3 Reprocessable material

The use of own reprocessable material, as defined in EN 13566-1:2002, is permitted without limitation.

The use of external reprocessable PE material, as defined in EN 13566-1:2002, in non-structural layers not in contact with the transported fluid shall be permitted without limitation.

External reprocessable material compounds of PE with EPDM, EVA or SEBS shall not be used.

External reprocessable material shall not be used in structural layers, or in non-structural layers in contact with the transported fluid.

4.1.2.4 Recyclable material

The use of recyclable PE and PP material, as defined in EN 13566-1:2002, in non-structural layers not in contact with the transported fluid shall be permitted without limitation. Recyclable material compounds of PE with EPDM, EVA or SEBS shall not be used. Recyclable material shall not be used in structural layers, or in non-structural layers in contact with the transported fluid.

4.2 General characteristics

When viewed without magnification the internal and external surfaces of pipes shall be smooth, clean and free from grooving, blistering, impurities and pores and any other surface irregularity likely to prevent their conformity to this standard. The pipe ends shall be cut square to the axis of the pipe.

4.3 Material characteristics

4.3.1 HW pipes

Material characteristics shall conform to the requirements of EN 12666-1:2005 or EN 1852-1.

4.3.2 SW pipes

PE and PP materials from which structural layers are made shall conform to the requirements given in Table 1 and Table 2. Materials from which the non-structural layers are made shall conform to the requirements given in Table 3.

Table 1 — Material characteristics for PE in structural layers of SW pipes

Characteristics	Requirements	Test parameters		Test method
		Characteristic	Value	
Reference density	≥ 930 kg/m^3	Temperature	(23 ± 2) °C	ISO 1183-1
Melt mass-flow rate	≤ 1,6 g/10 min	Temperature Loading mass	190 °C 5 kg	EN ISO 1133:1999 Condition T
Resistance to internal pressure (solid wall test piece)	No failure during the test period	End caps Orientation Number of test pieces Temperature Circumferential stress Conditioning period Type of test Test period	Type a or b Free 3 80 °C 3,9 MPa Shall conform to EN 921:1994 Water-in-water 165 h	EN 921:1994
Resistance to internal pressure (solid wall specimen)	No failure during the test period	End caps Orientation Number of test pieces Temperature Circumferential stress Conditioning period Type of test Test period	Type a or b Free 3 80 °C 2,8 MPa Shall conform to EN 921:1994 Water-in-water 1000 h	EN 921:1994
Thermal stability, OIT	≥ 20 min	Temperature	200 °C	EN 728