SLOVENSKI STANDARD
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Sistemi za odvod odpadne vode in kanalizacijo zunaj stavb - Upravljanje in nadzor aktivnosti - 2. del: Sanacija

Drain and sewer systems outside buildings - Management and control of activities - Part 2: Rehabilitation

Entwässerungssysteme außerhalb von Gebäuden - Management und Überwachung von Maßnahmen - Teil 2: Sanierung

Réseaux d'évacuation et d'assainissement à l'extérieur des bâtiments - Gestion et contrôle des activités opérationnelles - Partie 2: Réhabilitation

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ICS:

93.030	Zunanji sistemi za odpadno vodo	External sewage systems

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Drain and sewer systems outside buildings - Management and control of activities - Part 2: Rehabilitation

Réseaux d'évacuation et d'assainissement à l'extérieur des bâtiments - Gestion et contrôle des activités opérationnelles - Partie 2: Réhabilitation

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This European Standard was approved by CEN on 6 December 2020.

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

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European foreword

This document (EN 14654-2:2021) has been prepared by Technical Committee CEN/TC 165 “Wastewater Engineering”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by July 2021, and conflicting national standards shall be withdrawn at the latest by July 2021.

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

This document supersedes EN 14654-2:2013.

The changes to the text in this document are largely editorial and relate to the separation of the duplicated text. Annex A has also been deleted as this is now incorporated into EN 752:2017. The technical changes made is the addition of 7.5.5 on detailed design of the optimal solution.

EN 14654 consists of the following parts, under the general title *Drain and sewer systems outside buildings — Management and control of activities*:

— *Part 1: General*

— *Part 2: Rehabilitation*; (the present document)

— *Part 3: Drain and sewer cleaning*

— *Part 4: Control of inputs from users*

Other parts, dealing with other activities, may be added later.

In drafting this part of EN 14654, account has been taken of other available standards, in particular EN 752, *Drain and sewer systems outside buildings* and EN 13508 *Investigation and assessment of drain and sewer systems outside buildings*.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document establishes requirements for the management and control of activities in drain and sewer systems outside buildings and specifies requirements for development and implementation of work programmes, and the selection of techniques.

This document covers the management and control of rehabilitation activities.

It is applicable to drain and sewer systems from the point where wastewater leaves a building, roof drainage system, or paved area, to the point where it is discharged into a wastewater treatment plant or receiving water body.

Drains and sewers below buildings are included provided that they do not form part of the drainage system of the building.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 752:2017, *Drain and sewer systems outside buildings — Sewer system management*

EN 13508-1:2012, *Investigation and assessment of drain and sewer systems outside buildings — Part: 1: General Requirements*

EN 14654-1:2021, *Drain and sewer systems outside buildings - Management and control of activities — Part 1: General*

EN 16323:2014, *Glossary of wastewater engineering terms*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16323:2014, EN 14654-1: 2021 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia available at http://www.electropedia.org/

NOTE: Certain key definitions from EN 16323:2014 have been repeated below for clarity. The following additional terms used in this document are defined in EN 16323:2014.

— drain

— sewer

— receiving water body

— surface receiving water body

— sewer system

— wastewater treatment plant

3.1
extraneous water
unwanted flow in a drain or sewer system

[SOURCE: EN 16323:2014, definition 2.1.4.7]

3.2
inspection chamber
chamber with a removable cover constructed on a drain or sewer that permits the introduction of cleaning and inspection equipment from surface level, but does not provide access for personnel

[SOURCE: EN 16323:2014, definition 2.2.4.13]

3.3
maintenance
routine work undertaken to ensure the continuing performance of an asset

[SOURCE: EN 16323:2014, definition 2.1.6.2]

3.4
manhole
chamber with a removable cover constructed on a drain or sewer to permit entry by personnel

[SOURCE: EN 16323:2014, definition 2.2.4.15]

3.5
pipeline section
continuous section of drain or sewer between two adjacent nodes

[SOURCE: EN 16323:2014, definition 2.2.3.7]

3.6
rehabilitation
measures for restoring or upgrading the performance of existing systems, including renovation, repair and replacement

[SOURCE: EN 16323:2014, definition 2.1.6.3]

3.7
renovation
work incorporating all or part of the original fabric of the drain or sewer by means of which its current performance is improved

[SOURCE: EN 16323:2014, definition 2.1.6.4]

3.8
repair
rectification of local damage

[SOURCE: EN 16323:2014, definition 2.1.6.5]

3.9
replacement
construction of a new drain or sewer, on or off the line of an existing drain or sewer, the function of the new drain or sewer incorporating that of the old

[SOURCE: EN 16323:2014, definition 2.2.1.7]

3.10
wastewater
water composed of any combination of water discharged from domestic, industrial or commercial premises, surface run-off and accidentally any sewer infiltration water

[SOURCE: EN 16323:2014, definition 2.3.10.65]

4 General

Rehabilitation includes a wide range of activities to restore or upgrade the performance of a drain or sewer system including those examples shown in Table 1.

Table 1 — Scope of rehabilitation

Objective	Examples of system related measures	Examples of component related measures
Restore original performance	— Remove extraneous water — …	— Cleaning — Repair — Renovation — Replacement (like for like).
Upgrade original performance	— Maximize use of existing flow capacity — Reduce hydraulic input to the drain or sewer system — Attenuate peak flows — …	— Replacement (increased capacity).

This document applies the process described in EN 14654-1 for implementing rehabilitation activities in the integrated drain and sewer system management plan. This document shall be used in conjunction with EN 14654-1.

5 Integrated sewer system management planning

Rehabilitation activities are included in the rehabilitation plan, as part of an Integrated Sewer System Management Plan. A rehabilitation plan (see EN 752:2017, 6.4.4.4) should be in place for the drain and sewer system prior to carrying out any rehabilitation activities. However, this is not always possible if works are required urgently (e.g. in response to a drain or sewer failure).

6 Preparation of rehabilitation programme

6.1 Introduction

The rehabilitation programme defines a series of projects, in line with the rehabilitation plan, to ensure that the drain and sewer system meets the performance requirements. The rehabilitation programme should define the objectives for each project in sufficient detail so that a project specification can then be produced in accordance with Clause 7.

6.2 Review of the rehabilitation plan

A review should be undertaken of the rehabilitation plan within the integrated sewer system management plan.

6.3 Investigation

The scope of the investigations necessary to produce the rehabilitation programme will depend on the extent of the investigations carried out during the preparation of the integrated sewer system management plan.

Investigations shall be carried out where further information is required in order to produce the rehabilitation programme. Examples can include:

a) further inspection in parts of the system where the original assessment was based only on sample inspections;

b) production of more detailed sewer flow simulation models, where the original assessment was based on a simplified model;

c) more detailed studies of the impact of any discharges on receiving water bodies.

The types of investigation can include:

1) investigations of the existing drain and sewer system (e.g. visual inspections, radar, sonar, flow measurements, sewer flow simulation modelling, wastewater quality simulation modelling);

2) more detailed investigations of the impact of proposed new developments in the area (e.g. hydraulic modelling etc.);

3) other investigations to determine feasibility of options (e.g. preliminary topographical, geotechnical and other investigations (see EN 752:2017, 8.3.1).

Details of investigation techniques for existing drains and sewers are described in EN 13508-1.

6.4 Assessment

The assessment should identify the location of those components of the drains and sewer system where proactive or reactive rehabilitation are to be carried out. This shall be based on:

a) a knowledge of the characteristics and structural condition of the drain and sewer system;

b) an understanding of existing and past failures and their association with performance deficiencies including their impact on operations and maintenance of parts of the drain and sewer system concerned;

c) an analysis of the performance of the drain and sewer system;

d) a review of the available information including the evolution of failures and performance deficiencies over time.

The individual pipeline sections and other components shall be described with the existing information, in order to optimize the rehabilitation programme.

It is advisable to carry out an analysis of the information to be able to determine:

e) the extent and the nature of the structural defects, leak tightness, hydraulic deficiencies and mechanical damage and chemical attack (corrosion and abrasion);

f) causes of these failures and performance deficiencies;

g) environmental impacts of the defect.

6.5 Development of the programme

6.5.1 Introduction

The rehabilitation programme defines the activities that will be undertaken to meet the rehabilitation objectives in the form of a series of rehabilitation projects. It defines the scope and objectives of each rehabilitation project, the phasing of the projects and the relationship to any external constraints such as budgets, new developments, and interactions with other utility or development programmes (e.g. highway works).

The objectives of rehabilitation activities should be expressed through the following performance requirements:

— hydraulic performance;

— structural performance;

— environmental performance;

— operational performance.

6.5.2 Developing options

This should include issues relating to new development and solutions involving major upgrading work and maintenance, as well as changes to operational practices. Within this framework a number of feasible options should be developed.

Where appropriate the options should include solutions that address a number of problems. Examples include:

— replacement of a pipe to resolve a structural problem could also be used to resolve a hydraulic problem on a neighbouring area by diverting flow from a neighbouring area into the new pipe;

— reduction of flows could be used both to reduce flooding and to reduce discharges from combined sewer overflows.

The assessment of each performance deficiency identified in the rehabilitation plan should be reviewed, taking account of the additional information collected in developing the programme (see 6.3 and 6.4). The options should specify the group and class of solution. Examples of solutions are given in Table 2.

Table 2 — Solution types, groups and classes for rehabilitation

Type	Group	Class
Hydraulic	Maximize use of existing flow capacity.	Removal of constrictions.
		Reducing hydraulic pipeline roughness (including head losses at structures, junctions, etc.).
		Cleaning.
	Source control – Reducing the hydraulic input to the drain or sewer system.	Diversion of surface water flows to infiltration drainage systems or pervious areas.
		Use of porous pavements.
		Diversion of flows to another system.
		Manage surface water on the surface.
		Reduction of infiltration and inflow of extraneous water.
	Attenuate peak flows.	Utilization of existing storage potential within the system (strategically placed flow controls).
		Utilization of surface storage (including storage within the property boundary).
		Provision of additional storage (tank sewer or detention tank).
	Increase drain or sewer system flow capacity.	Replacement with larger pipe.
		Construction of additional pipeline.
Environmental	Reduce pollutant inputs to system in accordance with EN 14654-4:2021.	Sediment basins and grit separators.
		Use of vegetation to absorb pollutants from runoff before entering the system.
		Controlling inputs (e.g. industrial wastewater inputs).
	Decrease planned pollutant discharges to receiving water bodies.	Increase of flows to treatment (see hydraulic solutions above).
		Treatment of surface water discharges (e.g. by separators, retention ponds, etc.).
		Improve solids retention and hydraulic performance of combined sewer overflows.
		Real time control.
	Decrease impact by relocation of points of discharge.	
	Reduce exfiltration by rehabilitation measures.	Repair techniques (e.g. sealing leaks).
		Renovation techniques (e.g. provision of watertight lining).
		Replacement of pipeline using open-cut or trench-less techniques.