

ÄRAVOOLU- JA KANALISATSIOONISÜSTEEMID
VÄLJASPOOL HOONEID. PUMPAMISSÜSTEEMID. OSA 3:
VAAKUMSÜSTEEMID

Drain and sewer systems outside buildings - Pumping
systems - Part 3: Vacuum systems

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16932-3:2018 sisaldab Euroopa standardi EN 16932-3:2018 ingliskeelset teksti.	This Estonian standard EVS-EN 16932-3:2018 consists of the English text of the European standard EN 16932-3:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 11.04.2018.	Date of Availability of the European standard is 11.04.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 93.030

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Drain and sewer systems outside buildings - Pumping systems - Part 3: Vacuum systems

Réseaux d'évacuation et d'assainissement à l'extérieur
des bâtiments - Systèmes de pompage - Partie 3:
Systèmes sous vide

Entwässerungssysteme außerhalb von Gebäuden -
Pumpsysteme - Teil 3:
Unterdruckentwässerungssysteme

This European Standard was approved by CEN on 22 January 2018.

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: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword.....	4
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions	5
4 Symbols and units.....	7
5 General.....	8
6 Planning vacuum sewer systems.....	8
6.1 Basis of design	8
6.2 Location of collection chambers	8
6.3 Route and profile of vacuum pipelines.....	9
6.4 Hydro pneumatic design of the system	11
6.5 Vacuum station design	13
6.5.1 General.....	13
6.5.2 Sizing the vacuum vessel for flushing activities.....	16
6.6 Power consumption	17
7 Collection chambers on vacuum sewer systems.....	18
7.1 General.....	18
7.2 Collection chambers.....	18
7.3 Interface valve units.....	20
7.4 Explosion safety	20
7.5 Life of membranes and seals.....	21
8 Vacuum pipelines.....	21
8.1 Vacuum drain connections	21
8.2 Branch connections.....	21
8.3 Means of isolation	22
9 Detailed design of vacuum stations.....	22
9.1 Selection of type of vacuum pumping station	22
9.2 Vacuum vessel	23
9.3 Forwarding equipment	23
9.4 Non-return valves	23
9.5 Vacuum pumps.....	23
10 Controls, electrical equipment and instrumentation	25
10.1 Collection chamber controls	25
10.1.1 Level sensor	25
10.1.2 Interface valve controller.....	25
10.1.3 Monitoring of the interface valve	26
10.2 Vacuum station control.....	26
10.3 Explosion safety	26
11 Installation	27
12 Testing and verification.....	27
12.1 Collection chambers.....	27
12.2 Interface valve units.....	27

12.3	Vacuum pipelines	27
12.4	Commissioning tests.....	27
13	Operation and maintenance	28
13.1	General	28
13.2	Maintenance	28
13.3	Operation and maintenance manual.....	28
13.4	Power consumption	29
	Annex A (informative) Example of a dimensioning model	30
	Annex B (normative) Testing of vacuum sewer system.....	32
B.1	Testing of interface valve unit.....	32
B.1.1	Testing requirements.....	32
B.1.2	Preliminary checks	32
B.1.3	Endurance test.....	32
B.1.3.1	Test rig description.....	32
B.1.3.2	Test procedure	32
B.1.4	Resistance to blockage test	33
B.1.5	Submergence test	33
B.2	Testing of pipelines.....	33
B.2.1	Calibrating test equipment	33
B.2.2	General	34
B.2.3	Interim testing	34
B.2.4	Final testing	34
B.3	Leak testing of collection chambers.....	34
B.4	Commissioning tests.....	34
B.4.1	General	34
B.4.2	Noise	34
B.4.3	Minimum vacuum and vacuum recovery time.....	34
B.4.4	Air/water ratio	35
B.4.5	Operation of vacuum station controls.....	35
B.4.6	Replacement times.....	35
	Bibliography	36

European foreword

This document (EN 16932-3:2018) has been prepared by Technical Committee CEN/TC 165 “Waste water 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 October 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.

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

Together with EN 16932-1:2018 and EN 16932-2:2018, this document will supersede EN 1091:1996 and EN 1671:1997.

EN 16932:2018, *Drain and sewer systems outside buildings — Pumping systems*, contains the following parts:

- *Part 1: General requirements;*
- *Part 2: Positive pressure systems;*
- *Part 3: Vacuum systems.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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 Scope

This European Standard specifies requirements for design, construction and acceptance testing of wastewater pumping systems in drain and sewer systems outside the buildings they are intended to serve. It includes pumping systems in drain and sewer systems that operate essentially under gravity as well as systems using either positive pressure or partial vacuum.

This document is applicable to vacuum drain and sewer systems.

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 476, *General requirements for components used in drains and sewers*

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

EN 16932-1:2018, *Drain and sewer systems outside buildings — Pumping systems — Part 1: General requirements*

EN 16932-2:2018, *Drain and sewer systems outside buildings — Pumping systems — Part 2: Positive pressure systems*

EN 16933-2, *Drain and sewer systems outside buildings — Design — Part 2: Hydraulic design*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16323, in EN 16932-1 and the following apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

Note 1 to entry: 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:

collection tank;	pumping station;
domestic wastewater;	relevant authority;
extraneous flow;	rising main;
gradient;	runoff;
gravity system;	self-cleansing;
infiltration;	sewer;
maintenance;	sewer system.

non-domestic wastewater;

Note 2 to entry: The following terms used in this standard are defined in EN 16932-1:

collection chamber;	level sensor;
---------------------	---------------