

Drain and sewer systems outside buildings

Part 5. Rehabilitation

The European Standard EN 752-5 : 1997 has the status of a
British Standard

ICS 13.060.30; 91.140.80

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



National foreword

This British Standard is the English language version of EN 752-5 : 1997 published by the European Committee for Standardization (CEN).

The UK participation in its preparation was entrusted by Technical Committee B/505, Wastewater Engineering, to Subcommittee B/505/22, Drain and sewer systems outside buildings, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled 'International Standards Correspondence Index', or by using the 'Find' facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, page 2 to 26, an inside back cover and a back cover.

This British Standard, having been prepared under the direction of the Sector Board for Building and Civil Engineering, was published under the authority of the Standards Board and comes into effect on 15 March 1998

© BSI 1998

ISBN 0 580 29143 X

Amendments issued since publication

Amd. No.	Date	Text affected

ICS 13.060.30

Descriptors: Sanitation, water removal, water pipelines, buildings, exterior, structural design, maintenance design, capacitation, organizations

English version

Drain and sewer systems outside buildings — Part 5: Rehabilitation

Réseaux d'évacuation et d'assainissement à
l'extérieur des bâtiments —
Partie 5: Réhabilitation

Entwässerungssysteme außerhalb von Gebäuden —
Teil 5: Sanierung

This European Standard was approved by CEN on 1997-08-23. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

© 1997 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 752-5 : 1997 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 165, Waste water engineering, the secretariat of which is held by DIN.

This part is the fifth in a series relating to the functional requirements of drain and sewer systems outside buildings that operate essentially under gravity. There will be seven parts, as follows: Drain and sewer systems outside buildings –

Part 1 *Generalities and definitions*

Part 2 *Performance requirements*

Part 3 *Planning*

Part 4 *Hydraulic design and environmental considerations*

Part 5 *Rehabilitation*

Part 6 *Pumping installations*

Part 7 *Operations and maintenance*

In drafting this part of this European Standard account has been taken of other available draft standards, in particular EN 476 *General requirements for components used in discharge pipes, drains and sewers for gravity systems*.

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 March 1998, and conflicting national standards shall be withdrawn at the latest by March 1998.

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

Contents

	Page
Foreword	2
1 Scope	3
2 Normative references	3
3 Definitions	3
4 Sources of additional information	3
5 General	3
6 Initial planning	5
7 Diagnostic study	5
8 Developing integrated solutions	7
9 Rehabilitation plan	9
10 Safety	9
Annexes	
A (informative) Sources of additional information	10
B (informative) Bibliography	26

1 Scope

This European Standard is applicable to drain and sewer systems, which operate essentially under gravity, from the point where the sewage leaves a building or roof drainage system, or enters a road gully, to the point where it is discharged into a treatment works or receiving water.

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

This part 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.

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.

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

3 Definitions

For the purposes of this standard, the following definitions, together with those given in EN 752-1 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.

3.3 repair

Rectification of local damage.

3.4 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.

3.5 structural condition

State of a drain or sewer in matters relating to the integrity of its fabric.

3.6 tank sewer

Oversized sewer which acts as a detention tank.

4 Sources of additional information

This standard sets out the essential requirements for good practice in various engineering activities relating to the planning, design and operation of drain and sewer systems. For supplementary detail and guidance reference should be made to national documents until such time as fully comprehensive European Standards are available.

The documents listed in annex A contain details which may be used in the framework of this part, given approval by the relevant authority.

5 General

This part sets out rules for analysis to achieve satisfactory structural and operational condition and the environmental performance of existing systems (see clause 6 of EN 752-2 : 1996). Damaged, defective or hydraulically overloaded drains and sewers represent a potential hazard through flooding and collapses, and through pollution of groundwater, soil and watercourses.

The problems found in existing drain and sewer systems are frequently interrelated and upgrading works will often be designed to overcome a number of problems at the same time. The investigation and planning of upgrading work should be carried out on complete catchment areas so that all problems and their causes can be considered together. In large sewer systems it may be necessary to start by investigating appropriate parts of the system.

The procedures described in this Standard may be applied in any drain and sewer system, but detailed application may have to take account of the age, location and type of system, the materials used in its construction, together with functional and climatic factors.

Typical procedures are shown in figure 1. The following sections outline these procedures in more detail.

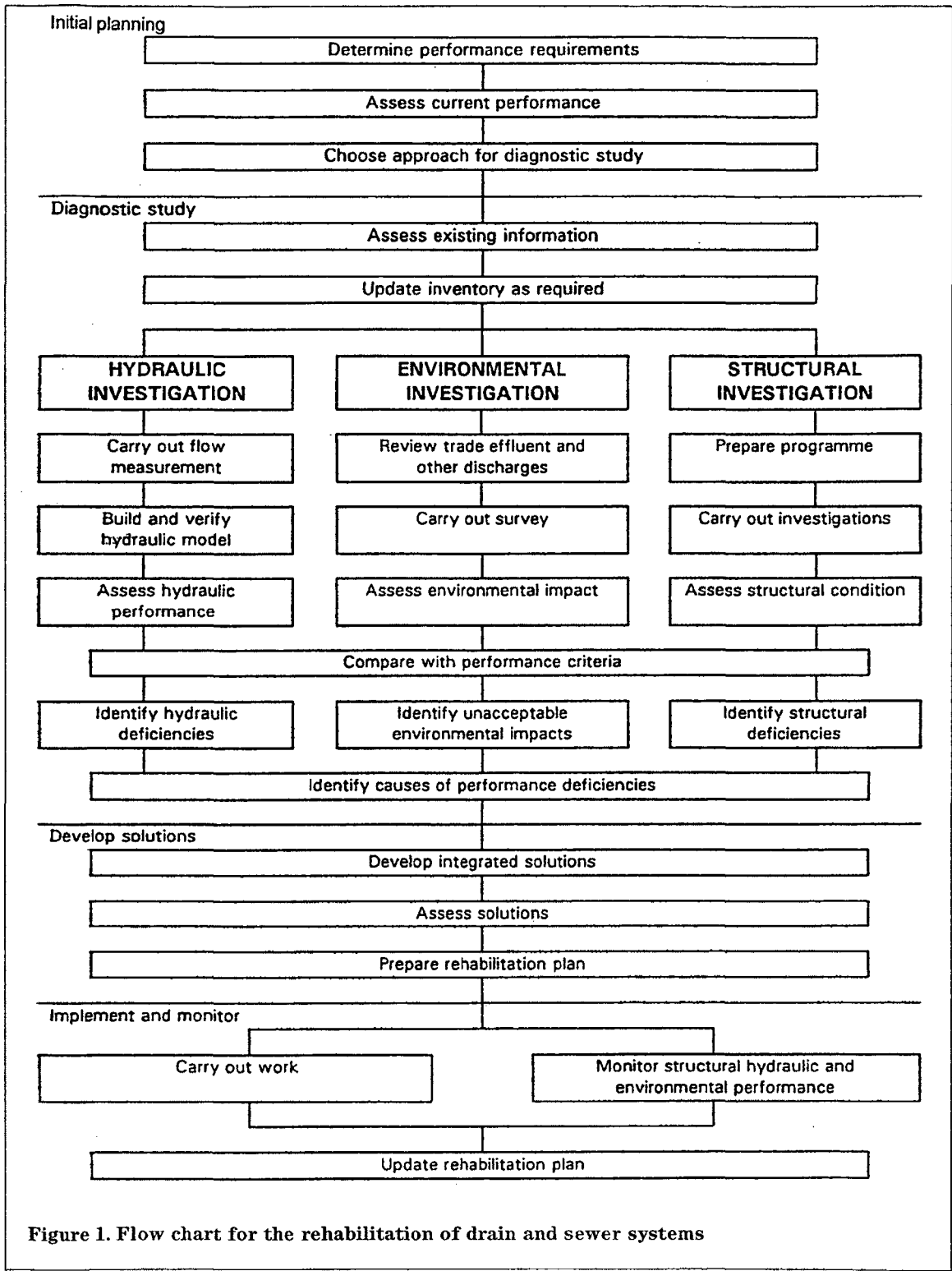


Figure 1. Flow chart for the rehabilitation of drain and sewer systems

6 Initial planning

6.1 Determination of performance requirements

The performance requirements for a rehabilitated system are similar to those for a new system (see EN 752-2 and EN 752-4), but special attention shall be given to the following:

- hydraulic capacity;
- operations and maintenance;
- selection of materials;
- access and installation constraints;
- treatment of branch connections;
- preservation of assets

In each of these areas there may be legal requirements, public expectations and financial constraints which will influence relative priorities.

Performance requirements may be set for:

- hydraulic performance;
- environmental impact;
- structural integrity.

For each aspect of performance different levels could be required for example:

- trigger levels which justify early upgrading action according to priority;
- target levels to aim for in upgrading, which shall be equal to the requirements for new construction, but which sometimes can only be achievable or necessary in the longer term.

Examples of performance requirements in use in different countries are included in documents listed in annex A.

6.2 Assessment of current performance

Performance problems on existing systems should be known through reports of incidents such as sewer collapses, flooding or polluted watercourses. Records of past incidents and any other relevant information should be brought together and a detailed assessment should be carried out to compare the current performance with the performance requirements (see 6.1).

6.3 Choice of approach for diagnostic study

Following the assessment of the current performance of the system it will be possible to decide whether the extent of the problems justifies an investigation of the entire catchment area. Where an investigation is required, it will be necessary to decide how detailed the diagnostic study of each of the aspects (hydraulic, environmental and structural) should be.

6.4 Setting priorities against each study

Where large numbers of complete or partial catchments are in need of study and upgrading, the existing information collected may also be used to assign priorities to the perceived problems in each catchment. These can then be used to draw up a comprehensive programme for investigation so that the catchments with the most serious problems are upgraded first.

7 Diagnostic study

7.1 Historical information collection

The collection and assessment of all available relevant information about the sewer system shall be carried out and is the basis from which all other activities are subsequently planned. Examples are:

- location, materials and size of drains and sewers including outfalls (inventory);
- relevant permits and legal requirements;
- previous operational, structural and safety measures to overcome the problems;
- nature and quantities of trade effluent;
- past inspections (surveys);
- previous hydraulic calculations;
- previous assessments of environmental impact;
- existing drain and sewer condition data;
- receiving water quality and use;
- groundwater levels and velocities;
- ground conditions including the potential for use of soakaways;
- groundwater protection zones;
- previous test information.

This information should be assessed to determine what further information is required in order to carry out the diagnostic study.

7.2 Inventory update

The inventory shall be updated so that a sufficient record of the sewer system is available. This can include the following information:

- the location, dimensions, shape and type of material of all drains and sewers;
- the position depth and levels of manholes and the levels of connections to the manholes;
- the positions of connections to drains and sewers;
- the layout of ancillary structures such as combined sewer overflows and pumping installations, including details of any special plant (e.g. pumps or screens).

7.3 Hydraulic investigation

7.3.1 Hydraulic surveys

Testing and inspection procedures can be required in order to ensure an adequate evaluation of flows (dry weather and storm), infiltration, exfiltration and wrong connections. Surveys can include precipitation and flow measurements, identification of wrong connections and groundwater measurements.

7.3.2 Hydraulic modelling and verification

A sewer flow simulation model can be necessary in order to understand the hydraulics of the system.

However, a model may not be necessary:

- where there are no known hydraulic problems (particularly where the sewer system takes only wastewater flows);
- and where there are no combined sewer overflows;
- and where structural problems are to be solved using techniques which do not reduce the hydraulic capacity of the sewer.

Information on the use of computer based sewer flow simulation programs is given in clause 11 of prEN 752-4 : 1995.

Verification and/or calibration of the models is necessary. The procedures used depend on the program.

If suitable agreement is not obtained, the model input data should be checked and then the sewer records. Having identified possible causes of error it will often be necessary to confirm these by site inspection and then adjust the model accordingly. Data shall not be modified without justification based on an inspection of the system.

7.3.3 Assessment of the hydraulic performance

The results of the hydraulic surveys and/or the verified flow simulation model shall be used to assess the hydraulic performance of the system for a range of rainfall conditions related to the performance requirements (see clause 11 of EN 752-4 : 1997).

7.4 Environmental investigation

7.4.1 General

Where necessary surveys shall be carried out to provide any data not available from records.

7.4.2 Trade effluents

The location of trade effluent sources shall be identified and the nature, quality, quantity and the potential environmental hazards reviewed.

7.4.3 Watertightness

Investigations can be required to determine where there is leakage from drains and sewers, giving priority to drains or sewers which pass through aquifer protection zones or where they carry particularly hazardous substances (see clause 7 of EN 752-2 : 1996).

7.4.4 Receiving water quality

The quality of all receiving waters shall be determined to see whether it meets the requirements and if not, whether the sewer system is a significant factor.

7.4.5 Other environmental impacts

Consideration should be given to other environmental factors such as noise, odour and visual intrusion.

7.4.6 Assessment of environmental impact

The results of the investigations shall be considered together with estimates of the frequency, duration and volume of discharges to receiving waters, determined using a verified flow simulation model (see 7.3.2) where this is available. This information shall then be used to assess the environmental impact (including impact on soil and groundwater) of the sewer system (see clause 12 of EN 752-4 : 1997 and annex D of EN 752-4 : 1997).

The results of the structural investigation (see 7.5), the trade effluent survey and other relevant investigations shall be examined to identify:

- sources of hazardous effluents;
- exceedence of permissible concentrations and discharges;
- other deviations from permits.

7.5 Structural investigation

7.5.1 Prepare programme

It is important to ensure that investigation of the system is selective in order to avoid duplication of previous work. The structural investigations may include either a complete survey of the drain and sewer system or a more selective approach.

7.5.2 Carry out investigations

The recording and assessment of the actual condition of drain and sewer systems can be carried out directly by walking through or indirectly with the aid of a closed circuit television (CCTV) system. The drain and sewer system shall be cleaned as necessary to make it possible to record and assess the actual condition. During the survey the system shall be kept free from wastewater as far as necessary.

The condition of the system, and in particular the defects, shall be recorded as accurately and comprehensively as possible. A uniform coding system should be used to ensure that the results can be compared. Details of standardized coding systems in use in various countries can be found in the documents listed in annex A.

The defects listed shall include:

- unacceptable cracks;
- deformation;
- open, defective or displaced joints;
- defective connections;
- tree root intrusion, infiltration, sediment and debris;
- subsidence;
- fractures;
- defective manholes;
- chemical or physical attack.

Where appropriate, other qualitative and quantitative investigation techniques may be used. These include sonar (for submerged pipes) and radar or other geophysical techniques (e.g. for detecting voids behind the wall of the sewer pipe).

The results of the structural investigations can also be relevant to the assessments of the hydraulic performance and environmental impact.

7.5.3 Assess structural condition

Once the system has been inspected, the next stage is to examine the results to identify those areas requiring action. A number of methods have been developed to assist in this process. Details of these are given in the documents listed in annex A.

7.6 Identify causes of performance deficiencies

Based upon the results of the hydraulic, environmental and structural investigations, the causes of performance deficiencies shall be determined. The relative impact of each cause should be assessed in order to develop appropriate solutions and to set the priority for action.

8 Developing integrated solutions

8.1 Identify solutions

8.1.1 General

Solutions shall be developed to solve all significant performance deficiencies.

The options to be considered will fall into one or more of the three categories: hydraulic, environmental and structural.

8.1.2 Hydraulic solutions

Hydraulic options include:

- a) Maximize use of existing flow capacity by:
 - removal of constrictions;
 - cleansing.
- b) Reduce hydraulic input to the sewer system by:
 - diversion of surface water flows to soakaways or pervious areas;
 - use of porous pavements;
 - diversion of flows to another system;
 - construction of additional surface water sewers;
 - reduction of infiltration and inflow of extraneous water.
- c) Attenuate peak flows by:
 - mobilization of existing storage potential within the system (strategically placed flow controls);
 - mobilization of surface storage;
 - provision of additional storage (tank sewer or detention tank).
- d) Increase sewer system flow capacity by:
 - replacement with larger pipe;
 - construction of additional pipeline.

8.1.3 Environmental solutions

Environmental options include:

- a) Reduce pollutant inputs to system.
- b) Decrease planned pollutant discharges to receiving waters by:
 - increase of flows to treatment (see hydraulic solutions above);
 - improve solids retention and hydraulic performance of combined sewer overflows;
 - real time control.

c) Decrease impact by relocation of points of discharge.

d) Reduce exfiltration by measures such as:

- sealing leaks;
- provision of watertight lining;
- replacement of pipeline.

8.1.4 Structural solutions

Structural options include:

- a) Protect fabric of sewer by provision of appropriate linings or internal coatings.
- b) Rehabilitate fabric of sewer by:
 - repair;
 - renovation;
 - replacement.

The decision process necessary to select the appropriate structural solution is given in figure 2.

8.2 Assess solutions

Solutions shall be assessed and the optimal solution selected having regard to the basic performance requirements (see clause 6 of EN 752-2 : 1996) and factors such as:

a) Phasing of the works

The possibility of integrating the solution into a staged programme of works shall be considered. This shall take into account the priorities of the works and the benefits in terms of improved performance associated with each identified phase of the works, and the cost savings associated with deferral of the later stages.

b) Recycling of materials

The ability to recycle materials used in the upgrading works and any waste produced shall be considered.

c) Relationship to other infrastructure works

The benefits of phasing the works with other infrastructure works shall be considered.

d) Social disruption

The disruption to local residents and other members of the public due to traffic delays, dust, noise and other social factors shall be considered.

e) Future maintenance liabilities

The cost of future maintenance works and other operational costs of the upgraded system should be taken into account. The environmental impact of disposal of maintenance residues (see prEN 752-4 : 1995) shall also be considered.

f) Economic appraisal

The costs and benefits shall be considered to determine whether the additional benefits of one solution over another, for example increased asset life, are justified.

g) Total cost

The total cost of the solutions including temporary works, diversion of other utility services and all design and investigation costs shall be taken into account as well as the indirect costs (e.g. cost of social disruption)

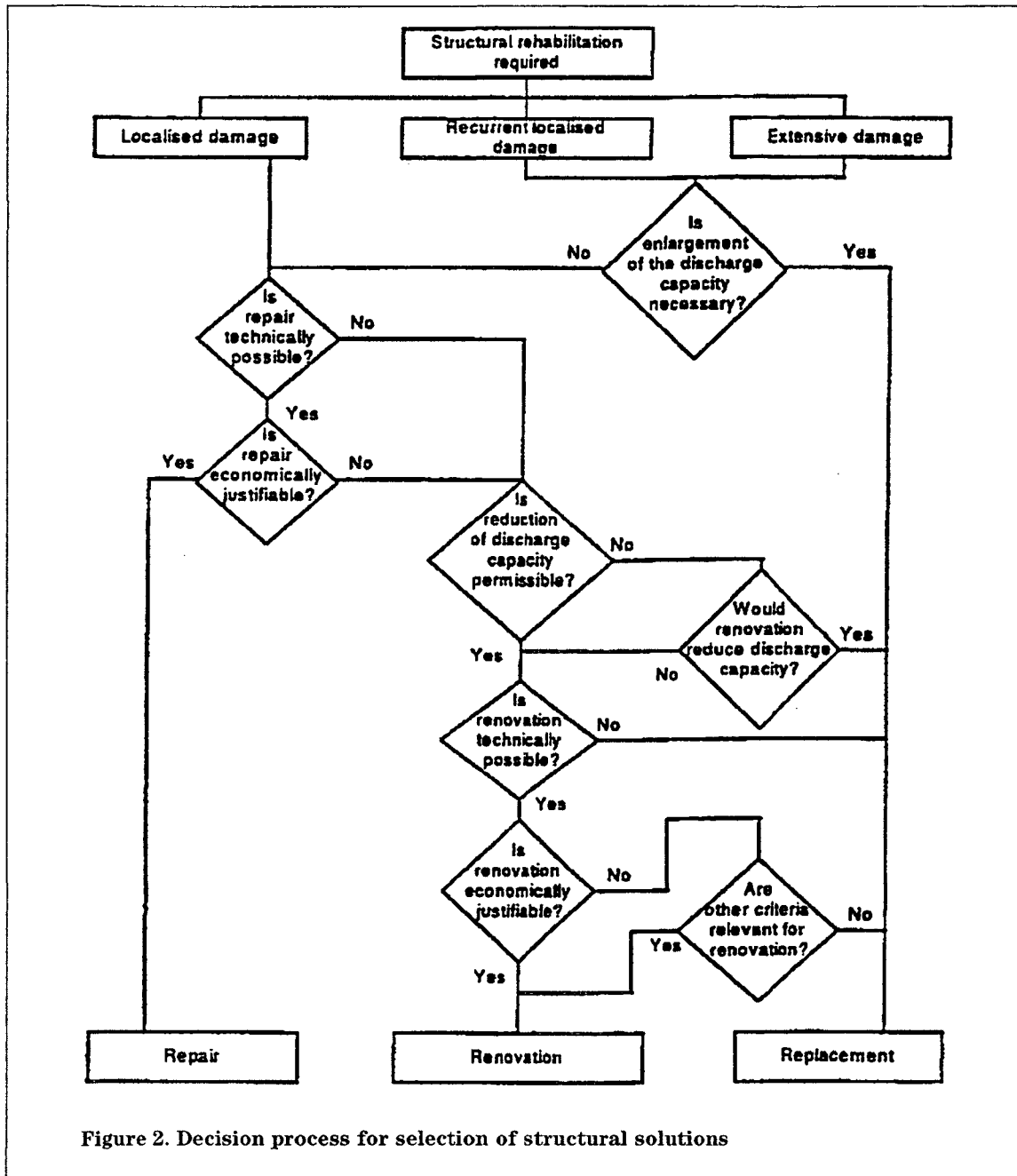


Figure 2. Decision process for selection of structural solutions

9 Rehabilitation plan

9.1 Document the plan

The selected rehabilitation solution shall be documented to give a single plan for the drain and sewer system. The documentation should include:

- detailed objectives;
- legal requirements and permits, including any timescales for improvement;
- performance criteria;
- priorities;
- proposed works including costs and phasing;
- relationship to other construction or planned development;
- consequences for operations and maintenance.

9.2 Monitoring

It is important to monitor the effectiveness of rehabilitation and to update the plan, including the records (inventory) and the hydraulic model.

10 Safety

Work in sewer systems is always potentially hazardous, during investigation and rehabilitation, as well as when carrying out maintenance.

It is not sufficient, however, to leave consideration of safety matters until the point of installation. Safety aspects shall be considered at all stages of the planning and design process (see clause 8 of EN 752-3 : 1996). Special care is also required when carrying out preliminary investigations as well as when planning installation and maintenance.

Annex A (informative) Sources of additional information

The titles of the documents are translated for information. Only those documents where the title is marked with an asterisk (*) are available in the language of the title.

A.1 Austria

A.1.1 Austrian Standards (ÖNORM)

No.	Title
B 2500	Abwassertechnik, Entstehung und Entsorgung von Abwasser, Begriffsbestimmungen und Zeichen.* Wastewater management: formation and disposal of wastewater; definitions and symbols.
B 2501	Entwässerungsanlagen für Gebäude und Grundstücke; Bestimmungen für Planung und Ausführung.* Sewer systems for buildings and premises; rules for planning and installation.
B 2503	Ortskanalanlagen (Straßenkanäle); Richtlinien der Ausführung.* Sewer systems; code of building practice.
B 2504	Schächte für Entwässerungsanlagen.* Manhole shafts for sewerage.
B 5012 Teil 1	Statische Berechnungen erdverlegter Rohrleitungen im Siedlungs- und Industrierwasserbau, Grundlagen.*
Part 1	Static calculation of buried pipelines for water supply and sewerage: principles.
Teil 2	Statische Berechnungen erdverlegter Rohrleitungen im Siedlungs- und Industrierwasserbau, Lastannahmen, rechnerische Nachweise.*
Part 2	Static calculation of buried pipelines as parts of water and sewerage conduits for housing and industry; assumptions of charge, calculating certificates.
B 5013 Teil 1	Oberflächenschutz mit organischen Schutzmaterialien im Siedlungswasserbau: Abschätzung der Korrosionswahrscheinlichkeit und Schutz von unlegierten und niederlegierten Eisenwerkstoffen.*
Part 1	Corrosion protection by organic coatings for water and wastewater engineering in residential areas, assessment of corrosion probability and protection of unalloyed and low-alloyed ferrous materials.
B 5013 Teil 2	Oberflächenschutz mit organischen Schutzmaterialien im Siedlungswasserbau: Abschätzung der Korrosionswahrscheinlichkeit und Schutz von zementgebundenen Werkstoffen.*
Part 2	Corrosion protection by organic coatings for water and wastewater engineering in residential areas, assessment of corrosion probability and protection of cement-bound materials.
B 5016	Überprüfung von Erdarbeiten für Rohrleitungen des Siedlungs- und Industrierwasserbaues; Verdichtungsgrade.*

Examination of earthworks for pipelines of water and sewage conduits for housing and industry - Degrees of compaction.

A.1.2 Austrian Water and Waste Management Association - Rules of Practice (ÖWAV - Österreichischer Wasser- und Abfallwirtschaftsverband - Regelblätter)

No.	Title
Regelblatt 5	Richtlinien für die hydraulische Berechnung von Abwasserkanälen. 1980*
Rule 5	Guidelines for the hydraulic calculation of sewerage pipelines. 1980
Regelblatt 11	Richtlinien für die abwassertechnische Berechnung von Schmutz-, Regen- und Mischwasserkanälen. 1982*
Rule 11	Guidelines for Technical calculation of foul water, stormwater and combined systems. 1982
Regelblatt 14 Teil A	Richtlinien zur Verhütung von Unfällen auf Kanalisations- und Abwasserreinigungsanlagen. Teil A - Bau und Einrichtung, 1983.*
Rule 14 Part A	Guidelines for the prevention of accidents in sewer systems and in sewage treatment plants. Part A - Construction and equipment, 1983.
Regelblatt 18 Teil B	Richtlinien zur Verhütung von Unfällen auf Kanalisations- und Abwasserreinigungsanlagen. Teil B - Betrieb, 1987.*
Rule 18 Part B	Guidelines for the prevention of accidents in sewer systems and in sewage treatment plants. Part B - Operation, 1987.
Regelblatt 19	Richtlinien für die Bemessung und Gestaltung von Regenentlastungen in Mischwasserkanälen. 1987*
Rule 19	Guidelines for the design of stormwater overflows in combined systems. 1987
Regelblatt 21	Kanalkataster. 1989*
Rule 21	Documentation of sewerage systems. 1989
Regelblatt 22	Kanalwartung und Kanalerneuerung. 1989*
Rule 22	Maintenance and renewal of sewerage systems. 1989

A.1.3 Other guidelines

No.	Title
ZL.57.030/3-V-6/84	Technische Richtlinien für die Errichtung, Erweiterung und Verbesserung von mit Mitteln des Wasserwirtschaftsfonds geförderten Wasserversorgungs- und Abwasserbeseitigungsanlagen (Technische Richtlinien des Wasserwirtschaftsfonds). Bundesministerium für Umwelt, Jugend und Familie.*

Technical guidelines for the construction, extension and improvement of water supply and wastewater systems financially supported by the

Water Management Fund (Technical Guidelines of the Water Management Fund). Federal Ministry for Environment, Youth and Family.

A.2 Belgium

No. Title

La Cahier des charges-type "Typebestek 200"
Ministère de la Région Flamande.

A.3 Denmark

A.3.1 Danish Standards Association (DS)

No. Title

DS 421 Norm for tætte fleksible samlinger i ledninger af beton mv.*
Code of practice for flexible watertight joints for pipelines of concrete, etc.

DS 430 Norm for lægning af fleksible ledninger af plast i jord.*
Code of practice for the laying of underground flexible pipelines of plastic.*

DS 437 Norm for lægning af stive ledninger af beton mv i jord.*
Code of practice for the laying of underground rigid pipelines of concrete, etc.*

DS 455 Norm for tæthed af afløbssystemer i jord.*
Code of practice for impenetrability of underground sewer systems.

DS 475 Norm for etablering af ledningsanlæg i jord.*
Code of practice for trenching for underground pipes and cables.*

A.3.2 The Danish Water Pollution Committee

No. Title

Skrift nr. 18
Guide 18 Maksimalafstrømninger og bassinvoluminer fra historiske regnserier.*
Urban storm water runoff and storage tanks calculated with series of historical rain events.

Skrift nr. 21
Guide 21 Recipientbelastning fra overløbssystemer.*
Calculation of combined Sewer overflow on receiving waters.

Skrift nr. 22
Guide 22 Forurening af vandløb fra overløbsbygværker.*
The impact of combined sewer overflows on small streams.

Skrift nr. 24
Guide 24 Standardiserede data for afløbssystemer.*
Standardised data for sewer systems.

ISBN 87-254-15-8 Huskelist for fornyelse af afløbssystemer*.
Check list for preparation of sewer rehabilitations plans.

A.3.3 The National Agency of Environmental Protection

No.	Title
SPVF nr. 6, 1990	Kvalitetsstyring af afløbsprojekter*. Quality control of sewer projects.
SPVF nr. 13,1990	Udarbejdelse af fornyelsesplaner for afløbssystemer*. Preparation of projects for renovation of sewer systems.
SPVF nr. 22	Renovering af afløbssystemer; Belastning af PEH-rør ved dynamisk rørsproening*. Renovation of sewer systems; HDPE pipes: Stress by dynamic pipe cracking.
SPVF nr. 33	Fornyelse af afløbssystemer; behov og økonomi*. Rehabilitation of sewer systems; needs and finance.
SPVF nr. 48	Uvedkommende vand i afløbssystemer*. Intruding water in sewer systems.
Projekt nr. 137 Project no. 137	Regulering af forurening fra afløbssystemer under regn*. Control of pollution from sewer systems during rain.

A.3.4 The Danish Technological Institute

No.	Title
ISBN 87-7511-974-9	Renovering af afløbsledninger, retningslinier for valg, dimensionering og udførelse*. Rehabilitation of sewer systems, guidelines for choice of method, design and installation.
ISBN 87-7756-112	Bedømmelse af afløbsledningers levetid*. Evaluation of life of sewer systems.
ISBN 87-7756-103-1	TV-inspektion af afløbsledninger: Særlige betingelser og beskrivelser for udførelse*. CCTV-Inspection of Sewer Systems: Special terms and specifications of operation
ISBN 87-7511-575-1	TV-inspektion af afløbsledninger: Standarddefinitioner og fotomanual*. CCTV-Inspection of Sewer Systems: Classification system and photo manual

A.3.5 Calculation Tools

No.	Title
SVK guide Nos. 18 & 21	MOUSE Modelling of Urban Sewer Systems.
	SOFFI Calculation of Hydrogen Sulphide in Pressure Systems - Dosage and Effect.
	DAS Database System for Sewer Systems.
	SAMBA Simple Model for Calculation of Overflow Quantities.
SVK Guide No. 22.	DOSMO Dissolved Oxygen Stream Model.

A.3.6 Danish Working Environment Service

No.	Title
	Arbejdsministeriets bekendtgørelse om arbejdets udførelse nr. 867 af 1994-10-13 § 13. Executive Order of the Ministry of Labour on the Performance of Work No. 867 of 13 October 1994, Section 13.
	Arbejdsministeriets bekendtgørelse nr. 1017 af 1993-12-15. Bekendtgørelse om indretning af byggepladser og lignende arbejdssteder efter lov om arbejdsmiljø. Kapitel 4. Executive Order of the Ministry of Labour No. 1017 of 15 December 1993 on the Organization of Construction Sites and Similar Workplaces cf. Chapter 4 of the Working Environment Act.

A.4 France

No.	Title
	Instruction technique relative aux réseaux d'assainissement des agglomérations (1977)*: Chapitre 1 Conception générale* Chapitre 2 Calcul des débits d'eaux pluviales* Chapitre 3 Calcul des débits d'eaux usées* Chapitre 4 Calcul des sections des ouvrages* Chapitre 5 Condition d'établissement des réseaux* Chapitre 6 Ouvrages annexes* Chapitre 7 Bassins de retenue d'eaux pluviales*
	Technical Directive for Urban Drain and Sewer Systems (1977): Chapter 1 General design data Chapter 2 Calculation of rainwater flow rates Chapter 3 Calculation of wastewater flow rates Chapter 4 Dimensioning of pipe diameters Chapter 5 Conditions for installation of systems Chapter 6 Ancillary works Chapter 7 Detention tanks for rainwater.

Cahier des clauses techniques générales applicables aux marchés publics de travaux (ouvrages d'assainissement); Fascicule 70*

Chapitre 1 Dispositions générales*
Chapitre 2 Nature et qualité des matériaux*
Chapitre 3 Règles de conception et de calcul des ouvrages*
Chapitre 4 Prestations préalables*
Chapitre 5 Exécution des travaux*
Chapitre 6 Conditions de réception.*

General technical requirements for public contracts dealing with installation of wastewater systems (Book No. 70)

Chapter 1 General requirements
Chapter 2 Type and quality requirements for materials
Chapter 3 Design requirements including structural design
Chapter 4 Preliminary work
Chapter 5 Installation
Chapter 6 Commissioning requirements

Recueil des recommandations techniques applicables aux travaux de réhabilitation des réseaux d'assainissement (AGHTM)*.
Technical specifications relating to sewerage systems rehabilitation work (AGHTM).

Manuel de recommandations techniques pour l'inspection télévisée des réseaux d'assainissement (AGHTM)*.
Technical specification for CCTV inspection of sewerage systems (AGHTM).

Guide international pour l'auscultation et la réhabilitation des conduites (FSTT - NANCIE 1992)*.
International Guide for Auscultation and Rehabilitation of Pipelines (FSTT - NANCIE 1992).

Réhabilitation des réseaux d'assainissement (édité en 93 par RESEAU)*.
Rehabilitation of sewerage systems (edited in 1993 by RESEAU)

Réception diagnostic et réhabilitation de réseaux d'eaux usées (CREATE 1983 et 1992)*.
Commissioning requirements, diagnosis and rehabilitation of sewerage systems (CREATE 1983 and 1992).

La pratique des études de réseau d'assainissement à l'agence de Basin Seine-Normandie (CREATE 1986)*.
Diagnosis of sewerage systems - Balance sheet of Seine-Normandie's studies (CREATE 1986).

Recommandations pour la réception des réseaux d'assainissement par test d'étanchéité (air ou eau). Comparaison des deux méthodes (CREATE 1993)*.
Technical requirements for commissioning networks with watertightness tests (air or water tests). Comparison of those two methods (CREATE 1993).

A.5 Germany

No.	Title
ATV-Merkblatt M 101	Planung von Entwässerungsanlagen, Neubau-, Sanierungs- und Erneuerungsmaßnahmen.*
ATV-Advisory leaflet M 101	Planning of Drain and Sewer Systems, New Construction, Rehabilitation and Replacement.*
ATV-Arbeitsblatt A 105	Hinweise für die Wahl des Entwässerungsverfahrens (Mischverfahren/Trennverfahren).*
ATV-Standard A 105	Notes for the Selection of the Sewer System (Combined System/Separate System).*
ATV-Arbeitsblatt A 110	Richtlinien für die hydraulische Dimensionierung und den Leistungsnachweis von Abwasserkanälen und -leitungen.*
ATV-Standard A 110	Standard for the Hydraulic Dimensioning and Performance Verification of Sewers and Drains.*
ATV-Arbeitsblatt A 111	Richtlinien für die hydraulische Dimensionierung und den Leistungsnachweis von Regenwasser-Entlastungsanlagen in Abwasserkanälen und -leitungen.*
ATV-Standard A 111	Standards for the Hydraulic Dimensioning and the Performance Verification of Stormwater Overflow Installations in Sewers and Drains.*
ATV-Arbeitsblatt A 112	Richtlinie für die hydraulische Dimensionierung und den Leistungsnachweis von Sonderbauwerken in Abwasserkanälen und -leitungen.*
ATV-Standard A 112	Standard for the Hydraulic Dimensioning and the Performance Verification of Special Structures in Sewers and Drains.*
ATV-Arbeitsblatt A 117	Richtlinien für die Bemessung, die Gestaltung und den Betrieb von Regenrückhaltebecken.*
ATV-Standard A 117	Standards for the Dimensioning, Design and Operation of Detention Tanks.*
ATV-Arbeitsblatt A 118	Richtlinien für die hydraulische Berechnung von Schmutz-, Regen- und Mischwasserkanälen.*
ATV-Standard A 118	Standards for the Hydraulic Calculation of Wastewater, Stormwater and Combined Wastewater Sewers.*
ATV-Arbeitsblatt A 119	Grundsätze für die Berechnung von Entwässerungsnetzen mit elektronischen Datenverarbeitungsanlagen.*
ATV-Standard A 119	Rules for the Calculation of Sewer Systems by Data Processing.*
ATV-Arbeitsblatt A 127	Richtlinie für die statische Berechnung von Entwässerungskanälen und -leitungen.*
ATV-Standard A 127	Standards for the Structural Design of Drains and Sewers.*
ATV-Arbeitsblatt A 128	Richtlinien für die Bemessung und Gestaltung von Regenentlastungsanlagen in Mischwasserkanälen.*
ATV-Standard A 128	Standards for the Dimensioning and Design of Stormwater Structures in Combined Sewers.*
ATV-Arbeitsblatt A 138	Bau und Bemessung von Anlagen zur dezentralen Versickerung von

ATV-Standard A 138	nicht schädlich verunreinigtem Niederschlagswasser.* Construction and Dimensioning of Facilities for Decentralised Percolation of Non-Harmful Polluted Surface Water.*
ATV-Arbeitsblatt A 139	Richtlinien für die Herstellung von Entwässerungskanälen und Leitungen.*
ATV-Standard A 139	Standards for the Fabrication of Sewers and Drains.*
ATV-Arbeitsblatt A 140	Regeln für den Kanalbetrieb, Teil 1: Kanalnetz.*
ATV-Standard A 140	Rules for the Operation of Sewers, Part 1: The Sewer Network.*
ATV-Arbeitsblatt A 142	Abwasserkanäle und -leitungen in Wassergewinnungsgebieten.*
ATV-Standard A 142	Sewers and Drains in Water Catchment Areas.*
ATV-Arbeitsblatt A 149	Zustandsklassifizierung und Zustandsbewertung von Abwasserkanälen und -leitungen.*
ATV-Standard A 149	Classification of Condition and Assessment of condition of drains and sewers.
ATV-Merkblatt M 143	Inspektion, Instandsetzung, Sanierung und Erneuerung von Abwasserkanälen und -leitungen: Teil 1: Grundlagen.* Teil 2: Optische Inspektion.* Teil 3: Relining.*
ATV-Advisory leaflet M 143	Inspection, Repair, Rehabilitation and Replacement of Sewers and Drains Part 1: Principles.* Part 2: Optical Inspection.* Part 3: Relining.
ATV-Arbeitsblatt A 161	Statische Berechnung von Vortriebsrohren.*
ATV-Standard A 161	Structural Calculation of Driven Pipes.*
ATV-Arbeitsblatt A 241	Bauwerke in Entwässerungsanlagen.*
ATV-Standard A 241	Drainage Structures in Drainage Systems.*
DIN 1986	Entwässerungsanlagen für Gebäude und Grundstücke.*
DIN 1986	Drainage Systems on Private Ground.*
DIN 4033	Entwässerungskanäle und -leitungen; Richtlinien für die Ausführung.*
DIN 4033	Sewers and Sewage Pipelines; Code of Practice for Construction.*
DIN 4045	Abwassertechnik - Begriffe.*
DIN 4045	Wastewater Engineering - Definitions.*
DIN 19549	Schächte für erdverlegte Abwasserkanäle und -leitungen. Allgemeine Anforderungen und Prüfungen.*
DIN 19549	Manholes for Buried Drains and Sewers. General requirements and testing.*
DIN 19550	Allgemeine Anforderungen an Rohre und Formstücke für erdverlegte Abwasserkanäle und -leitungen.*
DIN 19550	General requirements for Pipes and Fittings for Buried Sewers and Drains.*

A.6 Ireland

A.6.1 British Standards

No.	Title
BS 6100, Section 2.7	Building and Civil Engineering terms. Part 2 Civil engineering. Section 2.7 Public health. Environmental engineering.*
BS 8000: Part 14	Workmanship on building sites. Part 14 Code of practice for below ground drainage.*
BS 8005: Part 0	Sewerage: Introduction and Guide to Data Sources and Documentation.*
BS 8005: Part 1	Sewerage: Guide to new Sewerage Construction.*
BS 8005: Part 2	Sewerage: Guide to Pumping Stations and Pumping Mains.*
BS 8005: Part 3	Sewerage: Guide to Planning and Construction of Sewers in Tunnel.*
BS 8005: Part 4	Sewerage: Guide to Design and Construction of Outfalls.*
BS 8005: Part 5	Sewerage: Guide to Rehabilitation of Sewers.*
BS 8301	Code of Practice for Building Drainage.*

A.6.2 Building Regulations

No.	Title
	Building Regulations 1991 - Department of Environment. Available from Government Publications Office, Molesworth Street, Dublin 2.*

A.7 Italy

No.	Title
UNI 9183	Edilizia. Sistemi di scario delle acque usate. Criteri di progettazione, collaudo e gestione.* Building - Plumbing design criteria - Drainage system.
UNI 9184	Edilizia. Sistemi di scario delle acque meteoriche. Criteri di progettazione, collaudo e gestione.* Building - Plumbing design criteria - Storm water system.
UNI ISO 7336	Condotte di amianto-cemento. Direttive per il calcolo idraulico.* Asbestos cement pipelines - Guidelines for hydraulic calculation.

A.8 Netherlands

No.	Title
NPR 3218	Buitenriolering onder vrij verval - Aanleg en onderhoud.* Drainage and sewerage gravity systems outside buildings - Installation and maintenance.

NEN 3219	(Ontwerp) Buitenriolering - Aanduiding op tekeningen.* (Draft) Drainage and sewerage outside buildings - Symbols for drawings.
NEN 3220	Buitenriolering - Beheer.* Sewerage systems outside buildings - Management.
NEN 3221	Buitenriolering onder over - en onderdruk - Ontwerpcriteria, aanleg en onderhoud.* Drainage and sewerage partial vacuum and overpressure systems outside buildings - Design requirements, installation and maintenance.
NEN 3300	Buitenriolering - Termen en definities.* Drainage and sewerage outside buildings Terminology.
NPR 3398	Buitenriolering - Inspectie en toestandbeoordeling van riolen.* Sewerage systems outside buildings - Inspection and condition assessment of sewers.
NEN 3399	Buitenriolering - Classificatiesysteem bij visuele inspectie van riolen.* Sewerage systems outside buildings - Classification system for visual inspection of sewers.
NPR 7061	Aanleg van rioolpersleidingen van ongeplastificeerd PVC.* Installation of buried unplasticized PVC sewer pipelines under pressure.

A.9 Norway

No.	Title
ISBN 87-7511-974-9	Renovering af afløbsledninger, retningslinier for valg, dimensionering og udførelse. Dansk teknologisk Institut*. Rehabilitation of sewer systems, guidelines for choice of method, design and installation. Danish Technological Institute.
ISBN 87-7756-103-1	TV-inspektion af afløbsledninger: Særlige betingelser og beskrivelser for udførelse. Dansk teknologisk Institut*. CCTV-Inspection of Sewer Systems: Special terms and specifications of operation. Danish Technological Institute.
ISBN 87-7511-575-1	TV-inspektion af afløbsledninger: Standarddefinitioner og fotomanual. Dansk teknologisk Institut*. CCTV-Inspection of Sewer Systems: Classification system and photo manual. Danish Technological Institute.
-	Oversikt over rehabiliteringsmetoder og mikrotunnelmetoder tilgjengelig i Norge. Norsk Rørsenter A/S, 1991.* Overview of rehabilitation methods and micro tunnel methods available in Norway. (Norsk Rørsenter A/S 1991).
-	Rehabilitering av avløpsledninger. retningslinjer for dokumentasjon og kvalitetskontroll. Nordisk samarbeid: Norge (Østlandskonsult), Danmark (Rørcentret), Sverige (VBB Viak).* Rehabilitation of drainage pipes, guidelines for documentation and

quality control. (Nordic cooperation: Norway (Østlandskonsult), Denmark (Rørcentret), Sweden (VBB Viak)).

TA 738/91

Veiledning ved bygging av ledningsanlegg for avløpsvann. Statens Forurensningstilsyn, 1991.*
Instructions for construction of pipe system for drainage water. (Statens Forurensningstilsyn, 1991).

TA 523

Retningslinjer for prosjektering, utførelse og kontroll av ledningsanlegg for avløpsvann. Statens Forurensningstilsyn, 1979.*
Guidelines for design, execution and control of pipe systems for drainage water. (Statens Forurensningstilsyn, 1979).

NS 3420

Beskrivelsestekster for bygg og anlegg, kap. H: Konstruksjoner i grunnen. Norges Byggstandardiseringsrad, 1986.*
Specification texts for building and construction, chapt. H: Structures in the ground. Norwegian Council for Building Standardisation, 1986.

A.10 Portugal

A.10.1 Portugese Regulations

No.	Title
Portaria No. 11 338	Regulamento Geral de Canalizações de Esgoto. Ministério das Obras Públicas e Transportes, Lisboa, Imprensa Nacional - Casa da Moeda.* General Regulation for Sewers. Ministry of Public Works and Transportation, Lisbon, Imprensa Nacional - Casa da Moeda. Projecto de Regulamento Geral de Distribuição de Água e de Drenagem de Águas Residuais. Conselho Superior de Obras Públicas, Lisboa.* Project of General Regulation of Water Distribution and Wastewater Drainage. Superior Committee of Public Works, Lisbon.

A.10.2 Portugese Standards

No.	Title
NP-676 (1973)	Redes de Esgotos. Sarjetas. Tipos, características e condições de emprego.* Sewerage Systems. Storm water inlets. Types, characteristics and using conditions.
NP-677 (1973)	Redes de Esgotos. Sarjetas. Ensaios de permeabilidade.* Sewerage Systems. Storm water inlets. Water tightness tests.
NP-881 (1971)	Redes de Esgotos. Câmaras de visita. Características.* Sewerage Systems. Manholes. Characteristics.
NP-882 (1971)	Redes de Esgotos. Elementos pré-fabricados para câmara de visita. Características e recepção.* Sewerage Systems. Prefabricated elements for manholes. Characteristics and reception.
NP-883 (1971)	Redes de Esgotos. Degraus das câmaras. Características e montagem.* Sewerage Systems. Steps of manholes. Characteristics and assemblage.
NP-893 (1972)	Redes de Esgotos, Construção e Conservação.* Sewerage Systems, Building and maintenance.
NP-894 (1972)	Redes de Esgotos. Verificação de estanquidade.*

Sewerage Systems. Watertightness tests.

A.11 Spain

A.11.1 Ministry of Public Works, Transport and Environment (MOPTMA)

No.	Title
Orden del M° de Obras Públicas de 15 Septiembre 1986	Pliego de prescripciones técnicas generales para tuberías de saneamiento de poblaciones.* General technical prescriptions for sewer pipes.
SA 825 (1991)	Depuración de aguas residuales.* Sewage treatment plants.
INSTRUCCIÓN 5.2 IC (1990)	Drenaje superficial.* Outside drainage systems.
NTE-ISA (1973)	Alcantarillado. Diseño, Cálculo, Construcción, Control, Valoración y Mantenimiento.* Sewage. Design, calculation, construction, control, cost and maintenance.
NTE-ISD (1974)	Depuración y Vertido. Diseño, Cálculo, Construcción, Control, Valoración y Mantenimiento.* Sewage disposal plants. Design, calculation, construction, control, cost and maintenance.
NTE-ISS (1973)	Saneamiento. Diseño, Cálculo, Construcción, Control Valoración y Mantenimiento.* Drainage. Design, calculation, construction, control, cost and maintenance.

A.11.2 Water supply and sewage Spanish Association (AEAS)

- Recommendations for sewage connections (1988).
- Recommendations for sewer systems (1992).
- New technologies for rehabilitation of pipes (1994).

A.12 Sweden

No.	Title
VAV P28	Anvisningar för beräkning av allmänna avloppsledningar, VAV, 1976.* Guidelines for the design and hydraulic dimensioning of public drainage systems, The Swedish Water and Waste Water Works Association, VAV, 1976.
VAV P31	Utjämningsmagasin i avloppsnät. VAV, 1976.* Rules for the hydraulic dimensioning and design of storm water

retention tanks. The Swedish Water and Waste Water Works Association, VAV, 1976.

- VAV P49 Källaröversvämningar: Ansvar-Åtgärder - Ersättning, VAV, 1985.*
Flooded Basements: Responsibilities - Action - Compensation. The Swedish Water and Waste Water Works Association, VAV, 1985.
- VAV P59 Inre inspektion av avloppsledningar. Del 1 och 2. Handbok och upphandlingsanvisningar.*
Code of practice for interior inspection of sewers. Part 1 and 2. Handbook.
- VAV P60 Inre inspektion av avloppsledningar. Del 3. Dokumentation med fotomanual.*
Code of practice for interior inspection of sewers. Part 3. Documentation and photo manual.
- VAV P66 Renovering av avloppsledningar.*
Rehabilitation of sewers.

A.13 Switzerland

No.	Title
SN 533190	Kanalisationen.* Canalisations.* Canalizzazioni* Sewer Systems
SN 592000	Liegenschaftsentwässerung.* Evacuation des eaux des bien-fonds.* Smaltimento delle acque dei fondi.* Drainage systems inside and outside buildings
SN 531205	Verlegung von unterirdischen Leitungen.* Pose de conduites souterraines.* Construction of pipelines.
VSA-Richtlinie	Genereller Entwässerungsplan (GEP).* Plan général d'évacuation des eaux (PGEE).* Piano generale di smaltimento delle acque (PGS).* The Integrated Urban Drainage Master Plan.
VSA-Richtlinie	Unterhalt von Kanalisationen.* Entretien des canalisations.* Manutenzione delle canalizzazioni.* Maintenance of Sewer Systems.

A.14 United Kingdom

A.14.1 British Standards

No.	Title
BS 6100, Section 2.7	Building and Civil Engineering terms. Part 2 Civil Engineering. Section 2.7 Public health. Environmental engineering.*
BS 8000: Part 14	Workmanship on building sites. Part 14 Code of practice for below ground drainage.*
BS 8005: Part 0	Sewerage: Introduction and Guide to Data Sources and Documentation.*
BS 8005: Part 1	Sewerage: Guide to new Sewerage Construction.*
BS 8005: Part 2	Sewerage: Guide to Pumping Stations and Pumping Mains.*
BS 8005: Part 3	Sewerage: Guide to Planning and Construction of Sewers in Tunnel.*
BS 8005: Part 4	Sewerage: Guide to Design and Construction of Outfalls.*
BS 8005: Part 5	Sewerage: Guide to Rehabilitation of Sewers.*
BS 8301	Code of Practice for Building Drainage.*

A.14.2 Building Regulations

No.	Title
ISBN 0 11 7522 02 3	Building Regulations 1991 (revised) - Drainage and Waste Disposal Approved Document "H".*
ISBN 0 11 495163 2	The Building Standards (Scotland) Regulations 1990, Technical Standards. Part M - Drainage and Sanitation.*
ISBN 0 337 08225 1	The Building Regulations (Northern Ireland) 1990, Technical Booklet N - Drainage.*

A.14.3 Other Documents

No.	Title
ISBN 0 902156 91 8	Civil Engineering Specification for the Water Industry. Water Services Association/WRc.*
ISBN 0 902156 77 2	Sewers for Adoption. Water Services Association/WRc.*
ISBN 0 902156 82 9	Standard Specification for Water and Sewerage Schemes. Scottish Association of Directors of Water and Sewerage Services /Department of the Environment (Northern Ireland)/WRc.*
ISBN 1 898920 00 1	Sewerage Rehabilitation Manual. Third Edition. WRc 1994.*

ISBN 0 902156 89 6

Manual of Sewer Condition Classification, Third Edition, WRc 1993*.

A guide to short term flow surveys in sewers, WRc. Medmenham
1987.

Design and analysis of urban storm drainage The Wallingford Procedure,
HR Wallingford.

Annex B (informative) Bibliography

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

EN 752-3:1996 **Drain and sewer systems outside buildings - Part 3: Planning.**

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

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 0181 996 9000. Fax: 0181 996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 0181 996 7000. Fax: 0181 996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 0181 996 7111. Fax: 0181 996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 0181 996 7002. Fax: 0181 996 7001.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager. Tel: 0181 996 7070.

BSI
389 Chiswick High Road
London
W4 4AL