BRITISH STANDARD

BS EN
12050-1:2001

Wastewater lifting plants for buildings and sites — Principles of construction and testing —

Part 1: Lifting plants for wastewater containing faecal matter

The European Standard EN 12050-1:2001 has the status of a British Standard

ICS 13.060.30; 91.140.80

National foreword

This British Standard is the official English language version of EN 12050-1:2001.

The UK participation in its preparation was entrusted to Technical Committee B/505, Wastewater engineering, 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 committee 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.

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This British Standard, having been prepared under the direction of the Sector Committee for Building and Civil Engineering, was published under the authority of the Standards Committee and comes into effect on 15 March 2001

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by July 2001, and conflicting national standards shall be withdrawn at the latest by October 2002.

This is the first part of a total of four parts of the standard series EN 12050 with the following titles:

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

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU directives.

For relationships with EU Directives, see informative annex Z, which is an integral part of this standard.

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 of this European Standard applies to lifting plants for wastewater containing faecal matter (referred to as "faecal lifting plants" in this standard), which may also be used to deal with wastewater that does not contain faecal matter, for drainage of locations in buildings and sites **below flood level** for buildings and sites to prevent any backflow of wastewater into the building. This part of the European Standard contains general requirements, basic construction and testing principles, together with information on materials and conformity evaluation. Construction and testing requirements for non-return valves used in faecal lifting plants are given in EN 12050-4.

NOTE For pumping installations for drain and sewer systems see also EN 752-6.

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 (including amendments).

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

EN 752-6, *Drain and sewer systems outside buildings — Part 6: Pumping installations.*

EN 1085:1997, *Wastewater treatment — Vocabulary.*

EN 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.*

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

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

EN 12639:2000, *Liquid pumps and pump units — Noise test code — Grade 2 and grade 3 of accuracy.*

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

ISO 9906, *Rotodynamic pumps — Hydraulic performance acceptance tests — Grades 1 and 2.*

3 Terms and definitions

For the purposes of this standard, the definitions given in EN 1085:1997 and the following apply.

3.1
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 A non-return valve according to EN 12050-4 is a component of the plant.

3.2
collection tank for wastewater containing faecal matter
unpressurized part of a faecal lifting plant in which the incoming wastewater is stored prior to lifting

3.3
useful volume
volume in the collection tank between switch-on level and switch-off level

3.4
pumping device for effluent containing faecal matter
component of a faecal lifting plant which pumps the wastewater out of the collection tank to a height above flood level

3.5
warning device
device which gives a signal if a malfunction occurs

3.6
initial testing (type testing)
testing to demonstrate that a plant conforms to all requirements of this standard

4 Requirements

4.1 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.

4.2 Collection tank for wastewater containing faecal matter

Other than inlet, outlet and venting openings, collection tanks shall be closed, watertight and odour tight.

The inside of the collection tank of a faecal lifting plant may be regarded as a zone containing potentially explosive gasses. In this respect the tank and other mechanical fittings are not subject to any particular requirements, provided that measures are taken to ensure that explosions cannot occur within the tank.

Collection tanks outside the building shall be covered (see EN 124) and watertight, their structural design shall be in accordance with EN 752-6.

4.3 Manufacturer's statement

The manufacturer shall state the hydraulic performance characteristics (head and flow) according to grade 2 of ISO 9906 together with the maximum power consumption and maximum current consumption.

5 Construction principles

5.1 Pumping of solids

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.

5.2 Pipe connections

The dimensions of inlet, discharge and ventilating connections shall permit the use of standard pipe sizes. Connections shall be flexible and shall withstand the maximum pump pressure without leaking.

5.3 Minimum dimensions of ventilating pipework

The connection of the ventilating pipework shall have a nominal diameter of at least DN 50.

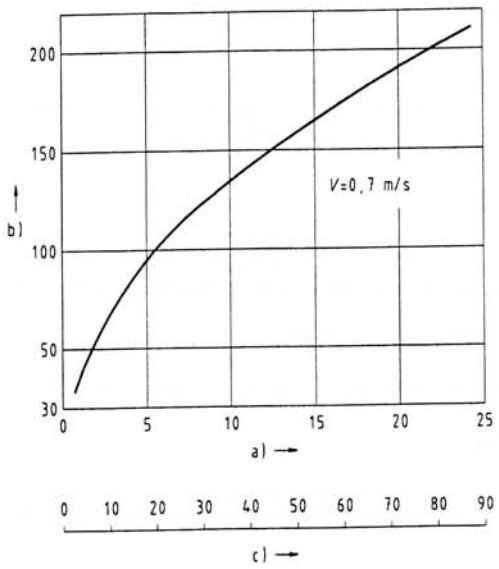
5.4 Minimum flow velocity

The flow velocity in the discharge pipework shall be at least 0,7 m/s at the duty point. The duty point shall be calculated according to EN 12056-4. The minimum flow rate shall be calculated in accordance with equation (1).

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

Where:

v is the minimum flow velocity in the discharge pipework = 0,7 m/s;
d_i is the pipe internal diameter in mm;
Q_{min} is the minimum flow rate in l/s.



Key
a) Flow rate Q in l/s
b) Pipe internal diameter d_i in mm
c) Flow rate Q in m^3/h

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

5.5 Minimum passage of the plant

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

5.6 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 required, the discharge connection shall be at least DN 50 and the ball passage of the non-return valve shall be at least 50 mm.

5.7 Minimum size of discharge pipework for macerating faecal lifting plants

Discharge connections, discharge pipework and non-return valves for macerating faecal lifting plants shall be at least DN 32.

5.8 Electrical equipment

Where required, electrical equipment installed in effluent lifting plants shall be explosion-proof. If only the wet end of the pump is in the potentially explosive zone there is no need for explosion-proof motors. The electrical equipment of the plant shall comply with at least Protection Type IP 44 to EN 60529, even where it is located in a well ventilated space and is not subject to possible flooding.

5.9 Fixing devices

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

6 Materials

Materials used shall be adequate to meet the demands of installation and operation; they shall comply with the requirements of this standard and shall not release dangerous substances. Examples of suitable materials for the construction of faecal lifting plants are given in annex B (informative). For materials where corrosion protection is necessary, such materials shall conform to the relevant corrosion protection requirements in force in the place of use of the plant.

7 Testing documentation and samples to be tested

For the initial testing, the following documentation shall be provided:

- drawings, including information on materials used;
- operating and maintenance instructions (acceptable in manuscript form).

The initial testing shall be carried out on the wastewater lifting plant with the lowest rated performance from each series.

8 Testing

8.1 General requirements

Testing shall be carried out on a plant that complies with the shape, dimensions and materials given in the testing documentation. The test shall demonstrate compliance with the requirements of this standard. The water temperature during the test shall not exceed 35 °C.

8.2 Test conditions

The hydraulic and electrical characteristics supplied by the manufacturer shall be confirmed, the hydraulic characteristics in accordance with grade 2 of ISO 9906, and shall conform to this standard. Before commencing testing, the pumping device shall be run continuously for at least 5 min. Testing of hydraulic and electrical characteristics shall be carried out over a period of 10 min to 15 min. Based on the hydraulic characteristics determined by testing, compliance with the minimum flow velocity given in 5.4 shall be checked.

8.3 Testing for leaks

8.3.1 Water pressure test

Water and odour tightness testing shall be carried out in a water-pressure test. During this test a faecal lifting plant full of water at a maximum temperature of 20°C shall withstand an overpressure of (0,50 ± 0,01) bar for 10 min without any visible leakage.

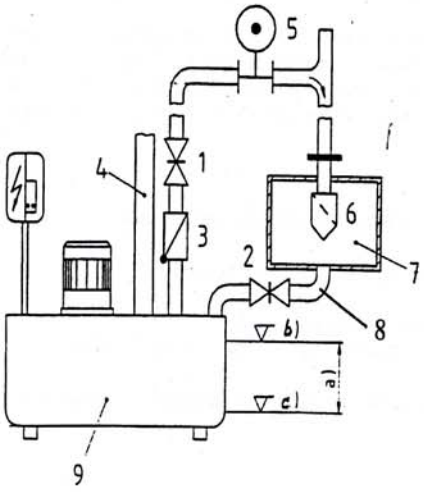
For watertightness only, testing shall be carried out by filling the tank with water at a maximum temperature at 20°C to the level to which the water may possibly rise. 24 h after the initial absorption period, there shall be no visible change in the water level.

8.3.2 Discharge pipe connection

The connection to the discharge pipework shall be tested for 10 min at the maximum operating pressure of the pumping device. No visible leakage of water is permitted.

8.4 Lifting effectiveness of the faecal lifting plant

The lifting effectiveness of the faecal lifting plant shall be tested using the arrangement shown in Figure 2 and using a test material of new woven floorcloths of 0,4 m × 0,25 m = 0,1 m^2 with a dry weight of 40 g ± 5 g (cut around all sides) and stored in water for 24 h.



Key

1	Shut-off valve	4	Vent	7	Tank	a)	Useful volume
2	Shut-off valve	5	Throttle	8	Inflow	b)	On
3	Non-return valve	6	Screen	9	Collection tank	c)	Off

Figure 2 — Testing arrangement

8.5 Test procedure

Regulate the inflow to the plant to cause the lifting device to turn on and off automatically. Calculate the duration of non pumping by dividing the useful volume of the collection tank by the maximum inflow to the plant stated by the manufacturer.

Test the operation, using water only, for a period of 10 min at the operating point, where $Q \times H$ is the maximum and a water temperature of 35°C ± 2°C. After this time no further heating of the water is required. Continue the test for a further 20 min, adding a total of three single floorcloths at intervals of 5 min.

During a further running period of 10 min without the addition of any further floorcloths, adjust the discharge head to give a flow velocity of 0,7 m/s in the discharge pipework.

Continue for a further 20 min, adding a total of three more single floorcloths at intervals of 5 min.

During this test a short reduction in the discharge output is acceptable provided that no failure of the plant occurs. All floorcloths shall have been pumped by the end of the test.

If a floorcloth has not been pumped, do not add a further floorcloth and the plant shall be considered to have failed the test. However, if a floorcloth becomes imbedded in the centre of the impeller, it shall be removed after 15 min and the test continued without the plant being considered to have failed; the lifting effectiveness shall not be seriously affected if there is a floorcloth in the centre of the impeller.

If the faecal lifting plant does not suffer any breakdown during the entire test, it shall be considered to have passed the test.

8.6 Macerating faecal lifting plants

In the case of macerating faecal lifting plants, the floorcloths shall be cut by the lifting plant into a number of individual parts where the diagonal dimension is smaller than the internal diameter of the discharge pipework during the test described in 8.5 (see A.2).

9 Conformity evaluation

9.1 General requirements

To demonstrate conformity with this standard the products manufactured shall be subjected to the following evaluation procedures:

- initial testing of the products (type testing) according to clause 8 and A.3 of this standard;
- factory production control to be carried out by the manufacturer (internal conformity evaluation) according to 9.3 of this standard.

If third party control is carried out other than required in annex Z, due to national requirements for example, this should be carried out in accordance with annex C (informative).

9.2 Initial testing of the products (type testing)

The type tests in accordance with clause 8 and A.3 of this standard shall be carried out on first application of this standard in order to demonstrate compliance with the requirements of this standard. Where these characteristics have been determined by the components supplier, they need not to be retested by the lifting plant manufacturer. Tests previously performed in accordance with the provisions of the standard (same product, same characteristic(s), test method, sampling procedure, system of attestation of conformity, etc.) may be taken into account.

For tanks made on site, watertightness shall not be part of the initial type test, but the watertightness of the tank shall be verified according to 8.3.1 or EN 12566-1 after installation. For wastewater lifting plants, where the tank is made on site, noise emission is not required for initial type testing.

Whenever a change occurs in the design, the raw material, components, supplier of the components or the production process, which would change significantly one or more of the stated characteristics, the type tests shall be repeated for the appropriate characteristic(s).

9.3 Factory production control (FPC) carried out by the manufacturer (internal conformity evaluation)

The FPC shall be carried out according to Table 1.

The manufacturer shall establish, document and maintain an FPC system to ensure that the products, placed on the market, conform with the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of results to control raw and other incoming materials or components, the production process and the product, and shall be sufficiently detailed to ensure that the conformity of the product is apparent.

An FPC system conforming with the requirements of EN ISO 9001 and/or EN ISO 9002 and made specific to the requirements of this standard, is considered to satisfy the above requirements.

The manufacturer shall have the following available:

- an organization chart with information on the person responsible for the conformity evaluation system;
- trained personnel;
- the required production equipment;
- the required test equipment.

The manufacturer shall provide written procedures for the following:

- control of the test reports;
- control of defective products, storage, handling and marking;
- the handling of customer complaints;
- the calibration and checking of measuring and test equipment.

Table 1 — Internal production control carried out by the manufacturer

No.	Characteristics	Frequency	Requirement as per clause
1	Principles of construction Marking Visual examination to determine that the device is complete, able to function and free from defects	per plant	5 and 10
2	Dimensions	Samples *)	5.2 5.3 5.5 5.6, or 5.7
3	Materials Use of the materials in accordance with the initial type test	Samples *)	8
4	Hydraulic values Water tightness	Samples *)	8.2 8.3
*) The frequency and extent of sampling depends on the production program, the scale of production and the manufacturing process in each factory. At least one part per production day and type shall, however, be checked. Where these characteristics have been determined by the components supplier, they need not be retested by the lifting plant manufacturer.			

9.4 Non-conforming products

All non-conforming products shall be separately stored and excluded from delivery, and instructions shall be given for further handling, storage and marking.

If during the factory production control non-conforming products are detected, the manufacturer shall investigate the cause of the defect and take appropriate corrective actions, e.g. stop the production related to the failure(s) and/or quarantine the defective product.

Only after a thorough examination and correction of the fault and a subsequent successful final inspection shall the evaluating personnel make a decision on recommencing production.

10 Marking

Faecal lifting plants complying with this standard shall be marked in a permanent and legible manner with the manufacturer's symbol[1)] and EN 12050-1.

11 Installation, operation and maintenance

The installation of faecal lifting plants shall be carried out in accordance with EN 12056-4 and the manufacturer's written instructions.

Faecal lifting plants shall be operated and maintained in order to achieve proper operation. All components shall be maintained in accordance with the manufacturer's written instructions. Only collection tanks made of corrosion resistant material may be buried.

1) The manufacturer is also the person under whose name the product is sold.

Annex A
(normative)

Additional requirements

A.1 Need for a stand-by pumping device

In cases where it is not possible to interrupt the inflow into the lifting plant during normal operation, the lifting plant shall be equipped with a stand-by pumping device of the same capacity, which starts automatically where necessary.

A.2 Faecal maceration

Faecal maceration is not the preferred solution and should be restricted to special cases, where small bore pipework is necessary for economic reasons.

A.3 Noise suppression

Where required and where the noise output is above 70 dB, the test shall be performed to EN 12639:2000. In addition, if the A-weighted emission sound pressure level is above 80 dB, the sound power level shall be reported. Where the A-weighted sound power level is below 70 dB, the manufacturer may state "70 dB" without the need for testing, unless he claims a better value in which case the plant shall be measured according to EN 12639:2000 and the corresponding test result shall be stated.

Annex B
(informative)

Recommended Materials

Experience has shown that the following materials are suitable for faecal lifting plants.

Table B.1 — Examples of suitable materials for faecal lifting plants

Material	
Flake graphite cast iron	ISO 185
Cast iron with nodular graphite	ISO 1083
Stainless steel	EN 10088-1
Steel	
Fibre glass reinforced plastic	
Sulphate resistant concrete	
Sulphate resistant reinforced concrete	
Polyethylene (PE)	
Polypropylene (PP)	
Acrylonitrile-Butadiene-Styrol (ABS)	
Acrylester-Styrol-Acrylonitrile (ASA)	
Unplasticized poly(vinyl chloride) of high impact resistance (PVC-HI)	
Nitrile rubber	

Metallic materials of Table B.1 which come into contact with the effluent and are not themselves resistant to corrosion should have a minimum wall thickness of 4 mm.

In the case of plastic components, materials of unknown and unsupervised composition should not be used. Details of the composition of non standardized materials should be retained by the manufacturer. Modifications to the specification should not be carried out. If any modifications are proposed, the manufacturer should consider the need for initial type testing according to clause 9.