SLOVENSKI STANDARD
oSIST prEN 16941-2:2017

01-december-2017

Sistemi za vodo, ki ni namenjena pitju, nameščeni na terenu - 2. del: Sistemi za uporabo očiščene sive vode

On-site non-potable water systems - Part 2: Systems for the use of treated greywater

Vor-Ort-Anlagen für Nicht-Trinkwasser - Teil 2: Anlagen für die Verwendung von behandeltem Grauwasser

Réseaux d'eau non potable sur site - Partie 2: Systèmes pour l'utilisation de l'eau grise traitée

Ta slovenski standard je istoveten z: **prEN 16941-2**

ICS:

93.025	Zunanji sistemi za prevajanje vode	External water conveyance systems

oSIST prEN 16941-2:2017 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 16941-2

September 2017

ICS 93.025

English Version

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

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European foreword

This document (prEN 16941-2:2017) has been prepared by Technical Committee CEN/TC 165 “Wastewater engineering”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

The series of standards EN 16941 "*On-site non-potable water systems*" consists of the following parts:

— Part 1: *Systems for the use of rainwater*

— Part 2: *Systems for the use of treated greywater*

Introduction

Ecological and sustainable water management is a goal of greywater management.

Greywater varies in volume and composition depending on different sources (see Figure 1) which would need different levels of treatment for use. Therefore greywater systems can vary significantly in their complexity and size. They can be grouped according to the type of system (see Annex B).

Greywater can also be used for heat recovery and cooling demands. Principles and design for such applications are not covered by this European Standard.

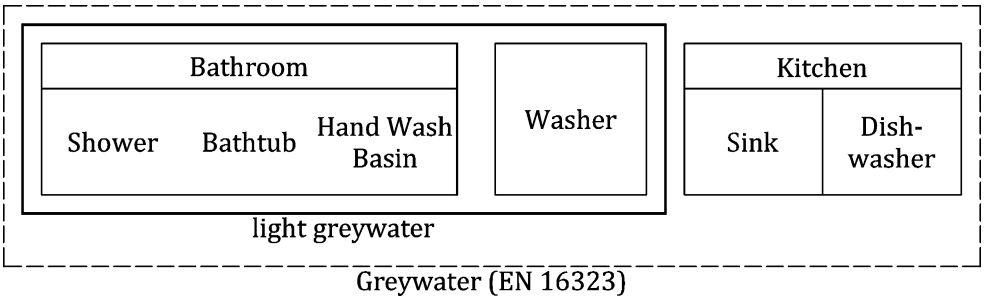

Figure 1 — Types of greywater

1 Scope

This European Standard specifies the principles of design, sizing, installation, identification, commissioning and maintenance of greywater systems with the purpose of use of greywater on-site.

It applies preferably for the use of treated greywater for:

— WC flushing;

— garden watering;

— laundry;

— cleaning purposes.

This European Standard also specifies the minimum requirements for greywater systems.

Excluded from the scope of this European Standard are:

— the use as drinking water and for food preparation;

— the use for personal hygiene purposes;

— direct reuse systems for external use e. g. garden watering;

— product design for specific system components;

— industrial effluents;

— heat recovery and cooling demands.

NOTE Conformity with this European Standard does not exempt from compliance with the obligations arising from local or national regulations.

2 Normative references

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

EN 476, *General requirements for components used in drains and sewers*

EN 806-1, *Specifications for installations inside buildings conveying water for human consumption — Part 1: General*

EN 806-2, *Specification for installations inside buildings conveying water for human consumption — Part 2: Design*

EN 806-3, *Specifications for installations inside buildings conveying water for human consumption — Part 3: Pipe sizing — Simplified method*

EN 806-4, *Specifications for installations inside buildings conveying water for human consumption — Part 4: Installation*

EN 806-5, *Specifications for installations inside buildings conveying water for human consumption — Part 5: Operation and maintenance*

EN 809, *Pumps and pump units for liquids — Common safety requirements*

EN 1610, *Construction and testing of drains and sewers*

EN 1717, *Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow*

EN 12050 (all parts), *Wastewater lifting plants for buildings and sites*

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

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

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

EN 13076, *Devices to prevent pollution by backflow of potable water — Unrestricted air gap-Family A — Type A*

EN 13077, *Devices to prevent pollution by backflow of potable water — Air gap with non-circular overflow (unrestricted) — Family A — Type B*

EN 13564-1, *Anti-flooding devices for buildings — Part 1: Requirements*

EN 60335-2-41, *Household and similar electrical appliances — Safety — Part 2-41: Particular requirements for pumps (IEC 60335-2-41)*

EN ISO 4064 (all parts), *Water meters for cold potable water and hot water (ISO 4064, all parts)*

3 Terms and definitions

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

3.1
greywater
domestic wastewater excluding wastewater from WC and urinal

[SOURCE: EN 16323:2014, 2.1.2.1]

3.2
light greywater
greywater excluding kitchen wastewater

3.3
storage device
unit for the storage of treated greywater

3.4
cistern
fixed container for holding water at atmospheric pressure for use as part of the plumbing system

3.5
non-potable water
water which has been made available for use, except drinking, food preparation and personal hygiene

3.6
non-return valve
device that prevents backflow of water

[SOURCE: EN 16323:2014, 2.2.5.12, modified: "wastewater" was changed to "water"]

4 Functional elements and greywater quality

Any greywater system is described through four main functional elements:

— collection;

— treatment;

— storage; and

— distribution.

Greywater systems shall be designed, installed, marked, operated and maintained in such a way that the required level of safety is ensured at any time and that the required servicing work can be easily carried out.

Greywater systems shall not cause flooding and therefore shall include potential bypasses and/or properly dimensioned overflows.

Volumes and pollution of the different kinds of greywater are depending on their origin.

5 Design

5.1 General

The following factors should be identified in order to determine the type and treatment capacity of the greywater system:

a) demand and yield, based on:

   1) the number and type of intended applications, both present and future;

   2) the volume and usage patterns of these applications;

   3) discharge figures of greywater connected for use.

b) peak capacity treatment rate;

c) water quality requirements for the intended use shall be in accordance with local and/or national regulations (an example of water quality requirements is given in Annex D).

The different types of greywater systems can be distinguished according to Annex A.

NOTE 1 Residual disinfectant or by products might be present in the treated greywater. Colour could also be present. These systems might not be suitable for laundry use or garden watering. Furthermore, if it is intended that treated greywater is to be used for garden watering, water that has been artificially softened might not be suitable for some plants and soils because of salt carryover in the treated greywater.

NOTE 2 It is noted that treated greywater discharge rates vary depending on the appliances that are in use. For example, a shower can discharge at a rate between 0,1 l/s (or less) and 0,3 l/s, while a full bath typically discharges at between 0,4 l/s and 0,5 l/s. The greywater system needs to manage these varying incoming flow rates.

The materials selected for the tank and other components should be suitable for the location and temperature ranges anticipated. All components of the greywater system should be capable of withstanding pH levels as low as 5 for the lifetime of the products.

Consideration should be given to the environmental impact of materials used. Existing resources on site should be utilized, where appropriate, and materials re-used where possible to limit the environmental impacts of the greywater system.

5.2 Collection

Greywater quality and volume depend significantly on the behaviour of the people using the collection appliances.

Depending on the type of system, greywater can be collected in different ways. It shall be collected in separate wastewater drainage pipework and allowed to flow from collection appliances to the greywater system by gravity.

NOTE Where this is not practicable, e. g. in single-storey dwellings, pumps need to be considered (see 5.6).

Collection pipework should be:

a) dedicated to greywater;

b) sized and laid out in accordance with EN 12056-2, such that the generation of foam is minimized. As air entrainment is a major factor in the generation of foam, turbulence and the use of bends should be minimized;

c) identified (see Clause 8);

d) free draining to avoid stagnation.

Collection pipework should prevent contaminated water entering the greywater system from other sources.

It is recommended that hair traps and filters be used to minimize pollutants entering the greywater system, wherever possible.

A bypass should be fitted around the greywater system allowing the collected greywater to flow directly to the foul sewer during periods of maintenance, blockage or system isolation. The bypass should not compromise the drainage system.

5.3 Treatment

The intended use of the collected greywater should be considered in order to determine whether treatment is needed and which method is appropriate, e. g. physical, chemical or biological.

The collected greywater should only be treated to the extent needed to meet the water quality guidelines of the application being supplied (see Clause 7).

After choosing the degree of treatment, the sustainability aspects and the environmental impact should also be considered in order to determine the most appropriate type of treatment.

Types of treatment may include one or more of the following sub-steps:

a) sedimentation/flotation, e. g. via settlement tanks;

b) screening, e. g. large particulate filtration;

c) mechanical fine filtration, e. g. membrane filtration;

d) biological treatment, e. g. aeration;

e) chemical treatment e. g. precipitation;

f) disinfection, e. g. ultraviolet (UV) radiation.

5.4 Storage

5.4.1 General

The storage of untreated greywater should be avoided, wherever possible. Where storage of treated greywater is necessary, it may be incorporated as part of the greywater system or provided separately.

The selection of storage should take into account:

a) the maximum hydraulic capacity treatment rate;

b) the necessary storage temperature and allow natural ventilation;

c) the maximum storage period and any other conditions stated by the manufacturer of the treatment equipment;

d) whether the system is to be dedicated to greywater only or combined with a rainwater harvesting system.

5.4.2 Materials

The materials used shall not have a negative effect on the stored water and the environment of the installation. The storage device shall be made from non-translucent material.

The materials (e. g. concrete, steel, Polyvinylchloride (PVC-U), Polyethylene (PE), Polypropylene (PP), Glass Reinforced Polyester (GRP-UP)) used for the storage device shall meet the conditions described in EN 12566-3. The materials constituting the submerged components shall be chosen considering the risk of corrosion.

5.4.3 Dimension

When prefabricated components are used, the overall dimensions, access and connection dimensions and tolerances shall be stated by the manufacturer. Individual storage devices may be connected to each other.

5.4.4 Capacity

The nominal capacity is the maximum volume of water that can be retained within the storage device and shall be stated by the manufacturer or designer within 0,1 m^3.

The capacity can be determined by testing or calculation.

5.4.5 Structural behaviour

Underground storage devices shall withstand the maximum stresses and loads exerted during its handling, installation, use and maintenance. This shall be assessed either by calculation or testing.

Above-ground storage devices shall withstand the action of hydrostatic pressure without generating excessive deformation adversely affecting its function.