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Survey of European Standards for rehabilitation of drain and sewer systems

ICS 93.030

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National foreword

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English version

Survey of European Standards for rehabilitation of drain and sewer systems

Aperçu des Normes européennes pour la réhabilitation des réseaux d'évacuation et d'assainissement

Übersicht über Europäische Normen für die Sanierung von Entwässerungssystemen

This Technical Report was approved by CEN on 24 April 2005. It has been drawn up by the Technical Committee CEN/TC 165.

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Foreword

This document (CEN/TR 15128:2005) has been prepared by Technical Committee CEN/TC 165 “Wastewater engineering”, the secretariat of which is held by DIN.

CEN/TC 165 having determined the current status of European standardization regarding general requirements for drain and sewer systems and existing standards and draft standards on the subject of rehabilitation of drain and sewer systems, and CEN/TC 165 having considered the results of an enquiry submitted by EUREAU on the status of European Standards in the field of rehabilitation of drain and sewer systems, it was established that those were not sufficiently known.

It was agreed that information of the status of European standard work in this area was greatly needed.

Therefore, CEN/TC 165 decided to make this information in summary form available with the aid of an informative CEN document in the form of a CEN/TR and, if necessary, to give the necessary explanations.

Standards produced by the following Technical Committees are included in this document:

CEN/TC 155 "Plastics piping systems and ducting systems";

CEN/TC 164 "Water supply";

CEN/TC 165 "Wastewater engineering".

Because European manufacturers have disbanded the production of fibre cement pipes and fittings for drain and sewer systems, European Standards in that field are not included in this document.

1 Scope

This document gives a survey of European Standards available in the field of rehabilitation of drain and sewer systems.

2 Normative references

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

NOTE Since Clause 5 refers to European Standards with their complete title they are not repeated here.

EN 476, *General requirements for components used in discharge pipes, drains and sewers for gravity systems*

EN 773, *General requirements for components used in hydraulically pressurized discharge pipes, drains and sewers*

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

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

prEN 14801, *Conditions for pressure classification of products for water and waste water pipelines*

3 Terms and definitions

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

3.1
rehabilitation
all measures for restoring or upgrading the performance of existing drain and sewer systems
[EN 752-1:1995]

3.2
renovation
work incorporating all or part of the original fabric of the drain or sewer by means of which its current performance is improved
[EN 752-5:1995]

3.3
repair
rectification of local damage
[EN 752-5:1995]

3.4
replacement
construction of a new drain or sewer, on or off the line of an existing drain or sewer

3.5
"M" stage
stage as manufactured, before any subsequent site processing of components associated with a particular repair or renovation technique
[EN 13380:2001]

3.6
"I" stage
stage as installed, i.e. in final configuration after any site processing of components associated with a particular renovation or repair technique
[EN 13380:2001]

4 Rehabilitation techniques applicable to drain and sewer systems

Figure 1 shows the structure of this document and shows where an EN or ENs are available.

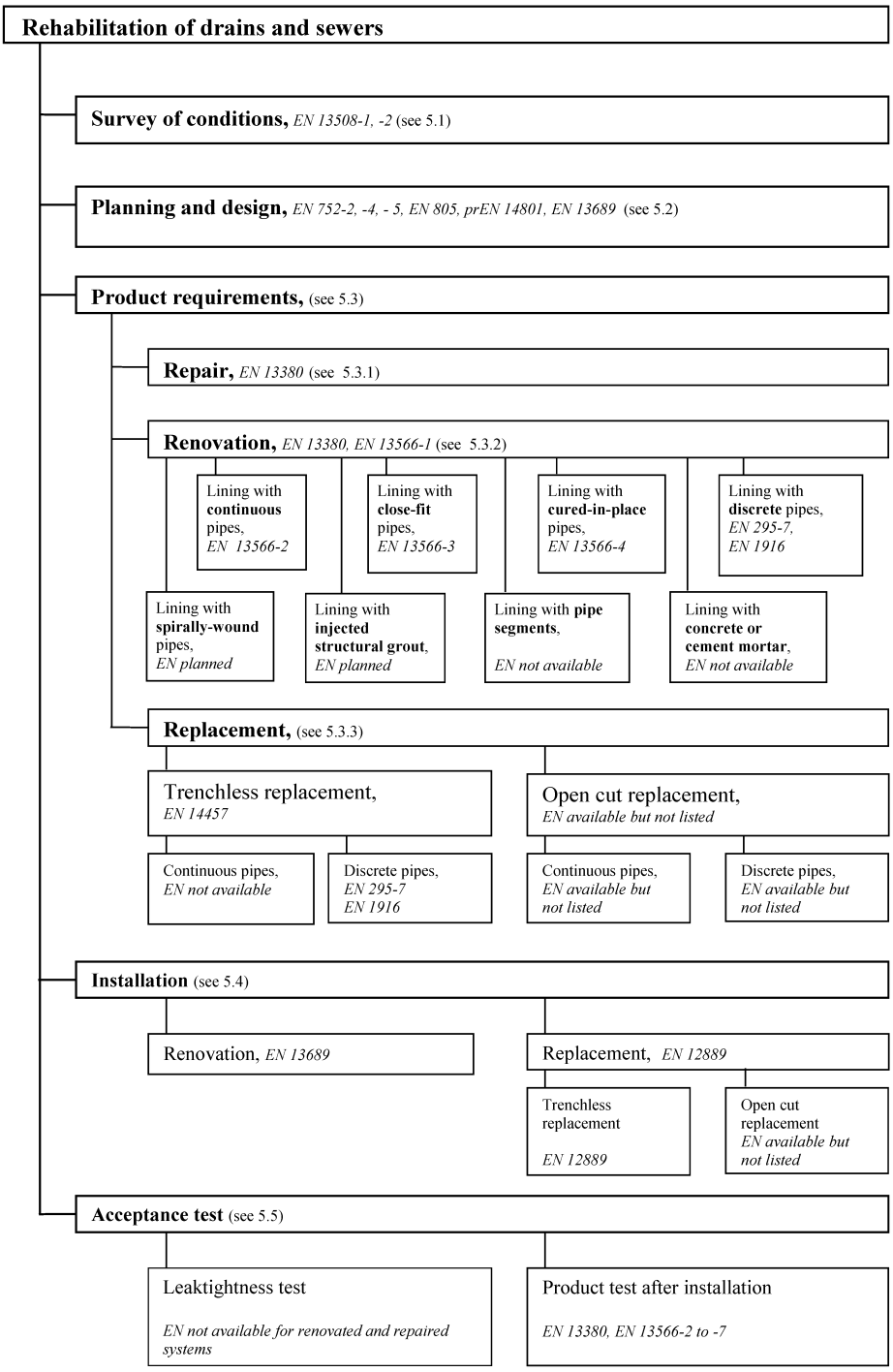

Figure 1 — Rehabilitation techniques applicable to drain and sewer systems

5 European Standards for rehabilitation of drain and sewer systems

5.1 Survey of condition

EN 13508-1:2003, *Condition of drain and sewer systems outside buildings — Part 1: General requirements*.

Summary: Establishment of the condition of existing drain and sewer systems and its elements outside buildings, Performance requirements and performance deficiencies are listed.

EN 13508-2:2003, *Conditions of drain and sewer systems outside buildings — Part 2: Visual inspection coding system.*

Summary: Specification of a system of codes which shall be used to describe the defects and features found in drains, sewers, manholes and inspection chambers identified by visual inspection. Where appropriate, EN 13508-2 can also be used for pressure and vacuum systems in accordance with the requirements of the employing authority.

5.2 Principles for planning and design

EN 752-2:1996, *Drain and sewer systems outside buildings — Part 2: Performance requirements.*

Summary: Specification of requirements to be considered when planning, designing, constructing, operating and maintaining drain and sewer systems operated mainly under gravity. These are basic performance requirements to which the sewer system shall operate; performance testing and performance assessment and documentation are included.

EN 752-4:1997, *Drain and sewer systems outside buildings — Part 4: Hydraulic design and environmental considerations.*

Summary: Sets out the principles which shall be followed for both the hydraulic design and consideration of environmental impact of drain and sewer systems that operate essentially under gravity.

EN 752-5:1997, *Drain and sewer systems outside buildings — Part 5: Rehabilitation.*

Summary: Sets out the principles and procedures for planning and design of rehabilitation works necessary to achieve prescribed levels of performance for existing drain and sewer systems, where investigations may lead to structural solutions such as replacement, renovation or repair. Regarding performance requirements of the rehabilitated system, part 5 indicates that they are similar to those for a new system (see EN 752-2 and EN 752-4).

EN 805:2000, *Water supply — Requirements for systems and components outside buildings*.

Summary: Specification of general requirements for water supply systems outside buildings including potable water mains and service pipes, service reservoirs, other facilities and raw water mains but excluding treatment works and water resources development. For significant modification and/or rehabilitation of existing water supply systems EN 805 specifies that for works of repair, renovation or replacement, the relevant requirements of the standard shall be followed. In case of repair or renovation, the design life extension may be less than 50 years. Allowable pressures (PFA, PMA and PEA) are defined. To ensure that pressure classification in ENs for products (used for water supply and pressurised wastewater systems) will be related to the allowable pressures as defined in EN 805, prEN 14801 shall be considered.

prEN 14801:2003, *Conditions for pressure classification of products for water and waste water pipelines.*

Summary: Specifies the installation and loading parameters to be used for the determination of the allowable pressures (PFA, PMA and PEA) as defined in EN 805, to components (pipes, joints, fittings, ferrules and valves), which have pressure related classification in European

Standards and which are intended to be used for buried water supply and waste water pressure pipelines outside buildings.

EN 13689:2002, *Guidance on the classification and design of plastics piping systems used for renovation.*

Summary: Guidance for defining families of techniques for renovation of non-pressure and pressure pipelines (for water, wastewater and gas) by use of plastics pipes, fittings and ancillary components. It provides guidance on the principles of, but not detailed methodologies for, the design of plastics piping systems applied as linings to existing pipelines, covering: liner functions; existing pipeline and site conditions; technique related aspects; structural aspects; hydraulic aspects.

5.3 Product requirements

5.3.1 Product requirements for repair

EN 13380:2001, *General requirements for components used for renovation and repair of drain and sewer systems outside buildings.*

Summary: Specification of general requirements test methods for components such as pipes and fittings with their respective joints, manholes, inspection chambers and materials such as mortar and chemicals all intended to be used for repair and renovation of drain and sewer systems which operate as gravity systems where any pressure likely to occur is a maximum of 40 kPa and which are generally buried.

5.3.2 Product requirements for renovation

Table 1 — Product /Technique requirements for renovation and available European Standards

Product/Technique requirements	EN available
General (plastics)	EN 13566-1
Lining with continuous pipes	prEN 13566-2
Lining with close-fit pipes	EN 13566-3
Lining with cured-in-place pipes	EN 13566-4
Lining with discrete pipes made from plastics	[a]
Lining with discrete pipes made from vitrified clay	EN 295-7
Lining with discrete pipes made from concrete	EN 1916
Lining with spirally-wound pipes	[b]
Lining with pipe segments	[c]
Lining with injected structural grout	[d]
Lining/coating with sprayed concrete or cement mortar	[c]

[a] EN-Project not yet activated in CEN/TC 155

[b] prEN 13566-7 issued for CEN enquiry in CEN/TC 155

[c] EN not available

[d] Planned EN-Project of CEN/TC 165

EN 295-7:1995, *Vitrified clay pipes and fittings and pipe joints for drains and sewers — Part 7: Requirements for vitrified clay pipes and joints for pipe jacking.*

Summary: Specification of requirements and test methods for flexibly jointed vitrified clay pipes for pipe-jacking techniques including micro-tunnelling, pipe- eating, pipe bursting and where appropriate for slip-lining (i.e. lining with discrete pipes).

EN 1916:2002, *Concrete pipes and fittings, unreinforced, steel fibre and reinforced.*

Summary: Specifies mandated performance requirements and describes test methods for precast concrete pipes and fittings, with flexible joints (with seals either integrated in the units or supplied separately) for which the main intended use is the conveyance of sewage, rainwater and surface water under gravity or occasionally at low head of pressure, in pipelines that are generally buried. A separate clause deals with jacking pipes which may be used for lining with discrete pipes.

EN 13380:2001, *General requirements for components used for renovation and repair of drain and sewer systems outside buildings.*

Summary: see 5.3.1

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

Summary: Deals with the general requirements for plastics piping systems used for renovation of underground non-pressure drainage and sewerage networks common to all relevant renovation techniques such as lining with continuous pipes, lining with close-fit pipes, lining with cured-in-place pipes, lining with discrete pipes, lining with spirally-wound pipes. It applies to pipes and fittings as manufactured as well as to the installed plastics lining system; it does not cover the requirements of the existing pipeline or any annular filler.

prEN 13566-2:2004, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 2: Lining with continuous pipes.*

Summary: Specifies requirements and test methods for homogeneous-wall pipes and fittings as well as for structured wall pipes and fittings made of PE or PP which are part of plastics piping systems installed as continuous pipes in the renovation of non-pressure drainage and sewerage networks. It does not cover the requirements for the existing pipeline. The document specifies requirements for materials, geometrical, mechanical and physical characteristics and their test methods for pipes, fittings and the system at the “M” stage (as Manufactured) and at the “I” stage (as Installed).

EN 13566-3:2002, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 3: Lining with close-fit pipes.*

Summary: Specifies requirements and test methods for pipes and fittings which are part of plastics piping systems installed as close-fit pipes in the renovation of non-pressure drainage and sewerage networks. It covers components 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. The document specifies requirements for materials, geometrical, mechanical and physical characteristics and their test methods for pipes, fittings and the system at the “M” stage (as Manufactured) and for the “I” stage (as Installed).

EN 13566-4:2002, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 4: Lining with cured-in-place pipes.*

Summary: 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. It does not cover the requirements for the existing pipeline. The document specifies requirements for materials, geometrical,

mechanical and physical characteristics and their test methods for pipes, fittings and the system at the “M” stage (as Manufactured) and at the “I” stage (as Installed).

5.3.3 Product requirements for replacement

5.3.3.1 Product requirements for trenchless replacement

EN 14457:2004, *General requirements for components specifically designed for use in trenchless construction of drains and sewers.*

Summary: Specifies general requirements for pipes and their joints intended for use in drain and sewer systems which are installed using trenchless construction methods "pipe jacking", "microtunnelling" and "pilot jacking" as defined in EN 12889 as gravity systems; shall be according to EN 476 where any pressure to occur is a maximum of 40 kPa or operated under pressure shall be according to EN 773 where pressure can be more than 40 kPa.

EN 295-7:1995, *Vitrified clay pipes and fittings and pipe joints for drains and sewers — Part 7: Requirements for vitrified clay pipes and joints for pipe jacking.*

Summary: see 5.3.2

EN 1916:2002, *Concrete pipes and fittings, unreinforced, steel fibre and reinforced.*

Summary: see 5.3.2.

5.3.3.2 Product requirements for open cut replacement

The rehabilitation of drain and sewer systems by open cut replacement requires reference to the product standards for new pipelines constructed in open trenches. These are not listed here.

5.4 Installation techniques

5.4.1 Techniques for repair

There is no EN available for repair techniques for drain and sewer systems.

5.4.2 Installation techniques for renovation

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

Summary: see 5.3.2. For installation EN 13566-1 specifies general requirements, safety precautions, simulated installation, process-related inspection, lining termination and reconnecting to existing manholes.

prEN 13566-2:2004, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 2: Lining with continuous pipes.*

Summary: see 5.3.2. For installation prEN 13566-2 specifies detailed instructions for the preparatory work, storage, handling and transport, installation equipment, installation practice, lining termination and reconnecting to existing manholes.

EN 13566-3:2002, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 3: Lining with close-fit pipes.*

Summary: see 5.3.2. For installation EN 13566-3 specifies detailed instructions for the preparatory work, storage, handling and transport, installation equipment, installation practice, process-related

inspection and testing, lining termination, reconnecting to existing manholes and documentation.

EN 13566-4:2002, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 4: Lining with cured-in-place pipes.*

Summary: see 5.3.2. For installation EN 13566-4 specifies detailed instructions for the preparatory work, storage, handling and transport, installation equipment, installation practice, process-related inspection and testing, lining termination, reconnecting to existing manholes and documentation.

EN 13689:2002, *Guidance on the classification and design of plastics piping systems used for renovation.*

Summary: This standard is a guidance document, defining families of techniques for renovation of non-pressure and pressure pipelines by use of plastics pipes, fittings and ancillary components. It provides guidance on the principles of, but not detailed methodologies for, the design of plastics piping systems applied as linings to existing pipelines, covering: - liner functions; - existing pipeline and site conditions; - technique related aspects; - structural aspects; - hydraulic aspects.

5.4.3 Installation techniques for replacement

5.4.3.1 Installation techniques for trenchless replacement

EN 12889:2000, *Trenchless construction and testing of drains and sewers*.

Summary: This European Standard is applicable to the trenchless construction and testing of new drains and new sewers in the ground, which are normally operating as gravity pipelines using prefabricated pipes and their joints. The trenchless construction and testing of drains and sewers operating under pressure is also covered by this European Standard together with EN 805 as appropriate.

Trenchless replacement techniques, such as pipe eating and pipe bursting, are covered by this document. Methods of trenchless construction include manned and unmanned techniques as well as steerable and non-steerable techniques.

Renovation techniques for existing sewers and drains are not covered by this European Standard.

5.4.3.2 Installation techniques for open cut replacement

The rehabilitation of drain and sewer systems by open cut replacement requires reference to the product standards and installation standards for new pipelines constructed in open trenches. These are not listed here.

5.5 Acceptance test

5.5.1 Leaktightness test

5.5.1.1 Leaktightness test for repaired systems

There is no EN available for leaktightness test for repaired systems. For pressure pipelines, EN 805 applies.

5.5.1.2 Leaktightness test for renovated systems

There is no EN available for leaktightness test for renovated systems. For pressure pipelines, EN 805 applies.

5.5.1.3 Leaktightness test for systems replaced by trenchless techiques

EN 12889:2000, *Trenchless construction and testing of drains and sewers.*

Summary: see 5.4.3.1. For leaktightness of gravity drain and sewer systems which are constructed by trenchless techniques including connections, manholes and inspection chambers tests are specified either using air (method "L") or water (method "W") as test medium. Pressure pipelines shall be tested as specified in EN 805.

5.5.1.4 Open cut replacement

The rehabilitation of drain and sewer systems by open cut replacement shall require reference to the leaktightness test specified EN 1610 for new pipelines constructed in open trenches, using either air (method "L") or water (method "W") as test medium. Pressure pipes shall be tested according to EN 805.

5.5.2 Product test after installation

These tests are required if the product characteristics will be changed during installation.

5.5.2.1 Product test after repair of the system

EN 13380:2001, *General requirements for components used for renovation and repair of drain and sewer systems outside buildings.*

Summary: see 5.3.1. This EN specifies product tests at the “M” stage (factory-made) and “I” stage (manufactured on site).

5.5.2.2 Product test after renovation of the system

EN 13380:2001, *General requirements for components used for renovation and repair of drain and sewer systems outside buildings.*

Summary: see 5.5.2.1

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

Summary: see 5.3.2. For the acceptance test the document specifies that the installed lining system shall be subject to a recorded internal visual examination, either by walk-through or closed-circuit television, throughout its length on completion.

prEN 13566-2:2002, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 2: Lining with continuous pipes.*

Summary: see 5.3.2. The fitness for purpose of these products shall be tested for the characteristics according to the test methods specified in the document for the “M” stage and for the “I” stage.

EN 13566-3:2002, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 3: Lining with close-fit pipes.*

Summary: see 5.3.2. The fitness for purpose of these products shall be tested for the characteristics according to the test methods specified in the document for the “M” stage and for the “I” stage.

EN 13566-4:2002, *Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks — Part 4: Lining with cured-in-place pipes.*

Summary: see 5.3.2. The fitness for purpose of these products shall be tested for the characteristics according to the test methods specified in the document for the “M” stage and for the “I” stage.

5.5.2.3 Product test for systems replaced by trenchless techiques

There is no EN for product test for systems replaced by trenchless techiques.

5.5.2.4 Product test for systems replaced by open trench techniques

The rehabilitation of drain and sewer systems by open cut replacement requires reference to the leaktightness test specified in product standards and installation standards for new pipelines constructed in open trenches. These are not listed here.

Bibliography

[1] EN 752-1:1995, *Drain and sewer systems outside buildings — Part 1: Generalities and definitions*

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