
Cevni sistemi iz polimernih materialov za obnovo podzemnih omrežij za odvodnjavanje in kanalizacijo - Obratovanje brez " tlaka (vodi s prosto gladino) – 4. del: Oblaganje s cevmi, ki se utrdijo na mestu vgradnje

Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks - Part 4: Lining with cured-in-place pipes

Kunststoff-Rohrleitungssysteme für die Renovierung von erdverlegten drucklosen Entwässerungsnetzen (Freispegelleitungen) - Teil 4: Vor ort härtendes Schlauchlining

Systemes de canalisations plastiques pour la rénovation des réseaux d'assainissement enterrés sans pression - Partie 4: Chemisage continu polymérisé en place

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Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks - Part 4: Lining with cured-in-place pipes

Rénovation des réseaux d'assainissement gravitaires enterrés par canalisations plastiques - Partie 4: Chemisage continu polymérisé en place

Kunststoff-Rohrleitungssysteme für die Renovierung von erdverlegten drucklosen Entwässerungsnetzen (Freispiegelleitungen) - Teil 4: Vor ort härtendes Schlauchlining

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

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EN 13566-4:2002 (E)

Foreword

This document EN 13566-4:2002 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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by December 2004.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 drainage and sewerage networks under pressure;
- 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 industrial pipelines

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.

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

- Part 1: General
- Part 2: Lining with continuous pipes
- Part 3: Lining with close-fit pipes
- Part 4: Lining with cured-in-place pipes (this standard)
- 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 technique families.

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

Annexes A and B are informative. Annexes 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

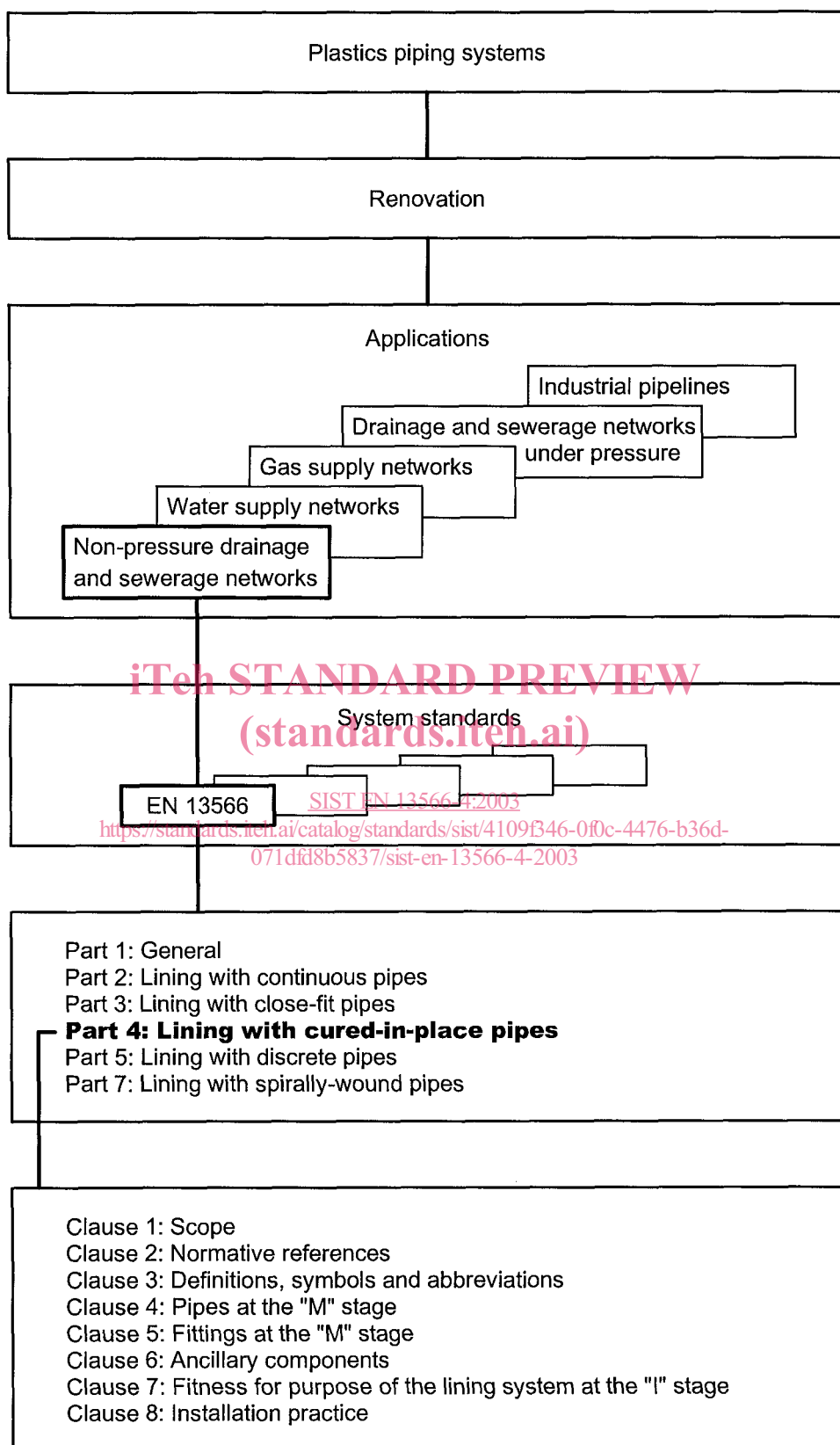


Figure 1 — Format of the renovation system standards

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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 cured-in-place pipes*, it is necessary to refer to both Parts 1 and 4. Complementary information is contained in ISO/TR 11295 ^[1] and a supporting standard, EN 13689 ^[2], listed in the bibliography.

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1 Scope

This Part 4 of EN 13566, in conjunction with Part 1, specifies requirements and test methods for cured-in-place pipes and fittings used for renovation of underground non-pressure drainage and sewerage networks.

It covers the use of various thermosetting resin systems in combination with compatible fibrous carrier materials and other process-related plastics components as defined in 4.1.

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 cited 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 705, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Methods for regression analysis and their use.*

EN 761, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of the creep factor under dry conditions.*

EN 1120, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Determination of the resistance to chemical attack from the inside of a section in a deflected condition.*

EN 1228:1996, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial specific ring stiffness.*

EN 1393:1996, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial longitudinal tensile properties.*

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 1852-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene (PP) — 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.*

prEN 14364:2002, *Plastics piping systems for drainage and sewerage with or without pressure — Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) — Specification for pipes, fittings and joints.*

EN ISO 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite (ISO 75-2:1993).*

EN ISO 178:1996, *Plastics — Determination of flexural properties (ISO 178:1993).*

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 899-2, *Plastics — Determination of creep behaviour — Part 2: Flexural creep by three-point loading (ISO 899-2:1993).*

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

3 Terms and definitions, symbols and abbreviations

3.1 Terms and definitions

3.1.1 General

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

3.1.1.1

carrier material

porous component of the liner which carries the liquid resin system during insertion into the pipe being renovated, and forms part of the installed lining system once the resin has cured

3.1.1.2

CIPP product

cured-in-place pipe of a particular design, produced from a liner of specified materials, with a wall structure which is uniquely defined for each diameter/wall thickness combination, and which is impregnated with a specific resin system and installed by a specific process

3.1.1.3

CIPP unit

specific cured-in-place pipe produced from a continuous liner which has been impregnated in one process and installed as a single length

3.1.1.4

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

3.1.1.5

composite

combination of cured resin system, carrier material and/or reinforcement, excluding any internal or external membranes, or non-structural resin-rich layers

3.1.1.6

first break

elastic limit or first major discontinuity of the stress-strain curve associated with local failure of the resin matrix or reinforcing fibres

3.1.1.7

curing

process of resin polymerisation, which may be initiated or accelerated by the use of heat or exposure to light

3.1.1.8

design thickness

required wall thickness of the composite as determined by structural design

3.1.1.9

internal membrane

membrane which forms the inside surface of the pipe after installation

3.1.1.10

external membrane

membrane which forms the outside surface of the pipe after installation

3.1.1.11

lateral connection collar

fitting for reconnecting a lined main pipe to an existing or renovated lateral pipe

3.1.1.12**lining tube**

flexible tube, consisting of carrier material, resin system, and any membranes and/or reinforcement, as combined prior to insertion in the pipe to be lined

3.1.1.13**nominal thickness**

one of a range of discrete liner wall thicknesses dictated by the materials used for liner construction, and chosen so as to result in a finished wall thickness of the composite not less than the design thickness

3.1.1.14**preliner**

external membrane which is installed separately and before the resin-impregnated liner

3.1.1.15**reinforcement**

fibres incorporated in the liner which enhance the dimensional stability of the liner and/or the structural properties of the cured composite. The reinforcement may be incorporated in the carrier material, may constitute the carrier material, or be a separate layer

3.1.1.16**resin system**

thermosetting resin including the curing agent(s) and any fillers or other additives, in specified proportions

3.1.2 Techniques

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3.1.2.1**eversion**

process of turning a flexible tube or hose inside out by the use of fluid (water or air) pressure

3.1.2.2**everted-in-place insertion**

method whereby the impregnated liner is introduced by eversion to achieve simultaneous insertion and inflation

3.1.2.3**winched-in-place insertion**

method whereby the flat impregnated liner is first pulled into the pipe to be lined and then inflated to bring it up to size

NOTE Inflation can be achieved by means of a separate pressurised tube or hose inside the liner which is either withdrawn after resin cure or left in place as a permanent internal membrane.

3.1.2.4**temporary membrane**

internal membrane used to separate process fluid from the resin system during liner insertion which is withdrawn after resin cure

3.2 Symbols and abbreviations

The following symbols and abbreviations apply in addition to those listed in EN 13566-1:2002.

3.2.1 Symbols

b	: width of test piece
d_m	: mean diameter of pipe
E_0	: short-term flexural modulus
E_x	: long-term flexural modulus at x years
E_t	: flexural creep modulus at time t

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F	: force applied in flexural test
h	: thickness of test piece
I	: moment of inertia (the second moment of area) per unit length of the pipe wall
L	: distance between supports in flexural test
S_0	: initial specific ring stiffness
δ_t	: deflection of flexural test piece at time t
$\alpha_{x,dry}$: dry creep factor at x years
ε_{t_0}	: initial flexural strain at zero stress
ε_{fb}	: flexural strain at first break
ε_{fM}	: flexural strain at maximum applied load
σ_0	: required flexural stress in creep test
σ_{fb}	: flexural stress at first break
σ_{fM}	: flexural stress at maximum applied load
σ_l	: ultimate longitudinal tensile stress

3.2.2 Abbreviations

CIPP	: Cured-in-place pipe
EP	: Epoxy
GRP	: Glass-reinforced thermosetting plastics
PA	: Polyamide
PAN	: Polyacrylonitrile
PE	: Polyethylene
PET	: Polyethylene terephthalate
PP	: Polypropylene
PUR	: Polyurethane
PVC-U	: Unplasticized poly(vinyl chloride)
UP	: Unsaturated polyester
VE	: Vinyl ester

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4 Pipes at the "M" stage

NOTE This clause specifies requirements for the lining tube (i.e. all components before resin cure). Requirements for the cured composite are specified in clause 7.

4.1 Materials

Lining tubes shall comprise at least the following components:

- resin system;
- carrier material;