SLOVENSKI STANDARD
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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

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

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ICS:

93.025	Zunanji sistemi za prevajanje vode	External water conveyance systems

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EUROPEAN STANDARD

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EN 16941-2

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ICS 93.025

English Version

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

Réseaux d'eau non potable sur site - Partie 2 : Systèmes pour l'utilisation des eaux ménagères traitées

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

This European Standard was approved by CEN on 20 December 2020.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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SIST EN 16941-2:2021
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SIST EN 16941-2:2021

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 16941-2:2021
https://standards.iteh.ai/catalog/standards/sist/8f68fb71-9f44-40f8-9211-2b0672f09499/sist-en-16941-2-2021

SIST EN 16941-2:2021

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 16941-2:2021
https://standards.iteh.ai/catalog/standards/sist/8f68fb71-9f44-40f8-9211-2b0672f09499/sist-en-16941-2-2021

SIST EN 16941-2:2021

European foreword

This document (EN 16941-2:2021) 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 July 2021, and conflicting national standards shall be withdrawn at the latest by July 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

The EN 16941 series, *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*.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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SIST EN 16941-2:2021
https://standards.iteh.ai/catalog/standards/sist/8f68fb71-9f44-40f8-9211-2b0672f09499/sist-en-16941-2-2021

SIST EN 16941-2:2021

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 depending on its intended 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 document.

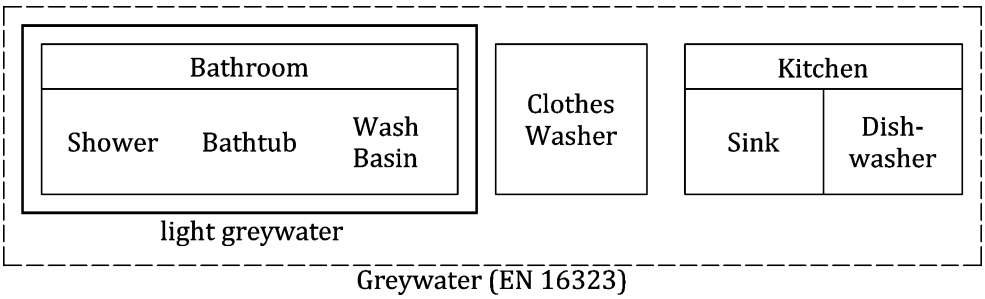

Figure 1 — Types and sources of light greywater

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SIST EN 16941-2:2021
https://standards.iteh.ai/catalog/standards/sist/8f68fb71-9f44-40f8-9211-2b0672f09499/sist-en-16941-2-2021

SIST EN 16941-2:2021

1 Scope

This document 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 document also specifies the minimum requirements for greywater systems.

Excluded from the scope of this document are:

— the use as drinking water and for food preparation;

— the use for personal hygiene purposes;

— direct use systems without treatment;

— product design for specific system components;

— industrial effluents;

— heat recovery and cooling demands.

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(standards.iteh.ai)
SIST EN 16941-2:2021
https://standards.iteh.ai/catalog/standards/sist/8f68fb71-9f44-40f8-9211-2b0672f09499/sist-en-16941-2-2021

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 476, *General requirements for components used in drains and sewers*

EN 806 (all parts), *Specifications for installations inside buildings conveying water for human consumption*

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 12056-2, *Gravity drainage systems inside buildings - Part 2: Sanitary pipework, layout and calculation*

SIST EN 16941-2:2021

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*

EN ISO 4064-1, *Water meters for cold potable water and hot water - Part 1: Metrological and technical requirements (ISO 4064-1)*

EN ISO 4064-5, *Water meters for cold potable water and hot water - Part 5: Installation requirements (ISO 4064-5)*

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ISO 7010, *Graphical symbols - Safety colours and safety signs — Registered safety signs*

SIST EN 16941-2:2021
https://standards.iteh.ai/catalog/standards/sist/8f68fb71-9f44-40f8-9211-2b0672f09499/sist-en-16941-2-2021

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

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 and clothes washer 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

SIST EN 16941-2:2021

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.

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

SIST EN 16941-2:2021
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Volume and pollution of different kinds of greywater depend on their origin. Where greywater is taken from a sink or dishwasher, the level of pollutant is far higher than light greywater and may require more intensive treatment.

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 appliances, both present and future;

   2) the volume and usage patterns of these appliances;

   3) discharge figures of greywater appliances connected for use.

b) peak capacity treatment rate;

c) water quality requirements for the intended use.

These requirements 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 B.

SIST EN 16941-2:2021

NOTE Residual disinfectant or by-products might be present in the treated greywater. Colour could also be present. Systems containing these mentioned products 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.

It is noted that 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 shall manage these varying incoming flow rates.

The materials selected for the tank and other components should be suitable for the location and temperature ranges and structural loadings anticipated. All components of the greywater system should be capable of withstanding all pollutants of greywater for the lifetime of the products.

Consideration should be given to the environmental impact of materials used. Where appropriate, existing resources on site should be utilized to limit the environmental impacts of the greywater system, materials should be reused where ever possible.

5.2 Collection

Greywater shall be collected in separate wastewater drainage pipework and allowed to flow from collection appliances to the greywater system by gravity. Where this is not practicable, pumps need to be considered (see 5.6).

Collection pipework shall be:

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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 shall be minimized;

SIST EN 16941-2:2021
https://standards.iteh.ai/catalog/standards/sist/8f68fb71-9f44-40f8-9211-2b0672f09499/sist-en-16941-2-2021

c) identified (see Clause 8); and

d) free draining to avoid stagnation.

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

It is recommended to minimize coarse pollutants, e.g. hair, entering the greywater system.

The greywater system should at least have a bypass to divert the greywater away from the system during periods of maintenance, blockage or system isolation. The bypass shall not overload the drainage system.

5.3 Treatment

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

The collected greywater shall at least be treated to the extent needed to meet the water quality guidelines of the application being supplied (see Annex D).

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

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

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

SIST EN 16941-2:2021

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. Where storage of treated greywater is necessary, it may be incorporated as part of the greywater treatment process or provided separately, e.g. in combination with a rainwater harvesting system.

The selection of storage should take into account:

a) the peak capacity treatment rate;

b) the necessary storage temperature and allow natural ventilation;

c) the maximum storage period and any other conditions related to the treatment equipment; and

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

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5.4.2 Materials

SIST EN 16941-2:2021
https://standards.iteh.ai/catalog/standards/sist/8f68fb71-9f44-40f8-9211-2b0672f09499/sist-en-16941-2-2021

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 material properties described in EN 12566-3. The materials of components in contact with water shall be chosen considering the risk of corrosion.

5.4.3 Dimensions

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.

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 their handling, installation, use and maintenance. This shall be assessed either by calculation or testing.