



SLOVENSKI STANDARD

SIST EN 12056-4:2001

01-december-2001

Težnostni kanalizacijski sistemi v stavbah - 4. del: Črpališča - Načrtovanje in izračun

Gravity drainage systems inside buildings - Part 4: Wastewater lifting plants - Layout and calculation

Schwerkraftentwässerungsanlagen innerhalb von Gebäuden - Teil 4: Abwasserhebeanlagen - Planung und Bemessung

Réseaux d'évacuation gravitaire à l'intérieur des bâtiments - Partie 4: Stations de relevage d'effluents - Conception et calculs

<https://standards.iteh.ai/catalog/standards/sist/437a25a2-fdab-4db8-aa7e-24da7c80829d/sist-en-12056-4-2001>

Ta slovenski standard je istoveten z: EN 12056-4:2000

ICS:

91.140.80 Drenažni sistemi Drainage systems

SIST EN 12056-4:2001 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12056-4:2001

<https://standards.iteh.ai/catalog/standards/sist/437a25a2-fdab-4db8-aa7e-24da7c80829d/sist-en-12056-4-2001>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12056-4

June 2000

ICS 91.140.80

English version

Gravity drainage systems inside buildings - Part 4: Wastewater lifting plants - Layout and calculation

Réseaux d'évacuation gravitaire à l'intérieur des bâtiments -
Partie 4: Stations de relevage d'effluents - Conception et
calculs

Schwerkraftentwässerungsanlagen innerhalb von
Gebäuden - Teil 4: Abwasserhebeanlagen - Planung und
Bemessung

This European Standard was approved by CEN on 27 October 1999.

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.

[SIST EN 12056-4:2001](https://standards.iteh.ai/catalog/standards/sist/437a25a2-fdab-4db8-aa7e-24da7c80829d/sist-en-12056-4-2001)

<https://standards.iteh.ai/catalog/standards/sist/437a25a2-fdab-4db8-aa7e-24da7c80829d/sist-en-12056-4-2001>



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

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

Contents

	Page
Foreword	3
1 Scope	3
2 Normative references	3
3 Definitions, symbols, units and designation	4
3.1 Definitions	4
3.1.1 Wastewater lifting plant	4
3.1.2 Backflow	4
3.1.3 Flood level	4
3.1.4 Backflow loop	4
3.1.5 Duty flow, \dot{V}_p	4
3.1.6 Discharge head, H_p	4
3.1.7 Collection tank for wastewater containing faecal matter	4
3.1.8 Useful volume	4
3.2 Symbols	5
4 Protection against backflow	5
5 Installation	7
5.1 General requirements	7
5.2 Pipework	7
5.3 Ventilation	10
5.4 Drains	10
5.5 Electrical connections	10
6 Selection of wastewater lifting plants	10
6.1 Determination of flow, Q_p	10
6.2 Determination of Head, H_p	10
6.2.1 Calculation procedure for Head H_p	11
6.2.2 Static head, H_{geo}	11
6.2.3 Losses in valves and fittings, $H_{v,A}$	12
6.2.4 Friction losses in discharge pipework, $H_{v,R}$	13
6.3 Determination of useful volume, V	14
7 Commissioning	16
8 Inspection and maintenance	16
8.1 Inspection	16
8.2 Maintenance	16
8.3 Maintenance contract	16
Annex A (informative)	17
Bibliography	19

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 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 December 2000, and conflicting national standards shall be withdrawn at the latest by June 2001.

This part is the fourth in a series relating to the functional requirements of gravity drainage systems inside buildings. There will be five parts, as follows: Gravity drainage systems inside buildings :

- Part 1: General and performance requirements
- Part 2: Sanitary pipework - Layout and calculation
- Part 3: Roof drainage - Layout and calculation
- Part 4: Wastewater lifting plants - Layout and calculation
- Part 5: Installation and testing, instructions for operation, maintenance and use

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.

1 Scope

This part gives layout, operation and maintenance requirements for lifting plants for wastewater containing faecal matter, faecal-free wastewater and rainwater within buildings and sites, together with their discharge pipework and connection to drain. It also covers faecal wastewater lifting plants for limited applications.

2 Normative references

This standard incorporates by dated or undated reference provision 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 to 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 1085

Wastewater treatment - Vocabulary

prEN 12050-1

Wastewater lifting plants for buildings and sites - Principles of construction and testing - Part 1: Lifting plants for wastewater containing faecal matter

prEN 12050-2

Wastewater lifting plants for buildings and sites - Principles of construction and testing - Part 2: Lifting plants for faecal-free wastewater

prEN 12050-3

Wastewater lifting plants for buildings and sites - Principles of construction and testing - Part 3: Lifting plants for wastewater containing faecal matter for limited applications

prEN 12050-4

Wastewater lifting plants for buildings and sites - Principles of construction and testing Part 4: Non-return valves for faecal-free wastewater and wastewater containing faecal matter

EN 12056-1

Gravity drainage systems inside buildings - Part 1: General and performance requirements

Page 4
EN 12056-4:2000

EN 12056-2
Gravity drainage systems inside buildings - Part 2: Sanitary pipework - Layout and calculation

EN 12056-3
Gravity drainage systems inside buildings - Part 3: Roof drainage - Layout and calculation

EN 12056-5
Gravity drainage systems inside buildings - Part 5: Installation and testing, instructions for operation, maintenance and use

3 Definitions, symbols, units and designation

For the purposes of this standard, EN 1085 and the following definitions and symbols apply:

3.1 Definitions

3.1.1 Wastewater lifting plant

Device for the collection and automatic lifting of wastewater, which may or may not contain faecal matter, to a height above flood level.

3.1.2 Backflow

Flow of wastewater from a drain or sewer against the direction of flow back into the connected pipework.

3.1.3 Flood level

The maximum level to which waste water can rise within a drainage system.

3.1.4 Backflow loop

Part of the pressurized pipework from a wastewater lifting plant above flood level (see figures 1 and 2).

3.1.5 Duty flow, \dot{V}_p

Flow discharged by the pumping device of the wastewater lifting plant against the total head at the duty point (see figure 6).

<https://standards.iteh.ai/catalog/standards/sist/437a25a2-fdab-4db8-aa7e-24da7c80829d/sist-en-12056-4-2001>

3.1.6 Discharge head, H_p

Pressure produced by the pumping device of a wastewater lifting plant at the duty point to overcome the static height difference plus the total losses in the discharge pipework (see figure 6).

3.1.7 Collection tank for wastewater containing faecal matter

Unpressurized part of a wastewater lifting plant in which the incoming wastewater is stored prior to lifting.

3.1.8 Useful volume

Volume in the collection tank between switch-on level and switch-off level that can be lifted.

3.2 Symbols

Table 1: Symbols

Symbol	Unit	Bezeichnung
d_i	mm	Inside diameter
DN	mm	Nominal size
g	m/s ²	Gravitational constant (= 9,81 m/s ²)
H_{stg}	m	Static head
H_p	m	Discharge head of pumping device at duty point
H_{tot}	m	Total head
H_v	m	Head loss
$H_{v,A}$	m	loss in valves and fittings
$H_{v,i}$	-	Dimensionless head loss as a function of pipe length
$H_{v,R}$	m	Friction loss in discharge pipework
L	m	Pipeline length
P_v	bar (N/m ²)	Pressure loss
$Q_i (\dot{V})$	l/s	Wastewater inflow
$Q (\dot{V}_A)$	l/s	Flow generally
$Q_p (\dot{V}_p)$	l/s	Duty flow of pumping device
$Q_R (\dot{V}_R)$	l/s	Rainwater discharge
T	s	Minimum running time
V	l	Useful volume
v	m/s	Flow velocity
ζ	-	Resistance factor

(standards.iteh.ai)

4 Protection against backflow

Even when a public drain or sewer system is designed in accordance with generally approved calculation methods and carefully maintained, it cannot, for economic reasons, be sized to be able to discharge the unusually large quantities of water which may arise during a heavy storm. Under these conditions surcharge the connecting drains and the building drainage system has to be taken into account.

A similar situation can be caused by unplanned inflows, blockages, overloading or reductions in cross-section.

In addition, failure of a pumping station can cause a sewer to surcharge. For these reasons, sanitary appliances below flood level shall be adequately protected against backflow. If no other information is available, in generally flat areas the level of the highway¹ at the point where the drain connects to the sewer may be assumed to be the flood level.

Protection against backflow may be provided by a wastewater lifting plant with a backflow loop (see figures 1 and 2). Only a backflow loop will provide a high degree of security against backflow.

Alternatively, an anti-flooding valve may be used (see figure 3), provided:

- there is a fall to the sewer, and;
- the rooms are of minor importance, ie. no valuable items are present and the health of the inhabitants will not be affected in the case of flooding, and;
- the number of users is small and a WC is available above flood level, and;
- sanitary appliances do not need to be used during flooding.

¹ "highway" refers to the road, pathways, roadside shoulders, etc

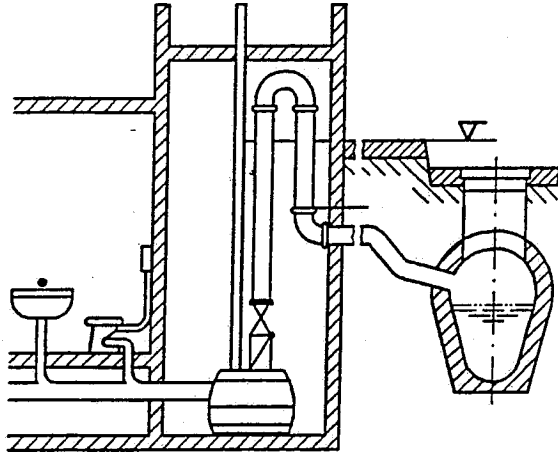


Figure 1: Illustration of protection against backflow where the drain or sewer is higher than the sanitary appliances

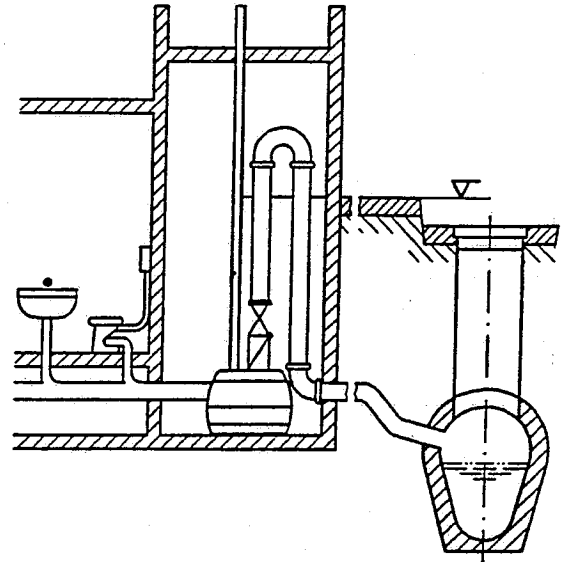


Figure 2: Illustration of protection against backflow by means of a wastewater lifting plant where there is a fall to the drain or sewer

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 12056-4:2001](https://standards.iteh.ai/catalog/standards/sist/437a25a2-fdab-4db8-aa7e-24da7c80829d/sist-en-12056-4-2001)

<https://standards.iteh.ai/catalog/standards/sist/437a25a2-fdab-4db8-aa7e-24da7c80829d/sist-en-12056-4-2001>

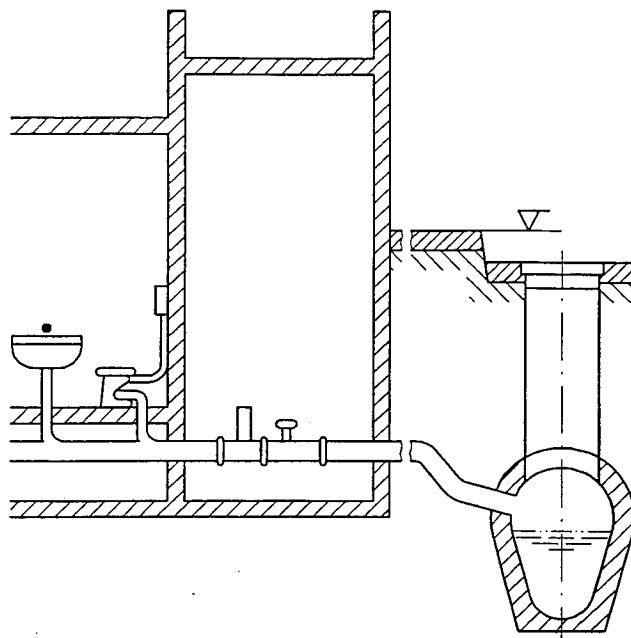


Figure 3: Illustration of protection of a room of minor importance against backflow by means of anti-flooding valve where there is a natural fall to the sewer

iTeh STANDARD PREVIEW
(standards.iteh.ai)

5 Installation

5.1 General requirements

Wastewater lifting plants shall be installed so that rotation is prevented. Wastewater lifting plants that might be subject to flotation shall be fastened down.

Rooms containing wastewater lifting plants shall be of sufficient size to give a working space of at least 600mm around and above all operating parts or components that may need maintenance. Rooms shall be adequately lit and well ventilated. Where a faecal wastewater lifting plant to prEN 12050-1 is used, a sump shall be provided.

All pipework connections to a wastewater lifting plant shall be noise absorbing.

Collection tanks for wastewater containing faecal matter shall not be structurally connected to the building. Where a faecal wastewater lifting plant is used within a building, it shall have a free-standing collection tank.

In accordance with prEN 12050-1, duplicate pumping devices shall be installed in plants where the wastewater inflow cannot be interrupted.

Surface water drainage of areas below flood level shall be kept separate from domestic wastewater and pumped away using a wastewater lifting plant installed outside the building.

5.2 Pipework

Sanitary pipework below flood level and draining to a wastewater lifting plant shall be designed and installed in accordance with EN 12056.

All pipework shall be installed so that it is self-draining and shall not be restricted or reduced in diameter in the direction of flow. The minimum size of discharge pipework shall be in accordance with table 2.

Table 2: Minimum size of discharge pipework

Type of wastewater lifting plant	Minimum size of discharge pipework
Non-macerating faecal lifting plant to prEN 12050-1	DN 80
Macerating faecal lifting plant to prEN 12050-1	DN 32
Faecal-free lifting plant to prEN 12050-2	DN 32
Non-macerating faecal lifting plant for limited applications to prEN 12050-3	DN 25
Macerating faecal lifting plant for limited applications to prEN 12050-3	DN 20

All pipework connected to a lifting plant shall be installed so that it is not under stress and shall be adequately supported.

An isolating valve shall be installed on the inlet of the wastewater lifting plant and also on the discharge side after the non-return valve. For wastewater lifting plants to prEN 12050-2 or prEN 12050-3 with discharge pipework less than DN 80, the isolating valves may be omitted provided that any non-return valve has a backwash device or some other means of emptying the discharge pipework into the collection tank is provided.

Discharge pipework from a wastewater lifting plant shall be installed to form a backflow loop above flood level (see figures 1 and 2).

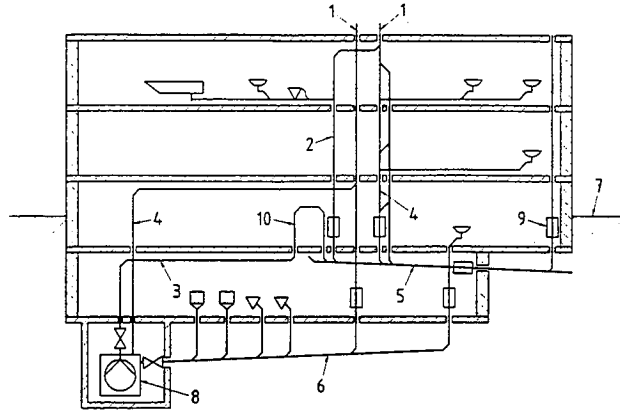
No other connections shall be made to the discharge pipework.

<https://standards.iteh.ai/catalog/standards/sist/437a25a2-fdab-4db8-aa7e->

Discharge pipework from a wastewater lifting plant shall always be connected to a ventilated drain (see figures 4 and 5) and never to a stack.

Discharge pipeworks shall be connected to a drain in the same way as for a gravity connection. Cleaning access to the drain shall be provided. Discharge pipework shall be capable of withstanding 1,5-times the maximum operating pressure of the lifting plant.

Air admittance valves shall not be installed in the discharge pipework.

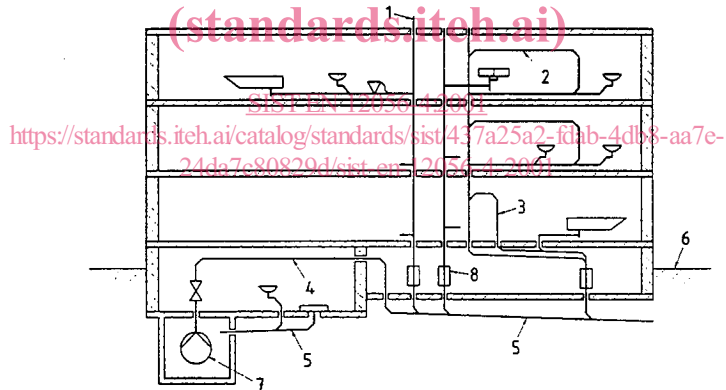


- | | |
|--|--|
| 1 Ventilating pipes | 6 Drain |
| 2 Discharge stack | 7 Flood level |
| 3 Discharge pipework from faecal lifting plant | 8 Faecal lifting plant with non-return valve |
| 4 Ventilating pipe for faecal lifting plant | 9 Access point |
| 5 Drain | 10 Backflow loop |

Figure 4: Illustration of connection of a faecal lifting plant to a drain

iTeh STANDARD PREVIEW

(standards.iteh.ai)



- | | |
|---|--|
| 1 Stack vent | 5 Drain |
| 2 Branch ventilating pipes | 6 Flood level |
| 3 Branch ventilating pipes | 7 Lifting plant for faecal-free wastewater with non-return valve |
| 4 Discharge pipework with backflow loop | 8 Access point |

Figure 5: Illustration of connection of a lifting plant for faecal-free wastewater to a drain