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

Abwasserhebeanlagen für die Gebäude- und Grundstücksentwässerung - Teil 1: Fäkalienhebeanlagen

Stations de relevage d'effluents pour les bâtiments et terrains - Partie 1: Stations de relevage pour effluents contenant des matières fécales

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This European Standard was approved by CEN on 17 January 2015.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EN 12050-1:2015 (E)**Foreword**

This document (EN 12050-1:2015) 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of an identical text or by endorsement, at the latest by September 2015 and conflicting national standards shall be withdrawn at the latest by December 2016.

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 document supersedes EN 12050-1:2001.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the Regulation (EU) No. 305/2011.

For relationship with EU Regulation, see informative Annex ZA, which is an integral part of this document.

The series of standards EN 12050 “*Wastewater lifting plants for buildings and sites*” consists of the following parts:

- Part 1: *Lifting plants for wastewater containing faecal matter;*
- Part 2: *Lifting plants for faecal-free wastewater;*
- Part 3: *Lifting plants for limited applications;*
- Part 4: *Non-return valves for faecal-free wastewater and wastewater containing faecal matter.*

The main changes with respect to the previous edition are listed below:

- a) reaction to fire added;
- b) hot water test added;
- c) Clause 6 updated in accordance with “Implementation of the Construction Products Regulation (CPR) in harmonized standards”;
- d) Annex ZA updated in accordance with “Implementation of the Construction Products Regulation (CPR) in harmonized standards” (adoption of the Regulation EU No. 305/2011);
- e) editorially revised.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard applies to lifting plants for wastewater containing faecal matter (referred to as “faecal lifting plants” in this standard) for drainage of locations below flood level in buildings and sites to prevent any backflow of wastewater into the building. These lifting plants may be prefabricated or delivered as prefabricated kits and assembled on site. This standard specifies general requirements, basic construction and testing principles, together with information on materials and assessment and verification of constancy of performance.

Construction and testing requirements for non-return valves used in wastewater lifting plants are given in EN 12050-4.

This European Standard does not apply for pumping installations for drain and sewer systems outside buildings for pumping of municipal wastewater according to EN 752:2008, Annex F.

NOTE Lifting plants for wastewater containing faecal matter can also be used for wastewater that does not contain faecal matter and for surface water.

This European Standard applies also to lifting plants for wastewater containing faecal matter which are not prefabricated but composed of individual components purchased from different suppliers and put together on site.

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 124, *Gully tops and manhole tops for vehicular and pedestrian areas — Design requirements, type testing, marking, quality control*

EN 12056-1:2000, *Gravity drainage systems inside buildings — Part 1: General and performance requirements*

EN 12056-4:2000, *Gravity drainage systems inside buildings — Part 4: Wastewater lifting plants - Layout and calculation*

EN 12566-1:2000/A1:2003, *Small wastewater treatment systems for up to 50 PT — Part 1: Prefabricated septic tanks*

EN 12566-4:2007, *Small wastewater treatment systems for up to 50 PT — Part 4: Septic tanks assembled in situ from prefabricated kits*

EN 13463-1, *Non-electrical equipment for use in potentially explosive atmospheres — Part 1: Basic method and requirements*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 13823, *Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item*

EN 13598-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 1: Specifications for ancillary fittings including shallow inspection chambers*

EN 60079-0, *Explosive atmosphere — Part 0: Equipment — General requirements (IEC 60079-0)*

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EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN ISO 9906:2012, *Rotodynamic pumps — Hydraulic performance acceptance tests — Grades 1, 2 and 3 (ISO 9906:2012)*

EN ISO 20361, *Liquid pumps and pump units — Noise test code — Grades 2 and 3 of accuracy (ISO 20361)*

3 Terms, definitions, symbols and abbreviations**3.1 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

3.1.1**domestic wastewater**

water which is contaminated by use and normally discharged from WC, showers, baths, bidets, wash basins, sinks and floor gullies

[SOURCE: EN 12056-1:2000, 3.1.2]

3.1.2**faecal 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

Note 1 to entry: A non-return valve according to EN 12050-4 is a component of the plant.

3.1.3**collection tank for wastewater containing faecal matter**

unpressurized part of a faecal lifting plant in which the incoming wastewater is stored prior to lifting

3.1.4**site**

area in the proximity of the building outside buildings

Note 1 to entry: For further explanation see EN 12056-1:2002, Figure 1.

3.1.5**useful volume**

volume in the collection tank between switch-on level and switch-off level

3.1.6**flood level**

maximum level to which wastewater can rise within a drainage system

[SOURCE: EN 12056-1:2000, 3.1.7]

3.1.7**pumping device for wastewater containing faecal matter**

component of a faecal lifting plant which pumps the wastewater out of the collection tank to a height above flood level

3.1.8**maximum pump operating pressure**

maximum hydrostatic pressure that the pumping device is capable to create

3.1.9**ball passage**

passage where a ball with a defined diameter can pass through without deformation

3.1.10**warning device**

device which gives a signal if a malfunction occurs

3.2 Symbols and abbreviations**3.2.1 Symbols**

d_i pipe internal diameter, in mm

Q flow rate, in l/s

H discharge head, in m

v flow velocity, in m/s

3.2.2 Abbreviations

AVCP assessment and verification of constancy of performance

DN nominal diameter

CWT classified without testing

CWFT classified without further testing

SBI single burn item

DoP declaration of performance

FPC factory production control

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4 Materials and product characteristics**4.1 Materials**

Materials used shall be adequate to meet the demands of installation and operation. Materials shall comply with the requirements of this standard and shall not release dangerous substances (see 4.10). Examples of suitable materials for the construction of wastewater lifting plants are given in Annex A (informative).

For collection tanks only corrosion resistant materials or materials with a corrosion resistant protective coating shall be used.

4.2 Collection tank**4.2.1 Mechanical resistance**

The structural stability of collection tanks shall be shown to be adequate for the place of installation. When tested according to 5.2.1 the tank shall be tight and shall not show any deformation influencing subsequent function of the lifting plant.

Where loads on the tank may be expected the load bearing capacity of the collection tank shall be shown to be adequate for the place of installation and the crushing resistance or maximum load deformation (as applicable) shall be tested and declared in accordance with appropriate standards, e.g. EN 13598-1:2010 or EN 12566-1:2000/A1:2003, Annex D.

The cover shall comply with EN 124 when applicable.

EN 12050-1:2015 (E)**4.2.2 Watertightness**

Collection tanks for use inside buildings, other than inlet, outlet and vent openings, shall be closed, watertight when tested according to 5.2.1.

Collection tanks for use at sites outside buildings shall be covered and watertight. If not tested according to 5.2.1 because the collection tank is assembled on site, the watertightness shall be tested and declared according to EN 12566-4.

4.2.3 Odourtightness

Collection tanks for use inside buildings, other than inlet, outlet and vent openings, shall be closed and odourtight when tested according to 5.2.

4.2.4 Protection against explosion

The inside of the collection tank of a faecal lifting plant can be regarded as a zone containing potentially explosive gases.

NOTE In those cases, the collection tank is regarded as zone 2 in accordance with Directive 1999/92/EC (ATEX operative guideline) and considered as temperature class 3.

Where protection against explosion is required, the collection tank and any device inside the tank shall meet the requirements of EN 13463-1 and EN 60079-0 and be tested accordingly and the product shall be marked as such.

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4.3 Lifting effectiveness**4.3.1 General**

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Faecal lifting plants shall be capable of pumping wastewater as defined in EN 12056-1 including all the solid matter usually contained in domestic wastewater. They shall be designed in such a way that solid matter does not accumulate in any of their included components.

NOTE For pumping sewage with abrasive particles present (e.g. sand), faecal lifting plants fitted with faecal macerating mechanisms are of their nature not suitable.

When tested in accordance with 5.3 the plant shall not show malfunction which could affect the operation of the plant.

4.3.2 Pipe connections

The dimensions of inlet, discharge and ventilating connections shall permit the use of standard pipe sizes. Connections shall be such that a flexible and sealed connection is ensured. The discharge pipe connection shall withstand a pressure that is 1,5 times the maximum pump operating pressure without leaking.

In case a positive displacement (PD) pump is used the pressure can rise to unexpectedly high values due to blockages in the discharge pipe for which case adequate safety measures shall be taken.

4.3.3 Minimum dimensions of ventilating pipe system

In the case of flows up to 12 l/s the ventilating pipe shall have a minimum size of DN 50. In the case of higher flows the ventilating pipe shall be a minimum of DN 70.

4.3.4 Minimum flow rate

When tested in accordance with 5.1.2, the flow velocity in the discharge pipe system shall be at least 0,7 m/s at a manometric head of 40 kPa (0,4 bar). The minimum flow rate shall be calculated in accordance with Formula (1).

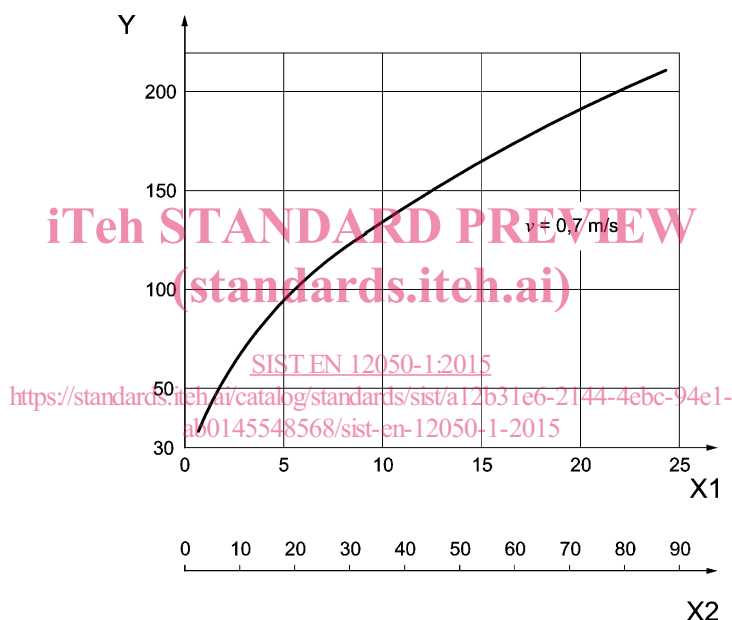
$$Q_{\min} = v \times \frac{\pi}{4} \times 10^{-3} \times d_i^2 \quad (1)$$

Where

v is the minimum flow velocity in the discharge pipe system = 0,7 m/s;

d_i is the pipe internal diameter in mm,

Q_{\min} is the minimum flow rate in l/s.



Key

Y pipe internal diameter d_i in mm

X1 flow rate Q in l/s

X2 flow rate Q in m³/h

Figure 1 — Relationship between flow rate and pipe internal diameter of the discharge pipe

4.3.5 Minimum free ball passage of the lifting plant

The free passage in the faecal lifting plant at any point between the faecal inlet into the lifting plant and the pumping device shall have at least a ball passage of 40 mm.

4.3.6 Minimum size of discharge connections for non-macerating faecal lifting plants

Discharge connections of non-macerating faecal lifting plants shall be at least DN 80. The ball passage of the non-return valve shall be at least 60 mm. Where permitted, the discharge connection shall be at least DN 50 and the ball passage of the non-return valve shall also be at least 50 mm.

EN 12050-1:2015 (E)**4.3.7 Minimum size of discharge pipe system for macerating faecal lifting plants**

Discharge connections, discharge pipework and non-return valves for macerating faecal lifting plants, where all the material pumped is macerated, shall be at least DN 32.

4.3.8 Useful volume

The useful volume of the collection tank shall be at least 20 l. In the case of macerating faecal lifting plants and discharge pipes DN \leq 50 the useful volume can be reduced to 10 l.

According to EN 12056-4 the minimum useful volume shall be higher than the volume of the discharge pipe.

4.4 Control equipment

Faecal lifting plants shall be fitted with control equipment for automatic operation of the plant and with a warning device. Manual operation shall also be possible.

4.5 Electrical equipment

The electrical equipment of the plant shall comply with at least protection type IP 44 according to EN 60529.

4.6 Fixing devices

Faecal lifting plants shall incorporate fixing devices to prevent rotation or floatation.

4.7 Reaction to fire**4.7.1 General**

Where use of a plant is subject to national regulatory requirements on reaction to fire, its reaction to fire performance shall be considered as that of its components (i.e. material approach) and shall be declared as one of the following classes, according to EN 13501-1.

- a) Class A1, without the need for testing (CWT), when meeting the requirements, specified in 4.7.2, or otherwise;
- b) Class A1 to E, defined according to the results of testing the plant's constituent material(s), according to the standard(s) referred to in EN 13501-1, as specified in 4.7.3 of this standard.

4.7.2 Plants classified as Class A1 without the need for testing

The reaction to fire performance of a plant shall be declared as Class A1¹⁾ without the need for testing, provided that:

- a) each of the plant's constituent materials contains not more than 1 % of homogeneously distributed organic material, by mass or volume (whichever is the most onerous); and
- b) any external coating, if applied over the surface area of the plant, is made of inorganic material(s), which is/are also classified as Class A1.

¹⁾ See Decision of the Commission 96/603/EC of 1996-10-04 (see OJEU L 267 of 1996-10-19), as twice amended by 2000/605/EC of 2000-09-26 (see OJEU L 258 of 2000-10-12) and by 2003/424/EC of 2003-06-06 (see OJEU L 144 of 2003-06-12).

4.7.3 Plants classified according to test results

4.7.3.1 Principle

For the purpose of the reaction to fire performance of the plant each of its constituent materials, including those in surface coating of the plant, if any, shall be classified according to EN 13501-1 and only the lowest class of such materials shall be declared. The class of an individual constituent material shall be obtained as the result of the test method(s), relevant to this class, and as specified in the standards referred to in EN 13501-1.

NOTE A constituent material of the plant is considered as one which may have a significant effect on the reaction to fire performance of such a plant. According to the definitions given in EN 13501-1, this may be in the case of:

- a homogeneous plant, its material, or
- a non-homogeneous plant, its substantial component (i.e. a material that constitutes a significant part of such plant). A layer with a mass per unit area $\geq 1,0 \text{ kg/m}^2$ or a thickness $\geq 1,0 \text{ mm}$ is considered to be a substantial component.

Test specimens used for the test methods applicable for this classification shall be prepared according to EN 13501-1 and to the relevant standards referred therein.

In addition, with regard to the SBI test according to EN 13823, when applied, the test specimen shall be prepared and mounted as specified in 4.7.3.2.

4.7.3.2 Sizes and mounting of the test specimen

The test specimen of each constituent material shall be in accordance with EN 13823 in a flat-sheet form of the following sizes:

- short wing: $(495 \pm 5) \text{ mm} \times (1\ 500 \pm 5) \text{ mm}$,
- long wing: $(1\ 000 \pm 5) \text{ mm} \times (1\ 500 \pm 5) \text{ mm}$.

4.8 Noise level

The manufacturer shall declare the A-weighted emission sound pressure level (to be measured at 1 m distance from the plant). Measurements shall be performed according to EN ISO 20361. The pump shall operate in best efficiency point during this measurement.

If an A-weighted emission sound pressure level is above 80 dB, the sound power level shall be determined according to EN ISO 20361 and shall be declared.

Where the manufacturer declares that the A-weighted emission sound pressure level is equal to 70 dB, although it might be smaller, the manufacturer may state "70 dB(A)".

If the manufacturer declares a lower value of the sound pressure level than 70 dB(A) the plant shall be measured according to EN ISO 20361 and the corresponding test result shall be declared.

4.9 Durability

4.9.1 General

Lifting plants for wastewater containing faecal matter are products of known and stable performance for defined end use applications with respect to their established durability for which experience has been accumulated over a long period of time. Durability is ensured by meeting the requirements of this standard, which represent the state of the art.