

STN	Stokové siete a systémy kanalizačných potrubí mimo budov Návrh Časť 2: Hydraulické navrhovanie	STN EN 16933-2
		75 6111

Drain and sewer systems outside buildings - Design - Part 2: Hydraulic design

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 02/18

Obsahuje: EN 16933-2:2017

126377

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 16933-2

September 2017

ICS 93.030

English Version

**Drain and sewer systems outside buildings - Design - Part
2: Hydraulic design**

Réseaux d'évacuation et d'assainissement à l'extérieur
des bâtiments - Conception - Partie 2 : Conception
hydraulique

Entwässerungssysteme außerhalb von Gebäuden -
Planung - Teil 2: Hydraulische Planung

This European Standard was approved by CEN on 30 July 2017.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

	Page
Contents	Page
European foreword.....	5
Introduction	6
1 Scope.....	8
2 Normative references.....	8
3 Terms and definitions	8
4 Symbols and units.....	10
5 General.....	11
6 Design criteria.....	12
7 Hydraulic capacity of pipelines.....	12
7.1 Introduction.....	12
7.2 Pipeline headlosses.....	12
7.2.1 General.....	12
7.2.2 The Colebrook-White formula.....	12
7.2.3 The Manning formula	13
7.2.4 Pipeline roughness values	13
7.2.5 Pipeline headloss values	13
7.3 Local headlosses	13
7.4 Total headlosses	13
8 Incoming flows	14
8.1 Foul wastewater flows.....	14
8.1.1 General.....	14
8.1.2 Calculation of foul wastewater flow rates based on the appliances connected	14
8.1.3 Calculation of foul wastewater flow rates from population and average flows	14
8.2 Rainfall and runoff from precipitation.....	15
8.2.1 Rainfall.....	15
8.2.2 Runoff	15
8.3 Extraneous flows	16
9 Hydraulic calculation of drain and sewer systems	17
9.1 General.....	17
9.2 Flow in sewer systems.....	17
9.3 Flow simulation methods.....	19
9.3.1 Introduction	19
9.3.2 Simple/empirical methods	19
9.3.3 Other simplified methods	19
9.3.4 Dynamic wave methods	19
9.3.5 Selection of calculation method.....	19
9.4 Surface flood routing	20
9.5 Validation of models	20
10 Hydraulic design.....	21
10.1 Capacity of drains and sewers	21
10.1.1 General.....	21
10.1.2 Foul drains and sewers	21
10.1.3 Surface water drains and sewers	21

10.1.4 Combined drains and sewers	22
10.2 Design for self-cleansing	22
10.2.1 Sediment transport.....	22
10.2.2 Minimization of blockages	22
10.3 Sewers with steep gradients.....	23
10.4 Surface water inlets	23
10.5 Separators, screens and pretreatment devices	23
10.5.1 General	23
10.5.2 Control of sediments.....	24
10.5.3 Control of grease and fats	24
10.5.4 Control of light liquids	25
10.5.5 Treatment of surface water to remove dissolved pollutants	25
10.5.6 Screening	26
10.6 Infiltration drainage systems.....	26
10.7 Evaporation systems	26
10.8 Manholes and inspection chambers	26
10.9 Combined sewer overflows.....	27
10.10 Tanks and ponds.....	27
10.10.1 General.....	27
10.10.2 Detention tanks.....	27
10.10.3 Ponds	28
10.11 Outfalls	28
11 Sources of additional information.....	28
Annex A (informative) Sources of additional information	29
A.1 National Standards Bodies	29
A.2 Austria	29
A.2.1 Regulatory Bodies	29
A.2.2 Other organisations	29
A.3 Denmark	29
A.3.1 Regulatory Bodies	29
A.3.2 Other organisations	30
A.4 France	31
A.4.1 Regulatory Bodies	31
A.4.2 Other organisations	31
A.5 Germany.....	31
A.5.1 Regulatory Bodies	31
A.5.2 Other organisations	32
A.6 Ireland	32
A.6.1 Regulatory Bodies	32
A.7 Italy	33
A.7.1 Regulatory Bodies	33
A.7.2 Other organisations	33
A.8 The Netherlands.....	33

A.8.1 Regulatory Bodies.....	33
A.8.2 Other organisations.....	33
A.9 Norway	34
A.9.1 Regulatory Bodies.....	34
A.9.2 Other organisations.....	34
A.10 Portugal	34
A.10.1 Regulatory Bodies.....	34
A.10.2 Other organisations.....	35
A.11 Sweden.....	35
A.11.1 Regulatory Bodies.....	35
A.11.2 Other organisations.....	35
A.12 Switzerland.....	35
A.12.1 Regulatory Bodies.....	35
A.12.2 Other organisations.....	36
A.13 United Kingdom.....	36
A.13.1 Regulatory Bodies.....	36
A.13.1.1 General	36
A.13.1.2 England.....	36
A.13.1.3 Wales	37
A.13.1.4 Scotland	37
A.13.1.5 Northern Ireland.....	38
A.13.2 Other organisations.....	38
Bibliography.....	40

European foreword

This document (EN 16933-2:2017) 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 March 2018 and conflicting national standards shall be withdrawn at the latest by March 2018.

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

This European Standard EN 16933, *Drain and sewer systems outside buildings — Design*, contains the following parts:

- Part 1: Physical design¹⁾
- Part 2: Hydraulic design.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1) Currently in preparation.

Introduction

Drain and sewer systems are part of the overall wastewater system that provides a service to the community. This can be briefly described as:

- removal of wastewater from premises for public health and hygienic reasons;
- prevention of flooding in urbanised areas;
- protection of the environment.

The overall wastewater system has four successive functions:

- collection;
- transport;
- treatment;
- discharge.

Collection and transport of wastewater is provided by drain and sewer systems.

EN 752:2017 provides a framework for the design, construction, maintenance, operation and rehabilitation of drain and sewer systems outside buildings. This is illustrated in the upper part of the diagram in Figure 1. EN 752:2017 is supported by more detailed standards for the investigation, design, construction, organization and control of drain and sewer systems.

Investigation and assessment standards include:

- EN 13508, *Investigation and assessment of drain and sewer systems outside buildings*.

Design and construction standards include:

- EN 16932²⁾, *Drain and sewer systems outside buildings — Pumping systems*;
- EN 16933³⁾, *Drain and sewer systems outside buildings — Design*;
- EN 1295⁴⁾, *Structural design of buried pipelines under various conditions of loading*;
- EN 1610, *Construction and testing of drains and sewers*;
- EN 12889, *Trenchless construction and testing of drains and sewers*;
- EN 15885, *Classification and characteristics of techniques for renovation, repair and replacement of drains and sewers*.

Management and control standards include:

- EN 14654, *Management and control of operational activities in drain and sewer systems outside buildings*.

²⁾ Currently in preparation.

³⁾ Currently in preparation.

⁴⁾ Currently in preparation.

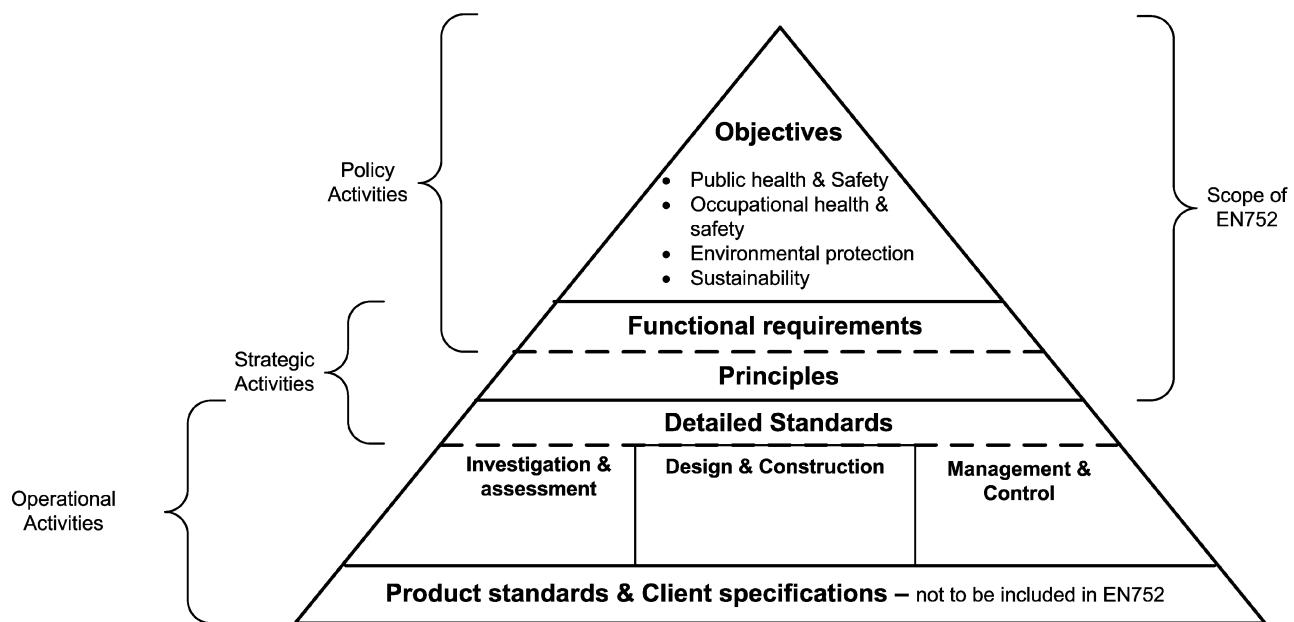


Figure 1 — Relationship to EN 752:2017 and other drain and sewer standards [Source EN 752:2017]

1 Scope

This European Standard specifies requirements for the design of drain and sewer systems outside buildings.

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

This document specifies requirements for the hydraulic design of drain and sewer systems and the assessment of the capacity of existing drain and sewer systems.

2 Normative references

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

EN 858-1, *Separator systems for light liquids (e.g. oil and petrol) — Part 1: Principles of product design, performance and testing, marking and quality control*

EN 858-2:2003, *Separator systems for light liquids (e.g. oil and petrol) — Part 2: Selection of nominal size, installation, operation and maintenance*

EN 1825-1, *Grease separators — Part 1: Principles of design, performance and testing, marking and quality control*

EN 1825-2:2002, *Grease separators — Part 2: Selection of nominal size, installation, operation and maintenance*

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

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

koniec náhľadu – text d'alej pokračuje v platenej verzii STN