BS EN 12566-6:2016

BSI Standards Publication

Small wastewater treatment systems for up to 50 PT

Part 6: Prefabricated treatment units for septic tank effluent

bsi.

National foreword

This British Standard is the UK implementation of EN 12566-6:2016. It supersedes BS EN 12566-6:2013 which is withdrawn.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.

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English Version

Small wastewater treatment systems for up to 50 PT - Part 6: Prefabricated treatment units for septic tank effluent

Petites installations de traitement des eaux usées jusqu'à 50 PTE - Partie 6: Unités préfabriquées de traitement des effluents de fosses septiques

Kleinkläranlagen für bis zu 50 EW - Teil 6: Vorgefertigte Bauteile für die weitergehende Behandlung des aus Faulgruben ablaufenden Abwassers

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

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European foreword

This document (EN 12566-6:2016) 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of an identical text or by endorsement, at the latest by February 2017, and conflicting national standards shall be withdrawn at the latest by May 2018.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 12566-6:2013.

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 12566-6:2013 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*;

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

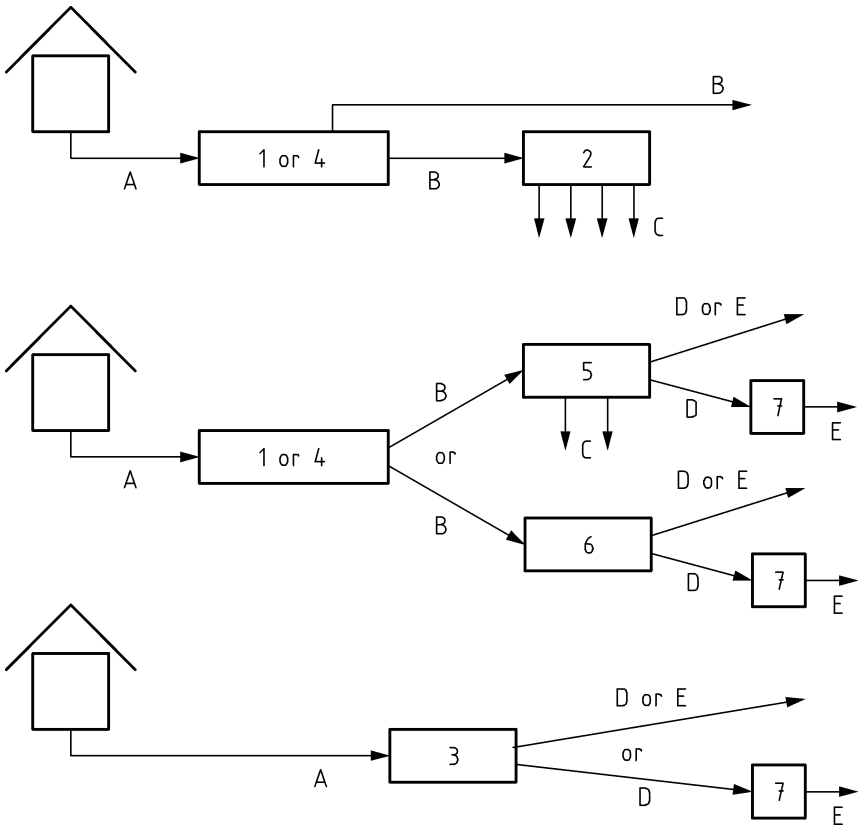
— *Part 6: Prefabricated treatment units for septic tank effluent (this document)*;

— *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 or CEN/TR 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, evaluation of conformity and marking for prefabricated secondary treatment units used for the treatment of effluent from septic tanks according to EN 12566-1 or EN 12566-4 in small wastewater treatment systems for up to 50 PT.

NOTE Equivalent septic effluent may come from existing septic tanks.

It applies to the prefabricated secondary treatment unit, where all its components are packaged or site-assembled and placed on the market as a kit by one manufacturer.

The prefabricated secondary treatment unit consists of one or more tanks made of concrete, steel, unplasticised polyvinylchloride (PVC-U), polyethylene (PE), glass reinforced polyester (GRP-UP), polypropylene (PP), polydicyclopentadiene (PDCPD) or container made of flexible sheets (HDPE, PP, PVC, EPDM). Other components specified by the manufacturer, such as pipes, pumps and filter material will be considered as part of the unit.

This European Standard establishes the performance of the prefabricated secondary treatment units needed to verify their suitability for the end use conditions for which the test methods are specified.

This European Standard applies for the packaged and/or site assembled secondary treatment units for use on the top of the ground (outside the building) or buried in the ground where no vehicle loads are applied to the unit.

This European Standard does not cover:

— non watertight secondary treatment units with direct infiltration into the ground;

— retrofit kits (see definition in 3.1.7).

2 Normative references

The following referenced documents, in whole or in part, are normatively referenced in this document and are indispensable for its application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

EN 12566-3:2016, *Small wastewater treatment systems for up to 50 PT — Part 3: Packaged and/or site assembled domestic wastewater treatment plants*

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

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

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12566-3:2016 and EN 16323:2014 and the following apply.

3.1.1
packaged secondary treatment unit
prefabricated factory-built unit which treats septic tank effluent to a declared quality

3.1.2
site assembled secondary treatment unit
unit supplied by one manufacturer composed of prefabricated components, assembled on site, which treats septic tank effluent to a declared quality

3.1.3
open unit
prefabricated unit where there is no cover

3.1.4
nominal designation
expressed as an integer giving the maximum number of population equivalent appropriate to the plant

3.1.5
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.

3.1.6
wastewater treatment system
combination of units (e.g. septic tank) and/or products (e.g. pipes, pumps) required for the construction of wastewater treatment plant according to Figure 1

3.1.7
retrofit kit
set of components that are provided by a single manufacturer for installation within an existing septic tank

3.1.8
flexible sheet
flexible impermeable liner

3.2 Symbols and abbreviated terms

The following symbols and abbreviations are used in this standard:

BOD_5 (or BOD_7)	Biochemical oxygen demand at 5 days (or 7 days)
COD	Chemical oxygen demand
KN	Kjeldahl nitrogen
NH_4-N	Ammonium nitrogen

SS	Suspended solids
TOC	Total organic carbon
PP	Polypropylene
PDCPD	Polydicyclopentadiene
HDPE	High Density Polyethylene
PVC	Polyvinyl Chloride
EPDM	Ethylene Propylene Diene Monomer

4 Products characteristics

4.1 Design

4.1.1 General

Prefabricated secondary treatment units for septic tank effluent shall be designed to be structurally stable with the expected loads for the intended use. In addition, the units shall be durable, watertight and corrosion resistant. Scaling rules, which ensure that the test results for one or more characteristics from any one unit within the family are valid for all other units within this family, shall be defined.

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 A.1.

Design of the unit should take into consideration appropriate safety requirements for construction, installation, operation and maintenance.

4.1.2 Overall dimensions

The overall dimensions of the prefabricated secondary treatment unit (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.

4.1.3 Inlets, outlets, internal pipework and connections

The nominal diameters for inlet and outlet pipework of the prefabricated secondary treatment unit shall be declared. The hydraulic design of the unit, the internal pipework and the connections shall ensure that no back-flows, blockage or surcharging occur during normal operation of the unit.

Inlet and outlet pipes shall be compatible with standardized pipe systems.

Assessment of inlets, outlets, internal pipework and connections shall be done by measurement with accuracy of ± 0,5 % of the dimension.

4.1.4 Access

The design of the unit shall provide access to allow routine maintenance sampling, removal of sludge (where applicable), cleaning and maintenance. 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 prefabricated secondary treatment unit 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.

Extension shafts, where applicable, and access covers of the prefabricated secondary treatment unit shall be designed to be fit for purpose.

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 prefabricated secondary treatment unit 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.

4.2 Load bearing capacity

For units not including a tank, load bearing capacity assessment is not required.

Test methods and values for mechanical characteristics of the materials of the tank, used for calculation of the load bearing capacity of the tank, shall be in accordance with EN 12566-3:2016, Annex D.

The prefabricated secondary treatment units shall be able to withstand the loads resulting from handling, installation and use including desludging and maintenance, for its design life.

When tested according to 5.1, the load bearing capacity is declared as:

— maximum allowed height of backfill (m);

— possibility to install the unit in water table or not, expressed as WET or DRY, respectively.

4.3 Secondary treatment efficiency

4.3.1 General

For the purpose of determination of the secondary treatment efficiency, the prefabricated secondary treatment unit shall be tested according to Annex A.

4.3.2 Secondary treatment efficiency ratio

The prefabricated secondary treatment unit shall demonstrate compliance with the declared performance. This performance shall be expressed and declared in terms of secondary treatment efficiency ratios on COD, BOD, SS concentration and nitrogen parameters and total phosphorus together with:

— the tested COD, BOD and SS influent daily load;

— or characteristics (hydraulic efficiency, nominal capacity, etc.) of the septic tank used during the test expressed according to EN 12566-1 or EN 12566-4.

The secondary treatment efficiency ratios on COD, BOD and, SS shall be given in the documentation.

When requested, nitrogen parameters and total phosphorus shall be analysed during the test. In this case related secondary treatment efficiency ratios shall also be declared.

Each secondary treatment efficiency ratio shall be calculated according to 5.2.

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

The secondary treatment efficiency ratios obtained do not automatically mean that the regulatory requirements on effluent qualities in a given place are met. A calculation should be made to indicate the final effluent qualities which will be compared to the requirements valid in the place of intended use of the unit. These ratios are laboratory determined but may not always be obtained when a unit is installed on a user site.

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

4.3.3 Microorganism reduction

When the microorganism reduction of the prefabricated secondary treatment unit is to be declared, the results of the tests (i.e. influent and effluent values) shall be expressed and declared in unit (i.e. cfu/100 ml or MPN/100 ml). The reduction shall be expressed in logarithmic unit. All results shall be given in a specific document as described in Annex B.

The recorded microorganism reduction does not automatically mean that the regulatory requirements on effluent qualities in a given Member state are met. It should be compared to the requirements valid in the place of intended use. The microorganism reduction may not always be obtained when the unit is operating in practice.

4.4 Watertightness

When tested according to EN 12566-3:2016, Annex A, the prefabricated secondary treatment units for septic tank effluent shall meet the watertightness requirements of EN 12566-3:2016, 4.4.

4.5 Power consumption

Where applicable, the power consumption of the unit shall be declared.

It shall be measured during the test described in Annex A 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 in A.2.4.5.

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

4.6 Durability

4.6.1 General

The prefabricated secondary treatment units for septic tank effluent, including all their internal components, shall be manufactured from materials that make them, from the durability aspects, suitable for use in a domestic wastewater environment.

Materials of the other components of the unit (i.e. filter material, pump, etc.) shall be in accordance with the specifications given by the manufacturer to the material/component supplier.

4.6.2 Concrete, steel, PVC-U, PE, GRP, PDCPD and flexible sheets

For concrete, steel, PVC-U, PE, GRP, PDCPD tank and flexible sheets (i.e. the parent material and the coatings, where relevant) the material shall comply with EN 12566-3:2016, 4.5.2 to 4.5.9, as appropriate.

4.7 Reaction to fire

4.7.1 General

Where use of a prefabricated secondary treatment unit 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 4.7.2, or otherwise; or

b) class, defined according to the results of testing of the material(s) used in the unit, according to the standard(s) referred to in EN 13501-1, as specified in 4.7.3.

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.

4.7.2 Units classified as Class A1 without the need for testing

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

a) each of the constituent materials that the tank of the unit 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 prefabricated secondary treatment unit may contain organic materials (e.g. admixtures, additives) if any, but their level is far below 1 %. Similarly, 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 Note 1 to entry:) 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) with thickness ≥ 1,0 mm or mass per unit area ≥ 1,0 kg/m^2, which is/are also classified as Class A1.

4.7.3 Units classified according to the test results

For the purpose of the reaction to fire performance of the unit, each of its constituent materials, including those in the surface coating of the unit, 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.

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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*).

NOTE A constituent material of the unit 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 unit where the tank is made from one or more of the following constituent materials: unplasticised 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.

4.8 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, assessing and sampling methods

5.1 Load bearing capacity

5.1.1 Generals

For buried installation, the load bearing capacity of the prefabricated secondary treatment unit (i.e. of the tank of this unit) 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 component of the unit (see 5.1.3).

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

The load bearing capacity of prefabricated secondary treatment units that are intended to be used only in non- buried conditions shall be assessed only by calculation.

For a unit with the container made of flexible sheets, the pit test 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:

1) Geometrical data of the unit: e.g. wall thickness, distance of ribs, shape;

2) Properties of the materials and components: All parameters given in chapter durability (4.6 and EN 12566-3: 2016, Annex D).

The manufacturer shall provide in the installation instructions the height of backfill and the possibility to install the unit in a water table or not (WET or DRY), respectively.

NOTE If required, the manufacturer may provide the calculation results according to the calculation method valid in the place of use.

— 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 be carried out according to EN 12566-3:2016, 5.1.2.2.

5.1.2.3 Hydrostatic loads

A vertical and a horizontal component of the hydrostatic loads shall be calculated according to EN 12566-3:2016, 5.1.2.3.

5.1.2.4 Pedestrian loads

For pedestrian loads, a value of 2,5 kN/m^2 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 prefabricated secondary treatment unit shall be established by the crushing resistance or maximum load deformation according to EN 12566-3:2016, Annex C.

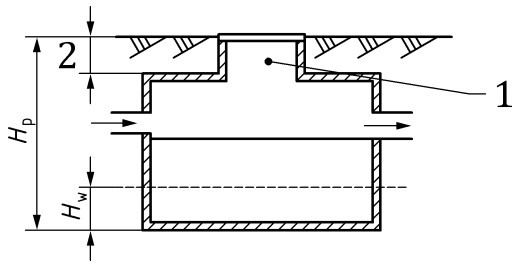
The test results shall ensure that the load bearing capacity under the declared height of backfill is ensured when tested according to:

When tested according to:

— C.5 of EN 12566-3:2016 (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 and C.3 of EN 12566-3: 2016 (crushing resistance test), the height of backfill shall be the minimum of H_1 or H_2 calculated according to Table 1;

— C.4 of EN 12566-3: 2016 (vacuum test), the height of backfill shall be the minimum of H_1 or H_2 calculated according to Table 2.



Key

1 extension shaft

2 H_1 or H_2

Figure 2 — Definition of parameters

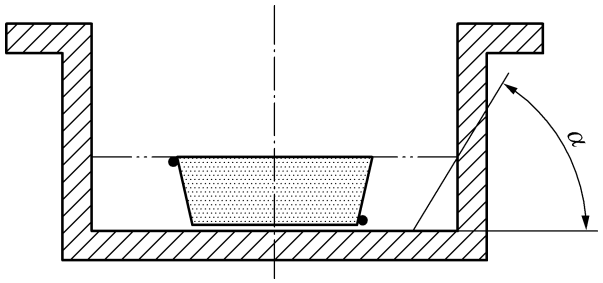
Table 1 — Formulae for height of backfill calculation after crushing resistance test

Vertical load	Horizontal load
$H_1 = \frac{\frac{F}{1,6 \times S_1} - 10 \times H_w - 2,5}{18}$	$H_2 = \frac{\frac{F}{1,6 \times S_2} - 10 \times H_w - 18 \times K \times H_p}{18 \times K}$
where:	where:
F is the crushing load (kN);	K is the coefficient (see 5.1.2.2);
S_1 is the horizontal surface of the plant (m^2);	F is the crushing load (kN);
H_W is the height of the groundwater table measured from the bottom of the plant (m);	S_2 is the lateral surface of the plant (m^2);
H_1 is the height of backfill (m).	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 2 — Formulae for height of backfill calculation after vacuum test

Vertical load	Horizontal load
$H_1 = \frac{\frac{P \times f}{1,5} - 10 \times H_w - 2,5}{18}$	$H_2 = \frac{\frac{P \times f}{1,5} - 10 \times H_w - 18 \times K \times H_p}{18 \times K}$
where:	where:
P is the underpressure (kPa) (see EN 12566–3:2016, C.4);	K is the coefficient (see 5.1.2.2);
f is the coefficient (see EN 12566–3:2016, C.4);	P is the underpressure (kPa) (see EN 12566–3:2016, C.4);
H_W is the height of the groundwater table measured from the bottom of the septic tank (m);	f is the coefficient (see EN 12566–3:2016, C.4);
H_1 is the height of backfill (m).	H_W is the height of the groundwater table measured from the bottom of the septic tank (m);
	H_p is the total height of the septic tank (m);
	H_2 is the height of backfill (m).

For open prefabricated secondary treatment unit, only the pit test shall be used (see example in Figure 3).



Key

α friction angle: $\alpha \leq 63°$

Figure 3 — Pit test for open unit

5.2 Secondary treatment capacity

The prefabricated secondary treatment unit shall be tested according to Annex A.

Each secondary treatment efficiency ratio shall be calculated using the following formula:

$$R_{ST} = \frac{P_i - P_o}{P_i}$$

where

R_{ST} is the secondary treatment efficiency ratio for a given parameter (e.g. COD, BOD, SS);

P_i is the value of the given parameter at the inlet of the prefabricated secondary treatment unit;

P_o is the value of the same given parameter at the outlet of the prefabricated secondary treatment unit.

5.3 Watertightness

For the declaration of watertightness, the treatment plant shall be tested according to the methods described in EN 12566-3:2016, Annex A.

Where the top of the unit is open, the watertightness test shall be performed by filling it up to the top.

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 3.

Table 3 — Number of samples to be tested and compliance criteria

Nr.	Characteristic		Requirement clause	Assessment method	Number of tests/ samples	Conformity criteria
1.1	Overall dimensions		4.1.2	According to 4.1.2	Each unit in the product family	Characteristic overall dimensions
1.2	Inlets, outlets, internal pipework and connections		4.1.3	According to 4.1.3	Each unit in the product family	Characteristic dimensions
1.3	Access		4.1.4	According to 4.1.4	Each unit in the product family	See 4.1.4
2.1	Secondary treatment efficiency ratios		4.3.2	According to 4.3.2 and Annex A	One unit of the product family [a]	Declared values: efficiency ratios for required parameters and desludging frequency during the test
2.2	Microorganism reduction, when required		4.3.3	According to 4.3.3 and Annexes A and B	One unit of the product family [a]	Declared values: individual values and reduction
4	Watertightness		4.4	According to 4.4 and EN 12566–3:2016, Annex A	Each unit in the product family	"Pass" or "Fail"
5.1	Load bearing capacity, calculated		4.2	According to 4.2	One unit of the product family [b]	Declared values: max depth of backfill (in m) and Wet or Dry
5.2	Load bearing capacity, tested		4.2	According to 4.2 [d] and EN 12566–3:2016, Annex C	One unit of the product family [b]	Declared values: max depth of backfill (in m) and Wet or Dry
6	Power consumption		4.5	According to 4.5	One unit of the product family	Declared value: power consumption (in kWh/d) during normal operating conditions (nominal sequences)
7	Durability [c] **for units made of:**	Concrete, steel, PVC-U, PE, GRP	4.6.2	EN 12566–3:2016, 4.5.2 to 4.5.7	-	Declared as "Pass" or "Fail" according to material used and test method applied
		PDCPD	4.6.2	Acc. to standards referred in 4.6.2		
		Flexible sheets	4.6.2	Acc. to standards referred in 4.6.2		
8	Reaction to fire		4.7.2	-	Each material(s)	Declared class A1 (CWT)
			4.7.3	Acc. to standards referred in 4.7.3		Declared the lowest class acc. to EN 13501–1 of the relevant material
9	Dangerous substances		4.8	As relevant	Each	As relevant, according to

			according to substance and intended place of use	material	substance and intended place of use

a The worst case unit for secondary 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 at least 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.

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

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 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);

[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.

— 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 (FPC)

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.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as foreseen 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 used for the prefabricated secondary treatment unit shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the attestation of conformity level of the component shall be that given in the appropriate harmonized Technical Specification for that component.

6.3.2.4 Traceability and marking

Individual prefabricated secondary treatment unit shall be identifiable and traceable with regard to their production origin. Written procedures shall be set up ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Controls during manufacturing process

Production shall be planned and carried out 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 4 — Minimum frequency of FPC testing for the prefabricated secondary treatment units

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, internal pipework 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
Secondary treatment efficiency	Check list of raw material and components	Every delivery of raw material and components
Microorganism reduction, when required	Check list of raw material and components	Every delivery of raw material and components
Watertightness	According to EN 12566–3:2016, Annex A	1/200 units or minimum 1/month
Load bearing capacity	Check list of raw materials and components	1/100 units or minimum 1/week
Power consumption	Check list of raw materials and components	1/100 units or minimum 1/week
Durability	Check list of raw materials and components	Every delivery of raw material and components
Reaction to fire	Check list of raw materials and components	Every delivery of raw material and components
Dangerous substances	As relevant according to substance and intended place of use	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 less 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.

Each prefabricated secondary treatment unit shall be designated according to

— the nominal organic daily load of septic tank effluent, expressed in kg of BOD_5 (or BOD_7) per day; and

— the nominal hydraulic daily flow Q_N, expressed in cubic metres of septic tank effluent per day.

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

NOTE Selection of nominal designated product. Depending on the type of end use condition of the prefabricated secondary treatment unit (i.e. domestic installations, guest houses, businesses, etc.) and the regulations in the place of intended use, one or more of the following design criteria may need to be taken into consideration to select the nominal designation of the unit into the product family:

— sizing of the septic tank (according to EN 12566-1 or EN 12566-4) in relation with the total population loading;

— declared value of SS settlement (grams of beads).

8 Marking, labelling and packaging

8.1 Marking

Each prefabricated secondary treatment unit, complying with this standard, shall be marked with the following information:

a) manufacturer and product identification;

b) the number of this standard: i.e. EN 12566-6;

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).

NOTE Where ZA.3 covers some of the requirements of this clause, such requirements need not be repeated here.

8.2 Technical information accompanying the unit

The following technical information shall accompany each prefabricated secondary treatment unit:

a) manufacturer and product identification;

b) the number of this standard, i.e. EN 12566-6;

c) information required when describing the unit:

- overall dimensions of the product;
- tank: material (type) and coating (type and thickness) where applicable;
- the volume or the amount of sludge production under nominal conditions;

d) information on the characteristics of the prefabricated secondary treatment unit:

- secondary treatment efficiency ratios on COD, BOD and SS and, if declared, treatment efficiency ratios for nitrogen parameters and total phosphorus together with:
  - the tested COD, BOD and SS influent daily load used during the test;
  - or the declared characteristics (at least hydraulic efficiency, nominal capacity, ...) of the septic tank used during the test expressed according to EN 12566-1 and EN 12566-4; in this option, it is necessary to have the hydraulic efficiency of the septic tank;
- microorganism reduction, when required;
- the nominal organic daily load, expressed in (kg/d) of BOD_5 (or BOD_7) and the nominal hydraulic daily flow (QN), expressed in (m3/d);

NOTE 1 This information could be accompanied by the equivalence in terms of total population (PT) in the intended place(s) of use of the unit.

- power consumption of the unit in normal operating conditions (nominal sequences) if applicable;
- watertightness;
- load bearing capacity expressed as:
  - maximum allowed height of backfill (m);
  - possibility to install the product in a water table or not, expressed as WET or DRY, respectively; the method of determination of this characteristic should be given (i.e. calculation or testing) according to the tank material;
- durability;

e) installation, operation and maintenance procedures;

f) date of manufacture;

g) name of laboratory(s);

h) test report number(s).

Other technical information may be provided.

NOTE 2 Where ZA.3 covers some of the requirements of this clause, such requirements need not be repeated here.

8.3 Installation instructions

With each prefabricated secondary treatment unit, clear and comprehensive installation instructions shall be provided, written in the language accepted in the place in which the unit is intended to be installed.

Installation instructions for the prefabricated secondary treatment units shall conform to EN 12566-3:2016, 8.2.

For open prefabricated secondary treatment units for septic tank effluent, the installation instructions shall describe how to prevent any water backflow into the unit that could affect the treatment process.

For non-buried units, the security conditions for protection of people and protection against impact onto the unit shall be given, e.g. using notices, painting or mechanical protection.

8.4 Operation and maintenance instructions

With each prefabricated secondary treatment unit, clear and comprehensive operation and maintenance instructions (including frequency of maintenance) shall be provided, written in the language accepted in the place in which the unit is intended to be installed.

The maintenance instructions shall indicate, where applicable:

- the electrical power information and consumption;
- actions during holiday periods;
- desludging frequency and method of determining the desludging frequency;
- the frequency of replacement for internal components, including any filtering material.

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)

Secondary treatment efficiency test procedure

A.1 Selection of the unit and its preliminary evaluation

A.1.1 General

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

Information detailing the mechanical, electrical and structural safety of the unit to be tested shall be provided.

A.1.2 Installation and commissioning

The unit 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. The unit shall be installed and commissioned in accordance with the manufacturer's instructions. All items of the unit shall be installed and commissioned prior to testing.

A.1.3 Operation and maintenance procedures during testing

The unit 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 unit when specified by the operating and maintenance instructions. All maintenance work during the test shall be recorded.

Any modifications made to the unit during the test (except during the sequence 1 (see Table A.1)) shall require the test to be restarted from the begginning of sequence 2 of the test.

In the case of a laboratory or unit malfunction that affects the efficiency performance of the unit during a given sequence, the test shall restart at either:

— the previous nominal sequence when the malfunction occurs during a stress sequence; or

— the current nominal sequence when the malfunction occurs during a nominal sequence.

A.1.4 Data to be monitored

The following core parameters shall be monitored in all prefabricated secondary treatment units for septic tank effluent. Parameters a), b) and c) shall be tested for both the influent and the effluent:

a) total chemical oxygen demand (COD) [4] and biochemical oxygen demand (BOD) [5];

b) suspended solids (SS);

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[4] TOC is an acceptable alternative for COD (for symbols and abbreviations, see Clause 4).

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

c) temperature (liquid phase);

d) power consumption of the unit;

e) daily hydraulic flow;

f) sludge production, if possible.

Other parameters may also be measured, for example:

g) pH value;

h) conductivity;

i) nitrogen parameters;

j) total phosphorus;

k) hourly hydraulic flow;

l) dissolved oxygen concentration;

m) ambient air temperature;

n) microorganisms: E. coli and intestinal Enterococci.

A.2 Test procedure

A.2.1 Time for establishment

Time needed for establishment of biomass, shown in Table A.1 as the X-value (in weeks), shall be indicated.

A.2.2 Influent characteristics

The influent shall be produced using raw domestic wastewater, which has been treated using a septic tank conforming to EN 12566-1 or EN 12566-4.

The characteristics of raw domestic wastewater used at the inlet of the septic tank shall comply with the influent characteristics described in EN 12566-3:2016, B.3.2, and shall be recorded.

A.2.3 Daily flow pattern for testing

The influent for the test shall be produced following the daily flow pattern specified in EN 12566-3:2016, B.3.3, at the inlet of the septic tank used for the test.

A.2.4 Test method

A.2.4.1 General

Routine monitoring shall take place throughout the period of the test procedure. The test schedules listed in Table A.1 shall apply at the inlet of the septic tank used for the test.

Measurements shall be regularly made during each test sequence at the inlet and at the outlet of the test unit.

The full test shall be carried out during a period of (38 + X) weeks (for X value see A.2.1) following the order given in Table A.1.

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

Table A.1 — Test schedules

Sequence	Characteristic		Time (weeks)
1	Sequence name: Hydraulic daily flow [d]: Sampling:	BIOMASS ESTABLISHMENT nominal no	X [a]
2	Sequence name: Hydraulic daily flow [d]: Sampling:	NOMINAL nominal 4 measurements	6
3	Sequence name: Hydraulic daily flow [d]: Sampling:	UNDERLOADING 50 % nominal 2 measurements	2
4	Sequence name: Hydraulic daily flow [d]: Sampling:	NOMINAL – POWER BREAKDOWN [b] nominal 5 measurements	6
5	Sequence name: Hydraulic daily flow [d]: Sampling:	LOW OCCUPATION STRESS no no	2
6	Sequence name: Hydraulic daily flow [d]: Sampling:	NOMINAL nominal 3 measurements	6
7	Sequence name: Hydraulic daily flow [d]: Sampling:	OVERLOADING [c] nominal and overload (see A.2.4.2) 2 measurements	2
8	Sequence name: Hydraulic daily flow [d]: Sampling:	NOMINAL – POWER BREAKDOWN [b] nominal 5 measurements	6
9	Sequence name: Hydraulic daily flow [d]: Sampling:	UNDERLOADING 50 % nominal 2 measurements	2
10	Sequence name: Hydraulic daily flow [d]: Sampling:	NOMINAL nominal 3 measurements	6

[a] X is the time indicated by the manufacturer to obtain normal operating performance (see A.2.1).

[b] A 24 h power breakdown shall take place two weeks after the beginning of that sequence (i.e. seq. 4 and 8). Two measurements shall be done before the power breakdown and the third within 24 h to 48 h after the power breakdown.

[c] An overload shall take place for duration of 48 h at the beginning of that sequence (i.e. seq. 7).

[d] Applied at the inlet of the septic tank used for the test.

A.2.4.2 Overload

The overload for the test shall be produced as specified in the test method given in EN 12566-3:2016, B.3.4.2, at the inlet of the septic tank used for the test.

A.2.4.3 Peak flow discharge

The peak flow discharge for the test shall be produced following the overload specified in the test method given in EN 12566-3:2016, B.3.4.3, at the inlet of the septic tank used for the test.

After peak flow discharge a period of at least 48 h shall be allowed before sampling.

A.2.4.4 Power breakdown/Machine breakdown

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

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

A.2.4.5 Power consumption

Where applicable, the power energy consumption of the unit shall be measured and expressed in kWh/d:

— for the complete duration of the test;

— for the five nominal sequences (sequences 2, 4, 6, 8 and 10).

The result shall be expressed by dividing the total power energy consumption (in kWh) with the duration of the measurement (i.e. total duration of the test and total duration of the nominal sequences in days (d).

A.2.5 Influent and effluent sampling

Samples to be tested shall be taken regularly at the inlet and at the outlet of the test unit. Samples shall be flow-based composites over 24 h taken according to Table A.1.

The effluent sample shall be analysed to determine the secondary treatment efficiency ratio.

A.3 Sample analysis

Samples shall be analysed in accordance with the relevant ISO or EN standard methods for wastewater analysis and reference to the testing analysis shall be given in the report.

Examples of EN and/or ISO standards to be used for analysis are given in Annex C.

Concentration shall be determined for each declared parameter.

The mean value of the 20 secondary treatment efficiency ratios (calculated by dividing by 20) obtained during the NOMINAL sequences (with and without power breakdown) shall be calculated for each parameter. This mean value shall be higher than the declared value.

The individual values for four efficiency ratios for the UNDERLOADING sequences (i.e. sequences 3 and 9) and 2 efficiency ratios for the OVERLOADING sequence (i.e. sequence 7) shall be stated in the test report.

A.4 Test report

The test report shall contain at least the following information:

a) complete description of the unit including main functional components;

b) details of the unit tested including information regarding the nominal organic daily load and hydraulic daily flow;

c) information on the conformity of the unit tested with the information provided prior to testing;

d) the complete set of data (all analyses and the testing method including for the verification of the influent into the septic tank used for the test) obtained during testing (see A.2.4) with the indication of efficiency ratio (individual and average);

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

f) information on the power consumption during the complete test period and during the five nominal sequences (normal operating conditions);

g) information on any problems, physical or environmental, occurring during the test period. Deviations from the manufacturers' maintenance instructions (e.g. maintenance frequency) shall be reported in this section;

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

i) information concerning any deviations from the test procedure;

j) the scaling rules used by the manufacturer to assess the same secondary treatment efficiency and load bearing capacity for all the units in the family.

Annex B
(normative)

Presentation of the microorganisms test results

The measurements of microorganism indicators shall be carried out on the following number of grab samples during:

a) NOMINAL sequences: 20;

b) UNDERLOADING sequences: 4;

c) OVERLOADING sequence: 2.

The tests results shall be presented as shown in Table B.1.

Table B.1 — Presentation of the results

E.Coli (EN ISO 9308-1 or EN ISO 9308-3) and intestinal enterococci (EN ISO 7899-1 or EN ISO 7899-2)						
Sample	**Inlet microorganisms** (cfu/100 ml or MPN/100 ml)		**Outlet microorganisms** (cfu/100 ml or MPN/100 ml)		**Reduction** (log unit)	
	E. Coli	**Intestinal enterococci**	**E. Coli**	**Intestinal enterococci**	**E. Coli**	**Intestinal enterococci**
S1						
S2						
… … … … …						
S26						
NOTE The influent level of microorganisms can vary greatly. The microorganism reduction obtained during the test does not automatically mean that the regulatory requirements on effluent qualities in a given place are met. These reductions are laboratory determined but may not always be obtained from the installed unit.						

Annex C
(informative)

Analysis method

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

Table C.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
E. coli	EN ISO 9308-1 or EN ISO 9308-3
Intestinal Enterococci	EN ISO 7899-1 or EN ISO 7899-2

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 prefabricated treatment units for septic tank effluent 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

Construction products: Kits and elements for wastewater treatment plants (prefabricated secondary treatment units) **Intended use:** To be used outside buildings for faecal water and organic effluent for a population up to 50 PE			
Essential characteristic	**Requirement clauses in this standard**	**Levels and/or classes**	**Notes**
Effectiveness of treatment, expressed as:			
secondary treatment efficiency ratios and/or	4.3.2	-	Tested acc. to 4.3.2 and Annex A and results expressed as the following secondary treatment efficiency ratios (in %), together with the tested organic daily load (BODx/d): — on COD, BOD, SS, nitrogen parameters and total phosphorus.
microorganism reduction, when required	4.3.3	-	Tested acc. to 4.3.3 and Annex A and results expressed acc. to Annex B as: — number of microorganism (cfu/100 ml or MPN/100 ml); and — reduction of microorganisms (in log unit).
Treatment capacity – nominal designation)	Clause 7	-	a) Designated according to Clause 7; and b) Expressed in the maximum number of population equivalent
number of desludging	4.3.2	-	a) Tested according to Annex A, and b) Expressed as an integer
Power consumption	4.7	-	a) Tested according to Annex A, and b) Expressed in kWh/d

Watertightness	4.4	-	Tested acc. to 4.4 [a] and EN 12566–3:2016, Annex A, and expressed as "pass/fail"
Reaction to fire	4.7.3	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.
Release of dangerous substances	4.8	-	As relevant, according to 4.8
Crushing resistance (and maximum load deformation) as:			
load bearing capacity	4.2	-	a) Calculated according to 5.1.2 and EN 12566–3:2016, 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	4.6.2	-	Tested according to 4.6.2 (as appropriate) and expressed as "Pass" or "Fail"

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 prefabricated secondary treatment units

ZA.2.1 System(s) of AVCP

The AVCP system(s) of prefabricated treatment units for septic tank effluent 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	Intended use	Level(s) or class(es)	Attestation of conformity systems
Kits and elements for wastewater treatment plants	To be used outside buildings for faecal and organic effluents	-	3
	For all use(s) 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 Prefabricated secondary treatment units fall within the definition of the product given in Table ZA.2.

The AVCP of the prefabricated treatment units for septic tank effluent 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 prefabricated secondary treatment units under 1 [a]

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to the characteristics of Table ZA.1, the performances of which are to be declared for the relevant intended uses including those subject to reaction to fire regulations	6.3.1, 6.3.2, 6.3.3, 6.3.6, 6.3.7
	Further testing of samples	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

[a] For products covered by footnote (*) of Table ZA.2.

Table ZA.3.2 — Assignment of AVCP tasks for prefabricated secondary treatment units under system 3 [a]

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
a For products covered by footnote (**) of Table ZA.2.			

Table ZA.3.3 — Assignment of AVCP tasks for prefabricated secondary treatment units under system 4 [a]

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
a For products covered by footnote (***) of Table ZA.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 prefabricated secondary treatment units

DECLARATION OF PERFORMANCE

No. 0012014-09-30

1. Unique identification code of the product-type:

prefabricated secondary treatment unit BWV 41 (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:

prefabricated secondary treatment units for population 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 12345/2014.

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 12566–6:2016
Effectiveness of treatment expressed as:		
secondary treatment efficiency ratios	COD: 80 % BOD5: 80 % SS: 70 % P: NPD KN: NPD	
microorganism reduction	E. Coli:1 000 cfu/100 ml 2 log unit Intestinal enterococci: 1 000 cf/100 ml 1,5 log unit	
Treatment capacity (Nominal designation)	From 4 to 50 PT	
Number of desludging during CE test	0	
Power consumption	0,2 kWh/d	
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 prefabricated septic plant; 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** **0012014–09–30**		*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 12566–6:2016 **Prefabricated treatment units for septic tank effluent** — - Product's reference code: "BWV 41" — - Material: CONCRETE To be used outside buildings for septic tank effluent		*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: 70 % P NPD KN NPD	*Level or class of the performance declared*
Number of desludging during CE test	0	
Power consumption	0,2 kWh/d	
Microorganism reduction	E. Coli: 1 000 cfu/100 ml 2 log unit Intestinal enterococci: 1 000 cf/100 ml 1,5 log unit	
Treatment capacity (nominal designation):	4 PT	
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

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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[8] EN ISO 10304-1, *Water quality — Determination of dissolved anions by liquid chromatography of ions — Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (ISO 10304-1)*

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[18] ISO 7150-1, *Water quality — Determination of ammonium — Part 1: Manual spectrometric method*

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