BS EN 12566-3:2016

BSI Standards Publication

Small wastewater treatment systems for up to 50 PT

Part 3: Packaged and/or site assembled domestic wastewater treatment plants

bsi.

National foreword

This British Standard is the UK implementation of EN 12566-3:2016. It supersedes BS EN 12566-3:2005+A2:2013 which is withdrawn.

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

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

Small wastewater treatment systems for up to 50 PT - Part 3: Packaged and/or site assembled domestic wastewater treatment plants

Petites installations de traitement des eaux usées jusqu'à 50 PTE - Partie 3: Stations d'épuration des eaux usées domestiques fabriquées en usine et/ou assemblées sur site

Kleinkläranlagen für bis zu 50 EW - Teil 3: Vorgefertigte und/oder vor Ort montierte Anlagen zur Behandlung von häuslichem Schmutzwasser

This European Standard was approved by CEN on 25 June 2016.

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.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 12566-3:2016) 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of an identical text or by endorsement, at the latest by February 2017, and conflicting national standards shall be withdrawn at the latest by May 2018.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 document supersedes EN 12566-3:2005+A2:2013.

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 EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

The differences between this version and EN 12566-3:2005+A2:2013 are mainly editorial changes according to the Construction Product Regulation (CPR) and declaration of power consumption and desludging during treatment efficiency test.

The standard series EN 12566 "Small wastewater treatment systems for up to 50 PT" contains the following parts (see Figure 1):

— *Part 1: Prefabricated septic tanks*;

— *Part 3: Packaged and/or site assembled domestic wastewater treatment plants (this document)*;

— *Part 4: Septic tanks assembled in situ from prefabricated kits*;

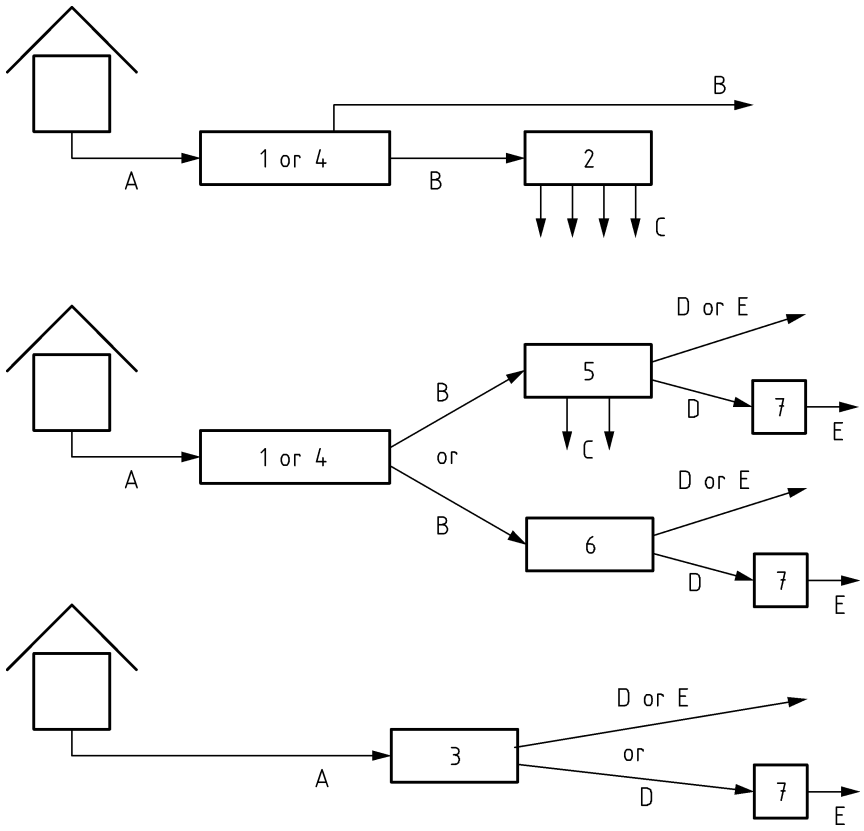
— *Part 6: Prefabricated treatment unit used for septic tank effluent*;

— *Part 7: Prefabricated tertiary treatment unit*

For filtration systems, CEN/TC 165 decided to publish the following CEN Technical reports, which are considered as Code of practices and do not specify treatment requirements:

— *Part 2: Soil infiltration systems*

— *Part 5: Pre-treated Effluent Filtration systems*



Key

A	domestic wastewater	1	prefabricated septic tank
B	septic tank effluent	2	soil infiltration system
C	treated infiltrated effluent	3	packaged and/or site assembled domestic wastewater treatment plant
D	treated wastewater	4	septic tank assembled *in situ* from prefabricated kit
E	tertiary treated wastewater	5	pre-treated effluent filtration system
		6	prefabricated treatment unit used for septic tank effluent
		7	prefabricated tertiary treatment unit

National regulations may specify different arrangements between the products described in the standard series EN 12566.

Figure 1 — Scheme related to the arrangement of the parts of EN 12566

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 specifies requirements, test methods, the marking and evaluation of conformity for packaged and/or site assembled domestic wastewater treatment plants (including guest houses and businesses) used for populations up to 50 inhabitants. Small wastewater treatment plants according to this European Standard are used for the treatment of domestic wastewater.

It covers plants made of concrete, steel, PVC-U, Polyethylene (PE), Polypropylene (PP), Glass Reinforced Polyester (GRP-UP), Polydicyclopentadiene (PDCPD), PVC and EPDM.

The test methods specified in this European Standard establish the performance of the plant, needed to verify its suitability for the end use (see 5.2).

This European Standard applies to small wastewater treatment plants for use buried in the ground where no vehicle loads are applied to the product.

This European Standard applies to plants where all prefabricated components are factory or site-assembled by one manufacturer and which are tested as a whole.

NOTE In some countries, domestic wastewater treatment plants are followed by other systems to conform to national regulations.

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 206, *Concrete — Specification, performance, production and conformity*

EN 580, *Plastics piping systems — Unplasticized poly(vinyl chloride) (PVC-U) pipes — Test method for the resistance to dichloromethane at a specified temperature (DCMT)*

EN 727, *Plastics piping and ducting systems — Thermoplastics pipes and fittings — Determination of Vicat softening temperature (VST)*

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 976-1:1997, *Underground tanks of glass-reinforced plastics (GRP) — Horizontal cylindrical tanks for the non-pressure storage of liquid petroleum based fuels — Part 1: Requirements and test methods for single wall tanks*

EN 978:1997, *Underground tanks of glass-reinforced plastics (GRP) — Determination of factor alpha and factor beta*

EN 1905, *Plastics piping systems — Unplasticized poly(vinyl chloride) (PVC-U) pipes, fittings and material — Method for assessment of the PVC content based on total chlorine content*

EN 10088-1, *Stainless steels — Part 1: List of stainless steels*

EN 12311-2, *Flexible sheets for waterproofing — Determination of tensile properties — Part 2: Plastic and rubber sheets for roof waterproofing*

EN 13369, *Common rules for precast concrete products*

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

EN 14150, *Geosynthetic barriers — Determination of permeability to liquids*

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

EN ISO 178, *Plastics — Determination of flexural properties (ISO 178)*

EN ISO 179 (all parts), *Plastics — Determination of Charpy impact properties (ISO 179, all parts)*

EN ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

EN ISO 899-2, *Plastics — Determination of creep behaviour — Part 2: Flexural creep by three-point loading (ISO 899-2)*

EN ISO 1133-1:2011, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method (ISO 1133-1:2011)*

EN ISO 1133-2, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 2: Method for materials sensitive to time-temperature history and/or moisture (ISO 1133-2)*

EN ISO 1183 (all parts), *Plastics — Methods for determining the density and relative density of non-cellular plastics (ISO 1183, all parts)*

EN ISO 2505:2005, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters (ISO 2505:2005)*

EN ISO 2555, *Plastics — Resins in the liquid state or as emulsions or dispersions — Determination of apparent viscosity by the Brookfield Test method (ISO 2555)*

EN ISO 9967, *Thermoplastics pipes — Determination of creep ratio (ISO 9967)*

EN ISO 9969, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969)*

EN ISO 13229, *Thermoplastics piping systems for non-pressure applications — Unplasticized poly(vinyl chloride) (PVC-U) pipes and fittings — Determination of the viscosity number and K-value (ISO 13229)*

EN ISO 14125:1998, *Fibre-reinforced plastic composites — Determination of flexural properties (ISO 14125:1998)*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16323:2014 and the following apply.

3.1.1
end use
condition in which a plant is normally installed

3.1.2
laboratory
body capable of testing a domestic wastewater treatment plant under controlled conditions

3.1.3
packaged domestic wastewater treatment plant
prefabricated factory-built wastewater treatment installation which accepts domestic wastewater and treats it to a declared quality

3.1.4
product family
group of products in which, for the purpose of evaluation, the selected property(s) is/are similar for all products within the group

Note 1 to entry: The definition of family takes into account at least similar shape, equipment, materials and conditions of end use and ensures the minimum hydraulic efficiency and minimum structural behaviour for all the products in the range.

Note 2 to entry: The minimum level of performance (hydraulic efficiency and structural behaviour) are given by the test carried out on one model of the family.

3.1.5
site assembled domestic wastewater treatment plant
unit composed of prefabricated components assembled on one site by one manufacturer, which accepts domestic wastewater and treats it to a declared quality

3.1.6
extension shaft
component(s) which, when placed on the top of the plant, allow access from or slightly above the ground surface

Note 1 to entry: It permits accessibility and maintenance work.

Note 2 to entry: It may be either a vertical extension piece of the tank, or components, which are fitted only over certain points for example to allow maintenance or observation.

3.1.7
nominal designation
expressed as an integer giving the maximum number of population equivalent appropriate to the plant

3.2 Symbols and abbreviated terms

BOD_5 (or BOD_7)	Biochemical oxygen demand at 5 or 7 days
SS	Suspended solids
KN	Kjeldahl Nitrogen
NH_4-N	Ammonium nitrogen
COD	Chemical oxygen demand
PE	Polyethylene
PVC-U	Unplasticized Polyvinyl Chloride

GRP	Glass reinforced plastic
PP	Polypropylene
PDCPD	Polydicyclopentadiene
HDPE	High Density Polyethylene
PVC	Polyvinyl Chloride
EPDM	Ethylene Propylene Diene Monomer
PT	Population total
P	Phosphorus
MFR	Melt mass-flow rate
QN	Nominal hydraulic flow

4 Product characteristics

4.1 Design

4.1.1 General

Plants shall be structurally stable, durable, watertight and corrosion resistant.

Raw wastewater shall not discharge to an open surface product.

Where electrical, mechanical or hydraulic malfunction of the unit could lead to any failure, it shall be provided with an alarm to indicate such failure. The functionality of the alarm shall be verified as referenced in Table B.2.

4.1.2 Inlets, outlets, internal pipework and connections

The minimum internal diameter of inlet and outlet pipes for gravity flow is specified below:

— 100 mm for nominal hydraulic daily flow ≤ 4 m^3/d;

— 150 mm for nominal hydraulic daily flow > 4 m^3/d.

The hydraulic design of the equipment, the internal pipework and connections shall ensure that no back-flows, blockage or surcharging occur during normal operation.

Inlet and outlet pipes shall be compatible with pipe systems in accordance with European Standards.

4.1.3 Access

The design shall provide access to the inlet and outlet areas; this access may allow routine maintenance sampling, removal of sludge, cleaning and maintenance.

Extension shafts and access covers shall be fit for purpose.

An opening with a dimension (i.e. width for rectangular section or diameter for circular section) of a minimum 400 mm shall be required. For an open unit, access is not required.

NOTE 1 For installation purposes of open units, there may be local regulations for maintenance access.

NOTE 2 The requirements to provide facility for the access of a person into the plant may depend on applicable regulations, valid in the member state for the intended end use conditions. For example, the minimum dimension of the opening for the access of a person in EN 476 is 600 mm.

The access dimensions shall be declared. Assessment of access dimension shall be carried out by a measurement with accuracy of 0,5 % of the dimension.

The plant shall be designed to restrict unauthorized access by one of the following means:

a) mass of the individual covers;

b) securing feature; or

c) locking accessory.

Where a locking accessory or securing feature is used, it shall be designed so that the cover cannot be easily opened with objects readily accessible by children.

4.1.4 Sizing basis

Rules and units (per inhabitant, BOD, SS…) to be used for the determination of the population load are given by national regulations.

Depending on the end use, one or more of the following design criteria shall be taken into consideration:

a) population load;

b) minimum and maximum daily loading that a plant can accept;

c) minimum volume criteria;

d) additional design criteria for domestic wastewater flows from sources such as hotels, restaurants or commercial premises. These additional design criteria are chosen according to the national codes of practice and/or regulations valid in the country of use of the plant.

The manufacturer shall declare the desludging frequency.

4.1.5 Overall dimensions

The overall dimensions of the plant (i.e. height, width, length, diameters, etc.) shall be measured and declared together with a tolerance.

Assessment of overall dimensions shall be done by measurement with accuracy of ± 0,5 % of the dimension.

4.2 Load bearing capacity

The small wastewater treatment plant shall resist the loads resulting from handling, installation and use including desludging and maintenance, for their design life.

When tested according to 5.1, the load bearing capacity of the small wastewater treatment plant is declared as:

— maximum allowed height of backfill (in meters);

— possibility to install the plant in wet or dry site, expressed as WET with the indication of the maximum height of the water table measured from the base of the plant or DRY.

4.3 Treatment efficiency

The plant shall demonstrate compliance with the wastewater treatment efficiency performances and the related operational data declared by the manufacturer, when tested according to Annex B.

The manufacturer's declaration shall be expressed in terms of the treatment efficiency ratios on COD, BOD, SS, nitrogen parameters and total phosphorus in relation to the tested organic daily load as indicated in B.4. The calculation method is provided in 5.2.

Any treatment efficiency ratio (R) declared for a given daily load shall not be greater than the mean value of the treatment efficiency ratio obtained during the test made according to Annex B. In addition, another way of expression of the efficiency may be used for BOD, COD and suspended solid.

EXAMPLE Minimum and maximum concentrations of the effluent and the influent.

The ratios obtained do not automatically mean that the regulatory requirements on effluent qualities in a given country are met. A calculation should be made to indicate the final effluent qualities that should be compared to the requirements valid in the place of use.

These ratios may not always be obtained when the plant is operating in practice.

In addition, the number of desludging procedures carried out during the test according to Annex B, shall be declared. The declared value for desludging frequency shall be higher or equal to the measured value during the test.

Where required, i.e. by national regulations, parameters described in B.2.4 shall be declared.

4.4 Watertightness

4.4.1 General

The plant shall meet at least one of the requirements given in 4.4.2 to 4.4.4 when tested according to the methods described in Annex A.

4.4.2 Water test

When tested according to A.2, the water loss for plants shall be measured after 30 min. For tanks made of concrete it shall be ≤ 0,1 l/m^2 of the internal wet surface of the external walls. For tanks made from plastics or other material, no leakage shall occur.

4.4.3 Vacuum test

When tested according to A.3, the plant shall be deemed watertight when the vacuum pressure selected for the test does not deviate by more than 10 % of the selected pressure.

4.4.4 Pneumatic pressure test

The plant is considered to be watertight when:

— tested in the conditions given in A.4.2 a), the pneumatic pressure selected for the test does not deviate by more than 0,5 kPa (0,005 bar) during the related test period; or

— tested in the conditions given in A.4.2 b), the variation of the initial pneumatic pressure (equal to 0,3 bar) is less than 3 kPa (0,03 bar) during 180 s.

4.5 Durability

4.5.1 General

Plants including all internal components shall be manufactured from materials that make them suitable for use in a wastewater environment.

The material(s) used shall comply with 4.5.2 to 4.5.9 as appropriate.

4.5.2 Concrete

The compressive strength shall be greater or equal to class C 35/45 in accordance with EN 206.

EN 13369, Table A.2 and A.2 shall apply for concrete cover of tanks made of steel reinforced concrete.

4.5.3 Steel

The grade of steel and type of coatings (where applicable) shall be in accordance with those specified in EN 858-1.

4.5.4 Unplasticized polyvinyl chloride (PVC-U)

The characteristics of the PVC-U used for the plant shall be:

— PVC content: at least 80 % of mass determined according to EN 1905;

— K-value: 57 ≤ K-value ≤ 70, determined according to EN ISO 13229;

— Vicat softening temperature (VST): VST ≥ 79 °C, determined according to EN 727;

— density (D): 1 390 kg/m^3 ≤ D ≤ 1 500 kg/m^3, determined according to EN ISO 1183;

— gelation: expressed as resistance to dichloromethane. Determination according to EN 580, light attack at the chamfered wall up to 50 % at a temperature of 15 °C for 30 min;

— longitudinal reversion: ≤ 4,0 %. Determination in accordance with method A of EN ISO 2505:2005.

4.5.5 Polyethylene (PE)

4.5.5.1 Rotational moulding

The characteristics of the PE-rotational moulding used for the plant shall be:

— MFR = (4,0 ± 3,0) g/10 min according to EN ISO 1133-1:2011 (under 2,16 kg and 190 °C);

— density ≥ 930 kg/m^3 according to EN ISO 1183;

— tensile properties, determined according to EN ISO 527-2, test piece type 1B, test temperature (23 ± 2) °C and test speed 100 mm/min on test pieces taken from the tank:

  — tensile stress at yield: ≥ 14 MPa;

  — tensile strain at yield: ≤ 25 %;

  — tensile strain at break: ≥ 80 %.

4.5.5.2 Blow moulding

The characteristics of the PE-blow moulding used for the plant shall be:

— 2,0 g/10 min ≤ MFR ≤ 12,0 g/10 min according to EN ISO 1133-1:2011 (under 21,6 kg and 190 °C);

— density ≥ 940 kg/m³ according to EN ISO 1183;

— tensile properties, determined according EN ISO 527-2, test piece type 1B, test temperature (23 ± 2) °C and test speed 100 mm/min on test pieces taken from the tank:

  — tensile stress at yield: ≥ 19 MPa;

  — tensile strain at yield: ≤ 25 %;

  — tensile strain at break: ≥ 200 %.

4.5.5.3 Extrusion

The characteristics of the PE-extrusion used for the plant shall be:

— 0,15 g/10 min ≤ MFR ≤ 1,0 g/10 min according to EN ISO 1133-1:2011(under 5,00 kg and 190 °C);

— density ≥ 930 kg/m³ according to EN ISO 1183;

— tensile properties, determined according to EN ISO 527-2, test piece type 1B, test temperature (23 ± 2) °C and test speed 100 mm/min on test pieces taken from the tank:

  — tensile stress at yield: ≥ 21 MPa;

  — tensile strain at yield: ≤ 25 %;

  — tensile strain at break: ≥ 200 %.

4.5.6 Glass reinforced plastic (GRP)

The characteristics of the GRP used for the plant shall be:

— material shall be constructed using resins, reinforcement materials, processing agents and other materials in accordance with EN 976-1:1997, Clause 3;

— creep factor (α_{material}) shall be ≥ 0,3. It is determined by using the following formula:

$$\alpha_{\text{material}} = \frac{E_t}{E_{f,i}} \tag{1}$$

where

initial flexural modulus (E_{fi}) is determined at (23 ± 5) °C according to EN ISO 14125:1998, method A and corrigendum 1;

long term flexural modulus (E_t) is determined according to EN ISO 899-2 (temperature (23 ± 5) °C; extrapolation procedure according to EN ISO 9967);

— ageing factor (β) shall be ≥ 0,3. It is determined by using the following formula:

$$\beta = \frac{E_{f,\text{aged}}}{E_{f,i}} \tag{2}$$

where

$E_{f,\text{aged}}$ and $E_{f,i}$ are determined according to the following procedure:

a) specimen samples of laminate from the plant shall be prepared. The exposed edges shall be coated with the resin used in the manufacture of the plant. The samples shall be post-cured in air at (50 ± 2) °C for a minimum of 72 h;

b) half of the specimen samples shall be immersed in water for (1 000 ± 16) h at (50 ± 1) °C or alternatively for (3 000 ± 16) h at (40 ± 1) °C. The flexural modulus ($E_{f,\text{aged}}$) shall be determined according to method A of EN ISO 14125:1998 at (23 ± 5) °C;

c) half of the specimen samples shall be stored for the time as above at (23 ± 5) °C. The flexural modulus ($E_{f,i}$) shall be determined according to method A of EN ISO 14125:1998 at (23 ± 5) °C.

4.5.7 Polypropylene (PP)

4.5.7.1 Injection moulding

The characteristics of the PP-injection moulding used for the plant shall be:

— MFR (230/2,16) = (5,0 ± 3,0 g)/10 min according to EN ISO 1133;

— density ≥ 905 kg/m^3 according to EN ISO 1183;

— yield stress ≥ 30 MPa according to EN ISO 527-2, test temperature (23 ± 2) °C.

4.5.7.2 Extrusion

The characteristics of the PP-extrusion used for the plant shall be:

— MFR (230/2,16) = (0,5 ± 0,1) g/10 min according to EN ISO 1133;

— density ≥ 908 kg/m^3 according to EN ISO 1183;

— yield stress ≥ 30 MPa according to EN ISO 527-2, test temperature (23 ± 2) °C.

4.5.7.3 Injection moulding with foam

The characteristics of Injection moulding with foam shall be:

— MFR (230/2,16) = (5,0 ± 3,0) g/10 min according to EN ISO 1133;

— density ≥ 720 kg/m^3 according to EN ISO 1183;

— yield stress ≥ 24 MPa according to EN ISO 527-2, flexural strength ≥ 30 MPa according to EN ISO 178, compressive strength ≥ 450 MPa according to EN ISO 179, test temperature (23 ± 2) °C.

4.5.8 PDCPD

The characteristics of RIM (Reaction Injection Moulding) moulded PDCPD polydicyclopentadiene used for unit shall be:

— brookfield viscosity of both A and B components before injection: > 210 × 10^{-3} Pa.s at (30 ± 1) °C according to EN ISO 2555;

— density: higher than 1 000 kg/m^3 at (23 ± 2) °C;

— tensile properties, determined according to EN ISO 527-2 (traction speed = 50 mm/min):

  — E Modulus: higher than 1 650 MPa;

  — stress at yield: higher than 40 MPa;

  — elongation at yield: higher than 3 %.

4.5.9 Flexible sheets

The characteristics of flexible sheets used for the small wastewater treatment plant shall be according to Table 1.

Table 1 — Characteristics of flexible sheets

Material	**Thickness**	**Weight** (g/m^2)	**Tensile test** (kN/m) **at elongation 250 %** (EN 12311–2)	**Permeability to liquid (**EN 14150**)**
HDPE	≥ 1,5 mm	> 1 400	≥ 17	Conform
PP	≥ 1 mm	> 800	≥ 5	Conform
PVC	≥ 0,9 mm	> 1 300	≥ 7	Conform
EPDM	≥ 1 mm	> 1 050	≥ 5	Conform

4.6 Reaction to fire

4.6.1 General

Where use of a small wastewater treatment plant is subject to national regulatory requirements on reaction to fire, its reaction to fire performance shall be considered as one 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 4.6.2, or otherwise; or

b) class, defined according to the results of testing of the material(s) used in the plant, according to the standard(s) referred to in EN 13501-1, as specified in 4.6.3

NOTE In most cases Class E is considered to be sufficient as a minimum regulatory requirement for the reaction to fire performance of units used in buried (i.e. underground) applications.

Conversely, where use of such a unit is not subject to national regulatory requirements on reaction to fire, either class, determined according to a) or b) or “No Performance Determined” (NPD) may be declared.

4.6.2 Plants classified as Class A1 without the need for testing

The reaction to fire performance of a plant shall be declared as Class A1 [1)] without the need for testing, provided that:

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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*).

a) each of the constituent materials that the tank of the plant is made of, contains not more than 1 % of homogeneously distributed organic material, by mass or volume (whichever is the most onerous), and

EXAMPLE In general, precast reinforced concrete used for small wastewater treatment plant may contain organic materials (e.g. admixtures, additives) if any, but their level is far below 1 %. Similarly also steel, used for the same purpose, is not used in a finely divided form. Thus, on account of their low level of combustibility and subject to the conditions set out (see Footnote 1) both materials may be considered, without testing, as Class A1 materials for their reaction to fire performance.

b) any external coating, if applied over the surface area of the tank, is made on inorganic material(s), which is/are also classified as Class A1.

4.6.3 Plants classified according to the test results

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.

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

— homogeneous unit: its material; or

— non-homogeneous unit: its substantial component, i.e. a material that constitutes a significant part of such unit. A layer with a mass per unit area ≥ 1,0 kg/m^2 or a thickness ≥ 1,0 mm is considered to be a substantial component.

EXAMPLE In general, this may be considered relevant for the plant where the tank is made from one or more of the following constituent materials: unplasticized polyvinylchloride (PVC-U), polyethylene (PE), glass reinforced polyester (GRP-UP), polypropylene (PP) and polydicyclopentadiene (PDCPD); or the container is made from flexible sheets (HDPE, PP, PVC, OR EPDM), with or without surface coating.

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.

4.7 Power consumption

The power consumption of the plant shall be declared by the manufacturer.

It shall be measured during the test described in Annex B and shall be expressed as the consumption for the normal operating conditions (nominal sequences of the test) in kWh/d.

The declared power consumption value shall be higher or equal to the measured value during the test.

Assessment of power consumption shall be done by measurement with accuracy of ± 5 % of the result.

4.8 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets. In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through: http://ec.europa.eu/enterprise/construction/cpd-ds/

5 Testing, assessment and sampling methods

5.1 Load bearing capacity

5.1.1 Generals

The load bearing capacity of the small wastewater treatment plant (i.e. of the tank of this plant) shall be established:

— either by calculation with the knowledge of basic data for material and loads (see 5.1.2);

— or by test directly on the tank of the plant (see 5.1.3).

Where the small wastewater treatment plant includes watertight extension shaft, and/or the unit is installed in a wet site, the relevant loads at the maximum installed depth of the plant and the declared height of the water table shall be taken into account and appropriate tests or calculations made to prove the load bearing capacity of the plant.

For a plant made of flexible sheets, the pit test (see C.5) only shall be used.

For a plant made of PDCPD, the direct test (see 5.1.3) only shall be used.

5.1.2 Load bearing capacity determined by calculation

5.1.2.1 General

The calculation shall be made based on an empty tank buried underground.

One of the following two methods may apply:

— Method 1: Indirect method usable for all materials by declaring the following parameters:

  — Geometrical data of the plant: e.g. wall thickness, distance of ribs, shape;

  — Properties of the materials and components: All parameters given in chapter durability (see 4.5 and Annex D).

The manufacturer shall provide the calculation results according to the calculation method valid in the place of use in the installation instructions in terms of height of backfill and possibility to install the plant in a wet or dry site with the indication of the height of the water table measured from the base of the plant.

— Method 2: Directly declaring the performance using the applicable Eurocode:

  — Eurocode 2 (EN 1992-1-1) for concrete (where applicable);

  — Eurocode 3 (EN 1993-1-1) for steel (where applicable).

The manufacturer shall provide the calculation results according to the relevant Eurocode in terms of height of backfill and possibility to install the plant in a wet or dry site with the indication of the height of the water table measured from the base of the plant.

5.1.2.2 Backfill loads

Calculation of backfill loads shall take account of the effect of ground conditions, backfill materials and tank shape factors. A vertical and a horizontal component shall be calculated as follows:

— vertical component: $H \times 18$ (expressed in kN/m²), where 18 (kN/m³) is the specific weight of the soil and H is the height (in meter) of backfill;

— horizontal component: $K \times D \times 18$ (expressed in kN/m²), where D (in meter) is the distance from the ground level to the point where the load applies:

— Following K coefficient applies depending on the backfill type:

  — sand: $K = 0{,}33$;

  — gravel: $K = 0{,}27$;

  — other backfill materials: $K = 0{,}5$.

5.1.2.3 Hydrostatic loads

A vertical and a horizontal component shall be calculated as follows:

— vertical component: $H_w \times 10$ (expressed in kN/m²), where 10 (kN/m³) is the action resulting from the specific weight of water and H_W is the declared water table level (in meter) from the base of the plant;

— horizontal component: $D \times 10$ (expressed in kN/m²) where D is the distance (in meter) from the ground level to the point where the load applies.

On sites where the groundwater table is significant (the highest level of the groundwater table is above the bottom of the tank), the stability conditions of the product in relation to the water pressure shall be indicated in the manufacturer's instructions. In this case, the specific load of soil is 10 kN/m³ and shall be added to the water load.

5.1.2.4 Pedestrian loads

For pedestrian loads a value of 2,5 kN/m² shall be considered in calculation only when the height of the backfill (H) is less than or equal to 1 m. Over 1 m, the pedestrian loads do not need to be taken into account for calculation, as it is assumed to be negligible against other loads.

5.1.3 Load bearing capacity determined by testing

The load bearing capacity of the small wastewater treatment plant shall be established by testing according to Annex C.

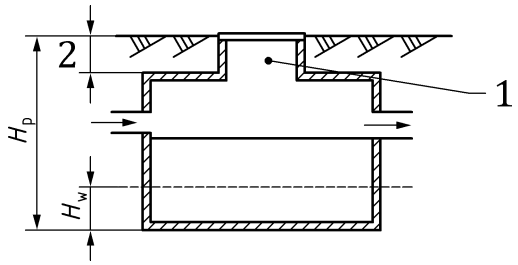
The test results shall ensure that the load bearing capacity under the declared height of backfill is ensured.

When tested according to:

— C.5 (pit test), the unit shall be installed according to the manufacturer’s indication for the maximum declared height of backfill and possibility to install the plant in WET or DRY site.

— C.2.1 and C.2.2 (crushing resistance test), the height of backfill shall be the minimum of H_1 or H_2 calculated according to Table 2.

— C.4 (vacuum test), the height of backfill shall be the minimum of H_1 or H_2 calculated according to Table 3.



Key

1 extension shaft

2 H_1 or H_2

Figure 2 — Definition of parameters

Table 2 — Formulae for height of backfill calculation after crushing resistance test

Vertical load

$$H_1 = \frac{\frac{F}{1{,}6 \times S_1} - 10 \times H_W - 2{,}5}{18}$$

where:

- F is the crushing load (kN);
- S_1 is the horizontal surface of the plant (m^2);
- H_W is the height of the groundwater table measured from the bottom of the plant (m);
- H_1 is the height of backfill (m).

Horizontal load

$$H_2 = \frac{\frac{F}{1{,}6 \times S_2} - 10 \times H_W - 18 \times K \times H_p}{18 \times K}$$

where:

- K is the coefficient (see 5.1.2.2);
- F is the crushing load (kN);
- S_2 is the lateral surface of the plant (m^2);
- H_W is the height of the groundwater table measured from the bottom of the plant (m);
- H_p is the height from the bottom to the top of the plant (m) (extension shaft excluded);
- H_2 is the height of backfill (m).

Table 3 — Formulae for height of backfill calculation after vacuum test

Vertical load

$$H_1 = \frac{\frac{P \times f}{1{,}5} - 10 \times H_W - 2{,}5}{18}$$

where:

- P is the underpressure (kPa);
- f is the coefficient (see C.5);
- S_1 is the horizontal surface of the plant (m^2);
- H_W is the height of the groundwater table measured from the bottom of the plant (m);
- H_1 is the height of backfill (m).

Horizontal load

$$H_2 = \frac{\frac{P \times f}{1{,}5} - 10 \times H_W - 18 \times K \times H_p}{18 \times K}$$

where:

- K is the coefficient (see 5.1.2.2);
- P is the underpressure (kPa);
- f is the coefficient (see C.5);
- S_2 is the lateral surface of the plant (m^2);
- H_W is the height of the groundwater table measured from the bottom of the plant (m);
- H_p is the total height of the plant (m);
- H_2 is the height of backfill (m).

5.2 Treatment efficiency

The treatment plant shall be tested according to Annex B.

Each efficiency ratio is calculated using the following formula:

$$R = \frac{P_i - P_o}{P_i} \quad (3)$$

where:

R is the efficiency ratio for a given parameter (COD, BOD, SS…);

P_i is the value of the given parameter at the inlet;

P_o is the value of the same given parameter at the outlet.

5.3 Watertightness

For the declaration of watertightness, the treatment plant shall be tested according to the methods described in Annex A.

6 Assessment and verification of constancy of performance – AVCP

6.1 General

The compliance of the small wastewater treatment plant with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— determination of the product type;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

6.2 Type testing

6.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests. (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE 1 Same AVCP system means testing by an independent third party, and for reaction to fire under the responsibility of a notified product certification body (only for products covered by system 1+ and 1).

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the product family are representative for that same characteristics for all products within that same family

NOTE 2 Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

— at the beginning of the production of a new or modified small wastewater treatment plant (unless a member of the same product family); or

— at the beginning of a new or modified method of production (where this may affect the declared properties);

— or they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the small wastewater treatment plant design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a product family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the small wastewater treatment plant manufacturer to ensure that the small wastewater treatment plant as a whole is correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

The number of samples of small wastewater treatment plant to be tested/assessed shall be in accordance with Table 4.

Table 4 — Number of samples to be tested and compliance criteria

Characteristic		Requirement	Assessment method	Number of tests/ samples	Compliance criteria
Overall dimensions		4.1.5	According to 4.1.5	Each unit in the product family	Characteristic overall dimensions
Inlets, outlets, internal pipework and connections		4.1.2	According to 4.1.2	Each unit in the product family	Characteristic dimensions
Access		4.1.3	According to 4.1.3	Each unit in the product family	Characteristic dimensions
Treatment efficiency		4.3	According to 4.3 and Annex B	One unit of the product family a	Declared values: efficiency ratios for required parameters and desludging frequency during the test
Watertightness		4.4	According to 4.4 and Annex A	Each unit in the product family	"Pass" or "Fail"
Load bearing capacity, calculated		4.2 and 5.1.2	According to 5.1.2 and Annex D	One unit of the product family b	Declared values: max height of backfill (in m) and Wet with the indication of the maximum height of the water table measured from the base of the plant or Dry
Load bearing capacity, tested		4.2 and 5.1.3	According to 5.1.3 and Annex C	One unit of the product family b	Declared values: max height of backfill (in m) and Wet with the indication of the maximum height of the water table measured from the base of the plant or Dry
Power consumption		4.7	According to 4.7	One unit of the product family	Declared value: power consumption (in kWh/d) during nominal operating conditions (nominal sequences).
Durability c for units made of:	Concrete, steel, PVC-U, PE, GRP	4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.6	4.5.2 to 4.5.6	Each material(s)	"Pass" or "Fail" according to material used and test method applied
	PDCPD	4.5.8	According to 4.5.8		
	Flexible sheets	4.5.9	According to 4.5.9		
Reaction to fire		4.6.1 and 4.6.2	-	Each material(s)	Declared class A1 (CWT)
		4.6.1 and 4.6.3	According to 4.6.3		Declared class: the lowest class according to EN 13501–1 of the relevant material
Release of dangerous substances		4.8	According to 4.8	Each material(s)	As relevant

a The worst case unit for treatment efficiency according to the scaling rules shall be selected for testing. The smallest is generally considered as the worst case, but this shall be verified according to the scaling rules.

b The worst case unit for load bearing capacity according to the scaling rules shall be selected for testing. The

biggest is generally considered as the worst case, but this shall be verified according to the scaling rules.

c Test methods of the materials, which the unit is made of, including their components (i.e. corrosion protective coating), if they represent the state of the art. In addition, materials used with already known adequate durability behaviour do not need to be tested for durability.

6.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for a minimum of 10 years after the last date of production of the small wastewater treatment plant to which they relate.

6.2.4 Shared other party results

A manufacturer may use the results of the product type determination (in consistency with this standard) obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted [2)] to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

  — ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

  — keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

6.2.5 Cascading determination of the product type results

For some construction products, there are companies (often called "system houses") which supply or ensure the supply of, on the basis of an agreement [3)] some or all of the components to an assembler who then manufactures the finished product (referred to below as the "assembler") in his factory.

Provided that the activities for which such a system house is legally established include manufacturing/assembling of products as the assembled one, the system house may take the

2) The formulation of such an agreement can be done by licence, contract, or any other type of written consent.

3) This can be, for instance, a contract, license or whatever kind of written agreement, which should also contain clear provisions with regard to responsibility and liability of the component producer (system house, on the one hand, and the assembler of the finished product, on the other hand.

responsibility for the determination of the product type regarding one or several essential characteristics of an end product which is subsequently manufactured and/or assembled by other firms in their own factory.

When doing so, the system house shall submit an "assembled product" using components manufactured by it or by others, to the determination of the product type and then make the determination of the product type report available to the assemblers, i.e. the actual manufacturer of the product placed on the market.

To take into account such a situation, the concept of cascading determination of the product type might be taken into consideration in the technical specification, provided that this concerns characteristics for which either a notified product certification body or a notified test laboratory intervene, as presented below.

The determination of the product type report that the system house has obtained with regard to tests carried out by a notified body, and which is supplied to the assemblers, may be used for the regulatory marking purposes without the assembler having to involve again a notified body to undertake the determination of the product type of the essential characteristic(s) that were already tested, provided that:

— the assembler manufactures a product which uses the same combination of components (components with the same characteristics), and in the same way, as that for which the system house has obtained the determination of the product type report. If this report is based on a combination of components not representing the final product as to be placed on the market, and/or is not assembled in accordance with the system house's instruction for assembling the components, the assembler needs to submit his finished product to the determination of the product type;

— the system house has notified to the manufacturer the instructions for manufacturing/assembling the product and installation guidance;

— the assembler (manufacturer) assumes the responsibility for the correct assembly of the product in accordance with the instructions for manufacturing/assembling the product and installation guidance notified to him by the system house;

— the instructions for manufacturing/assembling the product and installation guidance notified to the assembler (manufacturer) by the system house are an integral part of the assembler's Factory Production Control system and are referred to in the determination of the product type report;

— the assembler is able to provide documented evidence that the combination of components he is using, and his way of manufacturing, correspond to the one for which the system house has obtained the determination of the product type report (he needs to keep a copy of the system house's determination of the product type report);

— regardless the possibility of referring, on the basis of the agreement signed with the system house, to the latter's responsibility and liability under private law, the assembler remains responsible for the product being in compliance with the declared performances, including both the design and the manufacture of the product, which is given when he affixes the regulatory marking on his product.

6.3 Factory production control

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

Where the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as outlined in 6.2.4 and 6.2.5.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfill his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 standard and which addresses the provisions of the present European standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

6.3.2.2 Equipment

6.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

6.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

6.3.2.4 Traceability and marking

Individual small wastewater treatment plant shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

6.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, and the means of control, are:

Table 5 — Minimum frequency of FPC testing for the small wastewater treatment plant

Name of characteristic	Test method or verification	Minimum frequency of test
Overall dimensions	According to 4.1.2	1/100 units or minimum 1/week
Inlets, outlets and connections	According to 4.1.3	1/100 units or minimum 1/week
Access	According to 4.1.4	1/100 units or minimum 1/week
Treatment efficiency	Check list of raw material and components	Every delivery of raw material and components
Watertightness	According to Annex A	1/200 units or minimum 1/month
Load bearing capacity	Check list of raw material and components	Every delivery of raw material and components
Power consumption	Check list of raw material and components	Every delivery of raw material and components
Durability	Check list of raw material and components	Every delivery of raw material and components
Reaction to fire	Check list of raw material and components	Every delivery of raw material and components
Release of dangerous substances	Check list of raw material and components	Every delivery of raw material and components
NOTE It is understood that the week and the month are a week of production or a month of production.		

6.3.2.7 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

6.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

6.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

6.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan; and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

6.3.4 Initial inspection of factory and of FPC

For reaction to fire, for system 1+, 1 and 2+, initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 6.3.2 and 6.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European standard are in place and correctly implemented; and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice; and

c) that the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system

covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

6.3.5 Continuous surveillance of FPC

For reaction to fire, for system 1+, 1 and 2+, surveillance of the FPC shall be undertaken once every five years. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

6.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 6.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

6.3.7 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity

The small wastewater treatment plant produced as a one-off, prototypes assessed before full production is established, and products produced in very low quantities (not more than 1 per year) shall be assessed as follows.

For type assessment, the provisions of 6.2.1, 3rd paragraph apply, together with the following additional provisions:

— in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;

— on request of the manufacturer, the results of the assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The following shall be assessed:

— the FPC-documentation; and

— the factory.

In the initial assessment of the factory and FPC it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European standard will be available; and

b) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice; and

c) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this European standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this European standard has been verified.

Once series production is fully established, the provisions of 6.3 shall apply.

7 Classification and designation (Nominal designation)

For the application of this standard, a population equivalent relates to design value of 60 gBOD_5/d and 150 l/d of wastewater.

The nominal designation of the plant is expressed as an integer based on the hydraulic flow giving the maximum number of population equivalent appropriate to the plant.

8 Marking, labelling and packaging

8.1 Marking

The manufacturer shall provide the following information for each product:

a) manufacturer and product identification;

b) number of this European Standard, EN 12566-3;

c) nominal designation;

d) conditions of use;

e) date of manufacture;

f) name of laboratory;

g) test report number (where appropriate);

h) electrical supply (if required).

Where regulatory marking provisions require information on some or all items listed in this clause, the provisions of this clause concerning those common items are deemed to be met.

8.2 Installation instructions

The manufacturer shall supply installation instructions with each plant, written in the language accepted in the country in which the plant is to be installed. These instructions shall contain comprehensive data for the installation of plants and all operating conditions including pipes

connections, electrical connections and commissioning and start-up procedures. These instructions shall cover all installation conditions, including any limitation due to the effect of ambient temperature.

These instructions shall give the maximum backfill height, the bottom depth of the plant (Hp) and the maximum acceptable pedestrian load, and where applicable instructions to prevent floatation.

Products covered by this European Standard are not intended to be subject to vehicle loads. If products are to be used in such areas, measures should be taken to ensure that the vehicle load is not transferred directly to the plant.

The installation instructions shall contain details of sitting, requiring that the plant when installed has ready access for maintenance, particularly desludging equipment.

The manufacturer shall describe any ventilation requirements where applicable.

8.3 Operation and maintenance instructions

The manufacturer shall provide, with each plant, clear and comprehensive operation and maintenance instructions written in the language accepted in the country in which the plant is to be installed.

The manufacturer shall write clear instructions of safety so the operator shall pay attention that nobody falls in the plant during the maintenance.

Annex A
(normative)

Watertightness test

A.1 Selection of test

One of the watertightness tests in Table A.1 shall be carried out on a complete plant whether factory manufactured or assembled from prefabricated components.

For ITT, the water test is the reference test.

Table A.1 — Feasible tests

Tests	Tank material	
	Concrete	GRP, PE, PP, PVC-U, PDCPD, Steel and EPDM
Water test	X	X
Vacuum test	—	X
Pneumatic pressure test	—	X

A.2 Water test

A.2.1 Sample

The test is carried out on the plant.

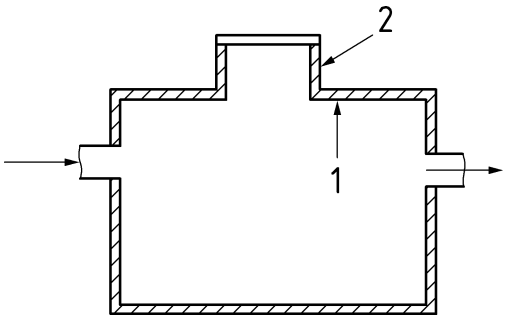
A.2.2 Procedure

The plant shall be placed and secured in place so as to enable inspection of the base of the plant.

The plant (with or without extension shaft) shall be filled with clean water to the declared height of water tightness (minimum height equal to top of the plant) (see Figure A.1) after sealing the connections.

In order to take into account the effective conditions of use and the possible saturation of the material, concrete plants shall be filled with water during a period of at least 24 h. After this saturation period, it may be necessary to refill the plant before the test starts. Then the volume of water required to refill the plant after the test period of 30 min shall be measured.

For plants made from other material, no saturation period is necessary before the test starts. After 30 min, plants shall be inspected for leaks and the observation shall be recorded.



Key

1 top of the plant

2 extension shaft

Figure A.1 — Height for filling

A.2.3 Expression of results

For concrete plants, at the end of the test period, the additional amount of clean water required to raise the water level up to the top of the plant shall be measured in litres. This additional amount shall be expressed in litres per m^2 of the internal wet surface of the external walls.

For plants made of other material, any water leakage shall be recorded.

A.3 Air permeability vacuum test

A.3.1 Sample

The test shall be carried out on an empty plant (with or without extension shaft).

A.3.2 Procedure

The plant shall be placed on a level surface and laterally supported. One of the three pressures given in Table A.2 shall be selected for the test.

The selected vacuum pressure shall be gradually imposed on the plant and held for 3 min to allow the plant to absorb the deformation.

After this, the variation of the pressure in the plant shall be measured during the related test period defined in Table A.2.

Table A.2 — Test parameters

Gauge test pressure kPa	**Test period** s
–10 ± 2 %	60 ± 1
–20 ± 2 %	30 ± 1
–30 ± 2 %	15 ± 1

A.3.3 Expression of results

The value of the variation of the pressure shall be expressed in kPa.

A.4 Pneumatic pressure test

A.4.1 Sample

The test shall be carried out on an empty plant (with or without extension shaft).

A.4.2 Procedure

The test shall be carried out according to one of the two following methods:

a) the plant shall be placed on a level surface and laterally supported. One of the three pressures given in Table A.3 shall be selected for the test. The selected pneumatic pressure shall be gradually imposed on the plant and held for 3 min to allow the plant to absorb the deformation. After this, the variation of the pressure in the plant shall be measured during the related test period defined in Table A.3;

b) the plant shall be placed on a level surface and laterally supported. The plant shall be subjected to an initial pneumatic pressure of 30 kPa (0,3 bar) for at least 3 min; after this period, the variation of the pressure is measured.

Table A.3 — Test parameters

Gauge test pressure kPa	**Test period** s
+10 ± 2 %	60 ± 1
+20 ± 2 %	30 ± 1
+30 ± 2 %	15 ± 1

A.4.3 Expression of results

The value of the variation of the pressure shall be expressed in kPa.

Annex B
(normative)

Treatment efficiency test procedure

B.1 Responsibility and testing location

The plant shall be tested by a laboratory.

The test shall be performed either in the test house of the laboratory or on a user site under the control of the laboratory.

The selection of the test location is the manufacturer's choice but with the agreement of the laboratory.

The test conditions at the location are the responsibility of the laboratory and shall comply with the following conditions.

B.2 Plant selection and preliminary evaluation

B.2.1 General

Before testing starts, the manufacturer shall provide the laboratory with plant and process design specifications including a complete set of drawings and supporting calculations. Full information concerning the installation and operation and maintenance requirements of the plant shall also be provided.

The manufacturer shall provide the laboratory with information detailing the mechanical, electrical and structural safety of the plant installation to be tested.

B.2.2 Installation and commissioning

The plant shall be installed in a way that is representative of the normal conditions of use.

Test conditions, including environment and wastewater temperatures, and compliance with the manufacturer's manual, shall be monitored and recorded and agreed upon by the laboratory. The plant shall be installed and commissioned in accordance with the manufacturer's instructions. The manufacturer shall install and commission all items of the plant prior to testing.

B.2.3 Operation and maintenance procedures during testing

The plant shall be operated in accordance with the manufacturer's operating instructions. Routine maintenance shall be carried out in strict accordance with the manufacturer's maintenance instructions. Sludge shall only be removed from the plant when specified by the manufacturer in his operating and maintenance instructions. All maintenance work shall be recorded by the laboratory.

During the test period no unauthorised access shall be permitted to the test site. Authorized access shall be supervised by the laboratory.

B.2.4 Data to be monitored

The following core parameters shall be monitored in all plants to be tested for both the influent and the effluent:

a) total chemical oxygen demand (COD) [4] and total biochemical oxygen demand (BOD) [5]; after a certain period, BOD of the influent only can be calculated from COD value;

b) suspended solids (SS);

c) temperature (liquid phase);

d) total power consumption of the product if applicable;

e) daily hydraulic flow.

The following parameters may also be measured if required:

f) pH;

g) conductivity;

h) nitrogen parameters;

i) total phosphorus;

j) hourly hydraulic flow;

k) dissolved oxygen concentration;

l) sludge production;

m) ambient air temperature.

B.3 Test procedure

B.3.1 Time for establishment

The manufacturer shall indicate to the laboratory the X-value defined in Table B.2.

B.3.2 Influent characteristics

Domestic wastewater shall be used. The laboratory shall not use grinding equipment on the raw wastewater supply. It is acceptable to coarse screen and remove grit prior to use as long as the influent is of the following quality:

a) BOD_5 or BOD_7(ATU): 150 mg O_2/l to 500 mg O_2/l or COD 300 mg O_2/l to 1 000 mg O_2/l;

b) SS: 200 mg/l to 700 mg/l;

c) KN: 25 mg/l to 100 mg/l or NH4 - N: 22 mg/l to 80 mg/l;

d) total phosphorus: 5 mg/l to 20 mg/l.

[4] TOC is an acceptable alternative method for COD.

[5] BOD may be expressed in BOD_5 or BOD_7.

B.3.3 Daily flow pattern for testing

The daily flow used for testing purposes shall be measured by the laboratory. The daily flow pattern shall comply with Table B.1 with a tolerance of ± 5 %.

Table B.1 — Daily flow pattern

Period h	Percentage of daily volume %
3	30
3	15
6	0
2	40
3	15
7	0

Where influent is introduced, it shall be done regularly throughout the entire period.

B.3.4 Test procedure

B.3.4.1 General

Routine monitoring shall take place throughout the period of the test procedure. The test schedules listed in Table B.2 shall apply.

Measurements shall be regularly made during each sequence avoiding the day when stress takes place.

The full test shall be carried out during a period of (38 + X) weeks.

After desludging, a period of 1 d shall be allowed for recovery before the programme of tests and sampling is continued.

Table B.2 — Test schedules

Sequence	Characteristic	Time elapsed weeks
1	Sequence name: BIOMASS ESTABLISHMENT Hydraulic daily flow: nominal Sampling: no	X [a]
2	Sequence name: NOMINAL Hydraulic daily flow: nominal Sampling: 4 measurements	6
3	Sequence name: UNDERLOADING Hydraulic daily flow: 50 % nominal Sampling: 2 measurements	2
4	Sequence name: NOMINAL – POWER BREAKDOWN [b] Hydraulic daily flow: nominal Sampling: 5 measurements	6
5	Sequence name: LOW OCCUPATION STRESS Hydraulic daily flow: no Sampling: no	2
6	Sequence name: NOMINAL Hydraulic daily flow: nominal Sampling: 3 measurements	6
7	Sequence name: OVERLOADING [c] Hydraulic daily flow: nominal and overload (see Table B.3) Sampling: 2 measurements	2
8	Sequence name: NOMINAL – POWER BREAKDOWN [b] Hydraulic daily flow: nominal Sampling: 5 measurements	6
9	Sequence name: UNDERLOADING Hydraulic daily flow: 50 % nominal Sampling: 2 measurements	2
10	Sequence name: NOMINAL Hydraulic daily flow: nominal Sampling: 3 measurements	6

[a] X is the time indicated by the manufacturer to obtain normal operating performance.

[b] A 24 h power breakdown is organized 2 weeks after the beginning of the sequence.

[c] An overload is organized for a duration of 48 h at the beginning of the sequence.

B.3.4.2 Overload

The laboratory shall adjust the hydraulic daily flow in order to establish the extra load during 48 h, as shown in Table B.3, at the start of the 2 weeks overloading phase.

Table B.3 — Definitions of overloads

Nominal hydraulic flow Q_N	Total flow %
$Q_N \leq 1{,}2$ m³/d	150
$Q_N > 1{,}2$ m³/d	125

B.3.4.3 Peak flow discharge

A peak flow discharge shall be executed once a week only during the NOMINAL sequences according to the conditions given in Table B.4. This peak flow discharge shall not be done during the day used for power breakdown.

One peak flow discharge consists of a volume of 200 l of test influent which shall be discharged, in addition to the daily flow, over a period of 3 min, at the beginning of the period with a flow equal to 40 % of the daily flow.

Table B.4 — Number of peak flow discharge

Nominal hydraulic flow Q_N	Number of peak flow discharge
$Q_N \leq 0{,}6$ m³/d	1
$0{,}6 < Q_N \leq 1{,}2$ m³/d	2
$1{,}2 < Q_N \leq 1{,}8$ m³/d	3
$Q_N > 1{,}8$ m³/d	4

B.3.4.4 Power breakdown / machine breakdown

Where applicable, a power breakdown test shall simulate loss of electric power/mechanical breakdown for 24 h for the plant equipment. During this power breakdown, influent input shall be maintained according to the daily flow pattern.

This test shall not be done during the day used for peak flow.

When there is optional electrical discharge equipment, the test shall be done with this equipment.

B.3.5 Influent and effluent samplings

The laboratory shall collect and analyse influent samples to determine compliance with the influent characteristics (see B.3.2). Effluent sample shall be analysed to determine efficiency ratio.

Inlet and outlet samples shall be flow-based composites over 24 h taken according to Table B.1. Samples shall be taken regularly.

B.4 Sample analysis

The determinants specified in B.2.4 shall be analysed in accordance with the relevant ISO, EN ISO or EN standard methods and reference to the testing analysis shall be given in the report (see Annex E).

Concentrations shall be determined for each load and each parameter.

The mean value of the 20 efficiency ratios obtained during the NOMINAL sequences (with and without power breakdown) shall be calculated for each parameter. The tested organic daily load shall be the mean value of the 20 organic daily loads measured during the NOMINAL sequences.

The individual values for UNDERLOADING sequences (4 efficiency ratios), OVERLOADING sequence (2 efficiency ratios) shall be stated in the report.

B.5 Test report

The report shall contain at least the information specified below:

a) details of the plant tested including information on the nominal organic daily load and nominal hydraulic daily flow;

b) information on the conformity of the plant tested with the information provided prior to testing;

c) data obtained during testing (see B.2.4), in particular: the mean value of efficiency ratios for nominal loading and individual values of efficiency ratios for non-nominal loading (see B.4);

d) information on all maintenance and repairs carried out during the test period, including details of desludging frequency, quantity and the volume removed;

e) information on the electrical energy absorbed during the test period;

f) information on any problems, physical or environmental, occurring during the test period. Deviations from the manufacturer's maintenance instructions shall be reported in this section;

g) information detailing any physical deterioration of the plant that has occurred during the test period; e.g. the clogging behaviour of the plant where applicable;

h) information concerning deviations from the test procedure;

i) scaling rules used by the manufacturer to assess the same treatment efficiency and structural behaviour for all the products in the range.

Annex C
(normative)

Test methods for structural behaviour

C.1 General

This annex gives the way to test the structural behaviour of plants which are installed buried in the ground.

To determine the structural behaviour of a plant, one or more methods described below and mentioned in Table C.1 shall be used.

For ITT, the test described in C.5 is the reference test.

Table C.1 — Test methods for the determination of the structural behaviour

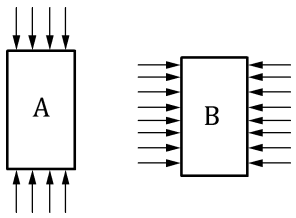
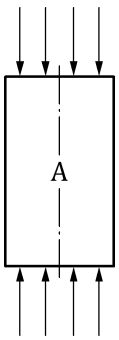
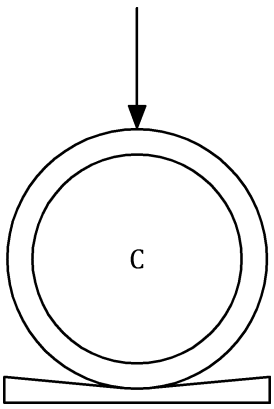
Condition	Concrete	GRP	PE, PP and PDCPD	Steel	PVC-U, EPDM
Dry	See C.2 or See C.5	See C.4 or See C.5	See C.3 or See C.5	See C.5	See C.5
Wet			See C.5		

C.2 Crushing test for concrete plant

C.2.1 Crushing test methods

Table C.2 indicates the crushing test method to be performed according to the shape of the plant being tested.

Table C.2 — Crushing test methods

Rectangular or trapezoidal shape	Vertical cylinder shape	Horizontal cylinder shape
		
NOTE Letters A, B and C correspond to the test method.		

C.2.2 Crushing test procedures

C.2.2.1 Type A test (vertical load)

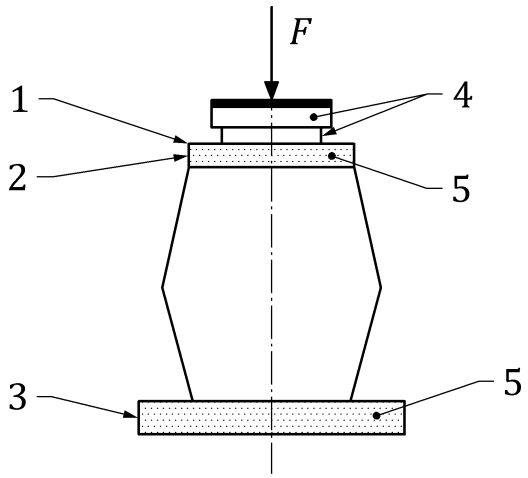
C.2.2.1.1 Sample

The test shall be carried out on an empty plant equipped with its cover(s) without any extension and/or maintenance shaft.

C.2.2.1.2 Procedure

The plant shall be placed on a sand bed of granulometry 0 to 5 mm, water content approximately 7 % and thickness of (6 ± 1) cm. This sand bed shall be levelled before the installation of the plant.

A similar sand bed shall be placed on the upper part in order to compensate for the thickness of the cover(s) and the geometry of the inner sides of the plant. The stress shall be equally distributed on the upper part of the plant using a loading plate (see the scheme of the principle in Figure C.1). The stress shall be applied at a uniform rate and the maximum loading time shall not be less than 5 min. The tolerance on the load shall be ± 3 %. The stress shall be applied up to failure.



Key

1 loading plate

2 plywood plate

3 plywood retaining ring

4 stiff load beam

5 sand bed

F load

Figure C.1 — Scheme of the principle of type A test

C.2.2.1.3 Expression of results

The load *F* corresponding to failure shall be noted and expressed in kN and converted to height of backfill and groundwater level in accordance with 5.1.3.

C.2.2.2 Type B test (horizontal load)

C.2.2.2.1 Sample

The test shall be carried out on an empty plant without its cover(s) and any extension and/or maintenance shaft.

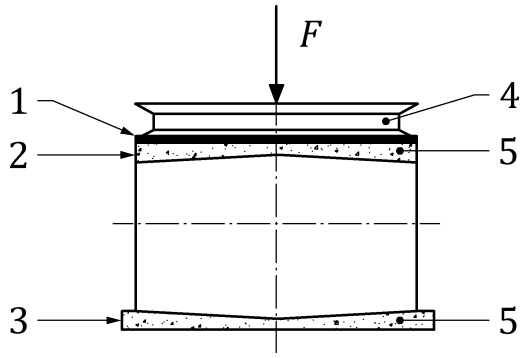
C.2.2.2.2 Procedure

The plant shall be placed so that the upper surface (which would support the cover(s)) is in a vertical position.

The plant shall be placed on a sand bed as defined in C.2.2.1.2.

The load shall be equally distributed on the plant using a loading plate or applied via a sand bed with the same characteristics as in C.2.2.1.2. The sand bed shall be levelled to take into account the geometry of the sides of the plant (see the scheme of the principle in Figure C.2).

The load shall be applied at a uniform rate and the maximum loading time shall not be less than 5 min. The tolerance on the load shall be ± 3 %. The load shall be applied up to failure.



Key

1 loading plate

2 plywood plate

3 plywood retaining ring

4 stiff loading beam

5 sand bed

F load

Figure C.2 — Scheme of the principle of the type B test

C.2.2.2.3 Expression of results

The load *F* corresponding to failure shall be noted and expressed in kN.

C.2.2.3 Type C test (vertical load)

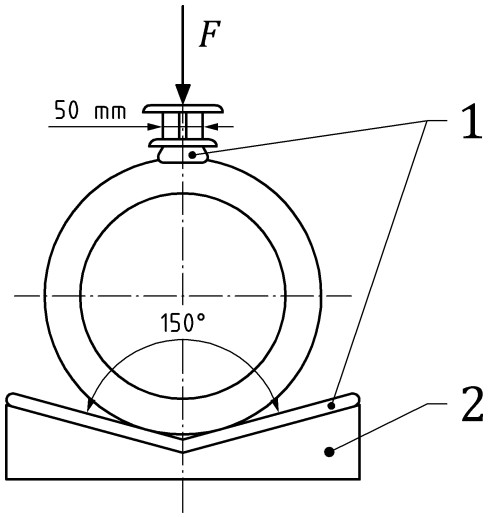
C.2.2.3.1 Sample

The test shall be carried out on an empty plant without its cover(s) and any extension and/or maintenance shaft.

C.2.2.3.2 Procedure

The plant shall be placed over its whole length on a "V" support forming a 150° angle and covered with a rubber strip of 50 mm wide and 10 mm to 20 mm thick with a mean hardness not less than 45 IRHD (see the scheme of the principle in Figure C.3).

The load shall be applied at a uniform rate and the maximum loading time shall not be less than 5 min. The tolerance on the load shall be ± 3 %. The load shall be applied up to failure.



Key

1 rubber strip (10 mm to 20 mm thick)

2 rigid support (wood)

Figure C.3 — Scheme of the principle of the type C test

C.2.2.3.3 Expression of results

The load *F* corresponding to failure shall be noted and expressed in kN.

C.3 Vertical load test for PE, PP and PDCPD plant

NOTE This test method is applicable for use in dry conditions only.

C.3.1 Sample

The test shall be carried out on an empty plant equipped with its cover(s) without any extension and/or possible maintenance shafts.

C.3.2 Procedure

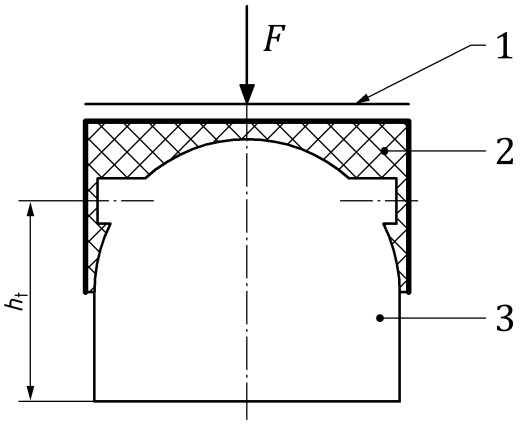
Testing shall be carried out at the temperature of (25 ± 5) °C.

The plant shall be placed in conditions representative of end use on a sand bed of granulometry 0 mm to 5 mm, water content less than 15 %. This sand bed shall be levelled to a thickness of (6 ± 1) cm before the installation of the tank (see Figure C.4).

A vertical load shall be equally distributed on the upper part of the plant. A loading plate shall be adjusted to the centre of the upper part of the plant and shall be placed on a 1 cm thick soft plywood

plate. If the upper part of the plant in contact with the loading plate is not plane (covers, raised points), level differences shall be compensated.

The load shall be applied at a uniform rate and the maximum loading time shall not be less than 5 min. The load shall be accurate to ± 3 %. The load on the tank shall be increased to collapse. Variation of h_t shall be noted, step by step. The maximum load F shall be noted.



Key

1 distributed load

2 polyurethane foam

3 tank

h_t distance between the bottom of the plant and the axis of the inlet pipe

Figure C.4 — Scheme of the principle of PE and PP plant tests

C.3.3 Expression of results

The load corresponding to collapse shall be noted and expressed in kN and converted to height of backfill and groundwater level in accordance with 5.1.3.

C.4 Vacuum test for GRP plants

The plant shall be designed to withstand an external pressure P. The plant shall be tested for the designed external load in any conditions, using the following formula:

$$P = \frac{L}{f}$$

where

P is the external pressure in kPa;

L is the load in kN (the greater of the vertical or horizontal load due to backfill and hydrostatic load, where applicable);

f is the factor to take into account long term physical properties of GRP material using the formula

$$f = \beta\sqrt{\alpha_{\text{construction}}}$$

where

$\alpha_{construction}$ (long term creep performance) is determined according to the test of EN 978:1997, 7.2;

β (ageing factor) is determined according to 4.5.6.

When tested according to EN 976-1:1997, 6.8 (without taking into account 6.8.1) with the above calculated pressure (P), the plant shall be free of any internal or external visual degradation. The results shall be expressed in kPa and converted to height of backfill and groundwater level in accordance with 5.1.3.

C.5 Pit test

C.5.1 Sample

The test shall be carried out on an empty plant equipped with pipe connections (inlet, outlet and interconnection pipes), its cover(s) and any extension and/or maintenance shaft(s).

The plant shall be installed in a watertight test excavation. The size of the testing excavation shall be calculated to avoid side effects. The plant shall be fixed on the base of the excavation, according to the manufacturer's installation instructions.

The excavation shall be backfilled with rounded gravel (size from 3 mm to 8 mm).

To test in wet ground conditions, add water to the top of the plant, as defined in Figure C.5.

C.5.2 Procedure

Step 1: Measure the initial internal dimensions of the plant.

Step 2: Place the plant in the test excavation.

Step 3: Backfill with gravel up to the level of pipe connections and simultaneously fill the plant with water up to the top, after sealing the inlet and outlet pipe connections.

For tanks made of concrete or GRP, the volume of water in the plant shall be measured; after that, discharge the plant.

For tanks made of other materials, discharge the plant and measure the volume of water in the plant one day later.

Step 4: Check the position of the inlet and outlet pipe connections.

Step 5: Complete the backfill up to the maximum permitted depth, in accordance with the manufacturer’s installation instructions, including the pedestrian load (2,5 kN/m^2) converted to a uniform backfill load. Seal the inlet and outlet pipe connections and, for a wet ground test, add water in the excavation to the level of the top of the plant.

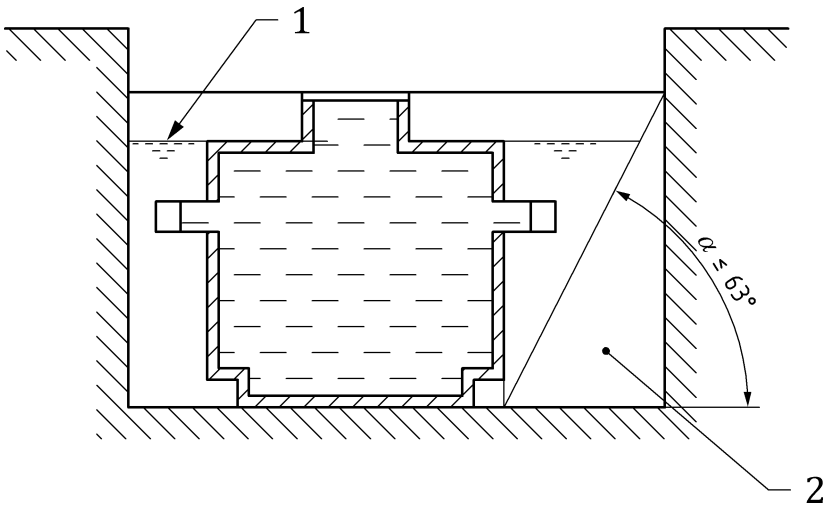
Step 6: For a plant with a tank made of concrete or GRP, maintain the test conditions for 24 h. For a plant with a tank made of other materials, maintain the test conditions for 3 weeks.

Step 7: In wet condition: examine the inside of the plant to show the watertightness is maintained. Discharge the water from the excavation. If the plant is watertight, refill with water, and measure any change in the capacity of the plant.

In dry condition: examine the inside of the plant. Refill with the volume of water required to fill the plant and measure any change in the capacity of the

plant.

Check the position of inlet and outlet pipe connections and the internal dimensions of the plant.



Key

1 water table level

2 backfill

Figure C.5 — Scheme of the principle for the pit test

C.5.3 Expression of results

For plants with tanks made of concrete or GRP, no failure shall occur during the test. In addition, no lack of watertightness shall be recorded.

For plants with tanks made with other materials:

— variation of the volume of the plant (expressed in litres) shall be lower than 20 % of the internal volume of the plant;

— movement of inlet, outlet and interconnecting pipe works shall not lead to a loss of watertightness.

Where the plant meets the above criteria, the height of backfill and groundwater level as specified by the manufacturer shall be declared.

Annex D
(normative)

Mechanical characteristics used for structural behaviour calculation

D.1 Concrete

The preparation, the construction and the test shall be carried out in accordance with EN 13369.

D.2 GRP

The creep factor ($\alpha_{material}$) shall be determined according to 4.5.6 The ageing factor (β) shall be determined according to 4.5.6

D.3 PVC-U

The initial stiffness (S_0) shall be determined according to EN ISO 9969.

The long term stiffness (S_t) shall be determined according to EN ISO 9967.

The creep factor (γ) shall be calculated using the following formula:

$$\gamma = \frac{S_o}{S_t}$$

D.4 PE and PP

The initial flexural modulus ($E_{f,i}$), shall be determined according to EN ISO 178 at a temperature of (23 ± 2) °C on test pieces which have an age of (21 ± 2) d (stored in normal laboratory conditions). The test pieces are taken directly from the tank or from forms which are produced with the same raw materials following the same fabrication method as for the tanks.

The long term flexural modulus (E_t) is determined according to EN ISO 899-2 under the following conditions:

1) testing temperature (23 ± 2) °C;

2) test pieces are taken directly from the tank or from forms which are produced with the same raw materials following the same fabrication method as for the tanks;

3) age of test pieces (21 ± 2) d (conservation in normal laboratory conditions);

4) extrapolation procedure according to EN ISO 9967.

D.5 Steel

For calculation, parameters are young modulus, ultimate bending stress, corrosion allowance and ultimate tensile stress. Steel shall be corrosion resistant according to EN 10088-1 and at least meet the corrosion resistance class III. The strength yield shall be $R_{p0,2} \geq 240$ MPa

Annex E
(informative)

Analysis method

Chemical analysis should be done using methods specified in the relevant EN, EN ISO and/or ISO standards. Examples are given in Table E.1.

Table E.1 — Analysis methods

Parameter	Measurement method
BOD	EN 1899–1
COD	ISO 6060 or ISO 15705
SS	EN 872
Ammonium nitrogen	ISO 5664 or ISO 6778 or ISO 7150-1 or EN ISO 11732 or EN ISO 14911
Kjeldahl nitrogen	EN ISO 11905-1 or EN 12260 or EN 25663
Nitrate	EN ISO 10304-1 or EN ISO 13395
Phosphorus	EN ISO 6878 or EN ISO 15681-2 or EN ISO 11885

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/118 "Wastewater engineering products" given to CEN by the European Commission and the European Free Trade Association.

If this European standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the Packaged and/or site assembled domestic wastewater treatment plants intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses for product and intended use

Product: Kits and elements for wastewater treatment plants **Intended use:** To be used outside buildings for faecal water and organic effluent for a population up to 50 PE			
Essential Characteristics	**Clauses in this standard related to essential characteristics**	**Regulatory classes**	**Notes**
Effectiveness of treatment, expressed as:			
treatment efficiency	4.3	-	a) Tested according to Annex B; and b) Expressed in % for COD, BOD, SS, nitrogen parameters and total phosphorus together with the tested organic daily load (kg BODx/d).
number of desludging	4.3	-	a) Tested according to Annex B; and b) Expressed as an integer
Power consumption	4.7	-	a) Tested according to Annex B; and b) Expressed in kWh/d
Treatment capacity (nominal designation)	7	-	a) Designated according to Clause 7; and b) Expressed in the maximum

			number of population equivalent
Watertightness	4.4	-	a) Tested according to Annex A; and b) Expressed as "Pass/Fail" together with the test method used
Crushing resistance (and maximum load deformation) as:			
load bearing capacity	4.2	-	a) Calculated according to 5.1.2 and Annex D; or b) Tested according to Annex C; and c) Expressed as maximum allowed height of backfill (m) and possibility to install the plant in wet or dry site, expressed as WET with the indication of the maximum height of the water table measured from the base of the plant or DRY.
Durability	4.5	-	a) Tested according to 4.5.2 to 4.5.9 (as appropriate) and the material used; and b) Expressed as "Pass/Fail"
Release of dangerous substance	4.8	-	As relevant, according to 4.8
Reaction to fire	4.6	A1 to F	a) Either classified and declared without need for testing (CWT); or b) Classified and declared, on the basis of the material of the lowest class, in accordance with EN 13501–1 using the relevant test method(s) specified therein.

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option "No performance determined" (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure of attestation of conformity of packaged and/or site assembled domestic wastewater treatment plants

ZA.2.1 System(s) of AVCP

The AVCP system(s) of packaged and/or site assembled domestic wastewater treatment plants indicated in Table ZA.1, established by EC Decision(s) 97/464/EC of 27 June 1997 (OJEU L198 of 25.7.1997) as amended by EC decision 2004/663/EC of 20 September 2004 (OJEU L302 of 29.9.2004) is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System(s) of AVCP

Product(s)	Intended use(s)	Level(s) or class(es) of performance	AVCP system(s)
Kits and elements for wastewater treatment plants	To be used outside buildings for faecal water and organic effluent	-	3
	For all uses when subject to regulations on reaction to fire	A1*, A2*, B*, C*	1
		A1**, A2**, B**, C**, D, E	3
		(A1 to E)***, F	4

System 1: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.2.

System 3: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.4.

System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5.

* Products/ materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material).

** Products/ materials not covered by footnote (*).

*** Products/ materials that do not require to be tested for reaction to fire (e.g. Products/materials of class A1 according to the Decision 96/603/EC, as amended).

NOTE Packaged and/or site assembled domestic wastewater treatment plants for a population up to 50 PE *are considered kits and elements for wastewater treatment plants.*

The AVCP of the packaged and/or site assembled domestic wastewater treatment plants in Table ZA.1 shall be according to the AVCP procedures indicated in Table(s) ZA.3.1 to ZA.3.3 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3.1 — Assignment of AVCP tasks for packaged and/or site assembled domestic wastewater treatment plants under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	All essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.3.1, 6.3.2, 6.3.3, 6.3.6, 6.3.7
	Further testing of samples taken at factory according to the prescribed test plan	Reaction to fire	6.3
Tasks for the notified testing laboratory	Determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product	All essential characteristics of Table ZA.1 relevant for the intended use which are declared except reaction to fire	6.2
	Initial inspection of manufacturing plant and of FPC	Reaction to fire	6.3.4
	Continuous surveillance, assessment and evaluation of FPC	Reaction to fire	6.3.5

Table ZA.3.2 — Assignment of AVCP tasks for packaged and/or site assembled domestic wastewater treatment plants under system 3

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	All essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.3.1, 6.3.2, 6.3.3, 6.3.6, 6.3.7
Tasks for a notified testing laboratory	Determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product	All essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.2

Table ZA.3.3 — Assignment of AVCP tasks for packaged and/or site assembled domestic wastewater treatment plants under system 4

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	All essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.3.1, 6.3.2, 6.3.3, 6.3.6, 6.3.7
	Determination of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product	All essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.2

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

In case of products under system 1

— the factory production control and further testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and

— the certificate of constancy of performance issued by the notified product certification body on the basis of determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; initial inspection of the manufacturing plant and of factory production control and continuous surveillance, assessment and evaluation of factory production control.

In case of products under system 3

— the factory production control carried out by the manufacturer; and

— the determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product, carried out by the notified testing laboratory.

In case of products under system 4

— the factory production control carried out by the manufacturer

— the determination by the manufacturer of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product.

ZA.2.2.2 Content

The model of the DoP is provided in Regulation (EU) No 574/2014.

According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product-type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;

e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

f) for the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined).

Regarding the supply of the DoP, article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for small wastewater treatment plant

DECLARATION OF PERFORMANCE

No. 0012013-07-14

1. Unique identification code of the product-type:

   small wastewater treatment plant BWV 714 (concrete)

2 Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11:

   BWV 714

from 4 to 50 PT

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

   domestic wastewater treatment for populations up to 50 inhabitants

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11:

   AnyCo SA,

   PO Box 21

   B-1050 Brussels, Belgium

   Tel. +32987654321

   Email: anyco.sa@provider.be

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12:

   Anyone Ltd

   Flower Str. 24

   West Hamfordshire

   UK-589645 United Kingdom

   Tel. +44987654321

   e-mail: anyone.ltd@provider.uk

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

   System 3 for all essential characteristics except reaction to fire

   System 4 for reaction to fire

7. In case of the declaration of performance concerning a construction product covered by a harmonized standard:

   Notified body number 0001 performed product type testing under system 3 and issued test report 12345/2013.

8. No European Technical Assessment has been issued for this product.

9. Declared performance

Essential characteristics	Performance	Harmonized technical specification
Reaction to fire	Class A1	EN 12566–3:2016
Effectiveness of treatment expressed as:		
Treatment efficiency (tested load 0,9 kg BOD_5/d)	COD: 80 % BOD_5: 80 % SS: 80 % P: NPD KN: 30 %	
Number of desludging	0	
Power consumption	0,2 kWh/d	
Treatment capacity (Nominal designation)	From 4 to 50 PT	
Watertightness	Pass	
Crushing resistance		
Load bearing capacity	Height of backfill: 0,5 m WET: 1,20 m	
Durability	Pass	
Release of dangerous substance	NPD	

10. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8.

    This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

    Signed for and on behalf of the manufacturer by:

.....

(name and function)

.....

(place and date of issue) (signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the packaged and/or site assembled domestic wastewater treatment plants; or

— to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

— to the packaging; or

— to the accompanying documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed;

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;

— the unique identification code of the product-type;

— the reference number of the declaration of performance;

— the level or class of the performance declared;

— the dated reference to the harmonized technical specification applied as it appears in OJEU;

— the identification number of the notified body;

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figure ZA.1 gives an example of the information related to products subject to AVCP under system 3 (all characteristics except reaction to fire) and 4 (for reaction to fire).

CE **9876**	*"CE marking, consisting of the "CE"-symbol* *Identification number of the notified test laboratory*
Any Co Ltd, P.O. Box 21, B–1050 **16** **0012013–07–14**	*name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 12566–3:2016 Packaged domestic wastewater treatment plant for treatment of domestic wastewater — Product's reference code: "BWV 714" Material: CONCRETE	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product-type* *Intended use of the product as laid down in the European Standard applied*
Effectiveness of treatment:	
Treatment efficiency (at tested organic daily load BOD_5 = 0,9 kg/d)	COD: 80 % BOD_5: 80 % SS: 80 % P NPD KN 30 %
Number of desludging	0
Power consumption	0,2 kWh/d
Treatment capacity (nominal designation):	4 EH
Watertightness: (water test)	Pass
Crushing resistance:	
Load bearing capacity	Height of backfill 0,5 m WET 1,20 m
Durability	Pass
Reaction to fire	A1
Release of dangerous substances	NPD

Level or class of the performance declared

Figure ZA.1 — Example CE marking information of products under AVCP system 3 (all characteristics except reaction to fire) and 1 (reaction to fire)

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[4] EN ISO 6878:2004, *Water quality — Determination of phosphorus — Ammonium molybdate spectrometric method (ISO 6878:2004)*

[5] EN ISO 11732, *Water quality — Determination of ammonium nitrogen — Method by flow analysis (CFA and FIA) and spectrometric detection (ISO 11732)*

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