SLOVENSKI STANDARD
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Toplotni sončni sistemi in sestavni deli - Industrijsko izdelani sistemi - 1. del: Splošne zahteve

Thermal solar systems and components - Factory made systems - Part 1: General requirements

Thermische Solaranlagen und ihre Bauteile - Vorgefertigte Anlagen - Teil 1: Allgemeine Anforderungen

Installations solaires thermiques et leurs composants - Installations préfabriquées en usine - Partie 1 : Exigences générales

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 312.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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Foreword

This document (prEN 12976-1:2012) has been prepared by Technical Committee CEN/TC 312 “Thermal solar systems and components”, the secretariat of which is held by ELOT.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12976-1:2006.

Introduction

Drinking water quality

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this standard:

a) This standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;

b) It should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

Factory Made and Custom Built solar heating systems

The standards prEN 12976-1, prEN 12976-2, CEN/TS 12977-1, CEN/TS 12977-2, EN 12977-3, CEN/TS 12977-4 and CEN/TS 12977-5 distinguish two categories of solar heating systems: **Factory Made** solar heating systems and **Custom Built** solar heating systems. The classification of a system as Factory Made or Custom Built is a choice of the final supplier, in accordance with the following definitions.

Factory Made solar heating systems are batch products with one trade name, sold as complete and ready to install kits, with fixed configurations. Systems of this category are considered as a single product and assessed as a whole.

If a Factory Made Solar Heating System is modified by changing its configuration or by changing one or more of its components, the modified system is considered as a new system for which a new test report is necessary. Requirements and test methods for Factory Made solar heating systems are given in prEN 12976-1 and prEN 12976-2.

Custom Built solar heating systems are either uniquely built, or assembled by choosing from an assortment of components. Systems of this category are regarded as a set of components. The components are separately tested and test results are integrated to an assessment of the whole system. Requirements for Custom Built solar heating systems are given in CEN/TS 12977-1; test methods are specified in CEN/TS 12977-2 and EN 12977-3. Custom Built solar heating systems are subdivided into two categories:

— **Large Custom Built systems** are uniquely designed for a specific situation. In general HVAC engineers, manufacturers or other experts design them.

— **Small Custom Built systems** offered by a company are described in a so-called assortment file, in which all components and possible system configurations, marketed by the company, are specified. Each possible combination of a system configuration with components from the assortment is considered as **one** Custom Built system.

Table 1 shows the division for different system types:

Table 1 — Division for factory made and custom built solar heating systems

Factory Made Solar Heating Systems (prEN 12976-1 & prEN 12976-2)	Custom Built Solar Heating Systems (CEN/TS 12977-1, CEN/TS 12977-2 & EN 12977-3)
Integral collector-storage systems for domestic hot water preparation	Forced-circulation systems for hot water preparation and/or space heating, assembled using components and configurations described in a documentation file (mostly small systems)
Thermosiphon systems for domestic hot water preparation	
Forced-circulation systems as batch product with fixed configuration for domestic hot water preparation	Uniquely designed and assembled systems for hot water preparation and/or space heating (mostly large systems)

NOTE 1 Forced circulation systems can be classified either as Factory Made or as Custom Built, depending on the market approach chosen by the final supplier.

NOTE 2 Both Factory Made and Custom Built systems are performance tested under the same set of reference conditions as specified in prEN 12976-2:2012, Annex B, and in CEN/TS 12977-2:2010, Annex A. In practice, the installation conditions may differ from these reference conditions.

NOTE 3 A Factory Made system for domestic hot water preparation may have an option for space heating, however this option should not be used or considered during testing as a Factory Made system.

1 Scope

This European Standard specifies requirements on durability, reliability and safety for Factory Made thermal solar heating systems. The standard also includes provisions for evaluation of conformity to these requirements.

The requirements in this standard apply to Factory Made solar systems as products. The installation of these systems itself is not considered, but requirements are given for the documentation for the installer and the user which is delivered with the system (see also 4.6).

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 1151 (all parts), *Pumps — Rotodynamic pumps — Circulation pumps having a rated power input not exceeding 200 W for heating installations and domestic hot water installations*

EN 1489, *Building valves — Pressure safety valves — Tests and requirements*

EN 1490, *Building valves — Combined temperature and pressure relief valves — Tests and requirements*

EN 1991-1-3, *Eurocode 1: Actions on structures — Part 1-3: General actions — Snow loads*

EN 1991-1-4, *Eurocode 1: Actions on structures — Part 1-4: General actions — Wind actions*

EN 1993-1-1, *Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings*

EN 1999-1-1, *Eurocode 9: Design of aluminium structures — Part 1-1: General structural rules*

EN 12975-1:2006+A1:2010, *Thermal solar systems and components — Solar collectors — Part 1: General requirements*

EN 12975-2, *Thermal solar systems and components — Solar collectors — Part 2: Test methods*

prEN 12976-2:2012, *Thermal solar systems and components — Factory made systems — Part 2: Test methods*

CEN/TS 12977-5, *Thermal solar systems and components — Custom built systems — Part 5: Performance test methods for control equipment*

EN 15092, *Building valves — Inline hot water supply tempering valves — Tests and requirements*

EN 60335-1, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1)*

EN 60335-2-21, *Household and similar electrical appliances — Safety — Part 2-21: Particular requirements for storage water heaters (IEC 60335-2-21)*

EN ISO 9488:1999, *Solar energy — Vocabulary (ISO 9488:1999)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 9488:1999 and the following apply.

3.1
expansion line
<systems with closed expansion vessels> connecting line between the collectors and the pressure expansion vessel

<systems with open expansion vessels> connecting line between the collector array and the open expansion vessel.

3.2
safety line
<systems with closed expansion vessels> connecting line between the collector array and the safety valve

<systems with open expansion vessels> connecting line between the collector array and the open expansion vessel

3.3
blow-off line
connecting line between the outlet of the safety valve and the environment

3.4
factory-made solar system
packaged solar energy system for the purpose of hot water preparation only, either of the close-coupled or remote-store type, consisting of either one integral component or of a uniform set and configuration of components, produced under conditions which are presumed uniform, and offered for sale under the same trade name

NOTE 1 A single system can be tested as a whole in a test laboratory, leading to representative results for all systems with the same trade name, configuration, components and dimensions (see also the Introduction).

NOTE 2 External auxiliary water heating devices that are placed in series with the Factory Made system are not considered to be part of the system. Cold water piping from the cold water grid to the system as well as piping from the system to an external auxiliary heater or to tapping points is not considered to be part of the system. Piping between components of the Factory Made system is considered to be part of the system. Any integrated heat exchanger or piping for space heating option (see Introduction, Note 3) is not considered to be part of the system.

4 Requirements

4.1 General

4.1.1 Safety

The system shall fulfil general safety requirements, e.g. care shall be taken to avoid protruding sharp edges on the outside of the system.

4.1.2 Suitability for drinking water

The system shall conform to EN 806-1 and EN 806-2.

NOTE See 4.6.2 c) 7) and 4.6.3 b) 3).

4.1.3 Water contamination

The system has to be designed to avoid water contamination for backflow from all circuits to drinking main supplies.

4.1.4 Freeze resistance

4.1.4.1 General

The manufacturer shall state a minimal allowed temperature for the system. The parts of the system that are exposed to the outdoors shall be able to withstand freezing to this specified temperature without any permanent damage.

The manufacturer shall describe the method of freeze protection used for the system.

Any indoor components that are to be installed in places where temperatures can drop below 0 °C, shall be protected against freezing.

The freezing mechanism shall be tested in accordance with 5.1 of prEN 12976-2:2012.

4.1.4.2 Freeze protection by means of antifreeze fluid

The manufacturer shall define the composition of the heat transfer fluid, including additives, allowed for the system.

Precautions shall be taken to prevent the antifreeze fluid from deterioration as a result of high temperature conditions. These precautions shall be checked in accordance with 5.2 of prEN 12976-2:2012.

NOTE In general the minimal allowed temperature of the system is equal to the freezing point of the antifreeze fluid. If the concentration of some antifreeze fluids - like glycols - exceeds a certain limit, they can freeze without damaging the system. In this case the minimal allowed temperature can be lower than the freezing point of the antifreeze fluid.

4.1.5 Over temperature protection

4.1.5.1 General

The system shall have been designed in such a way that prolonged high solar irradiation without heat consumption does not cause any situation in which special action by the user is required to bring the system back to normal operation.

When the system has a provision to drain an amount of drinking water as a protection against overheating, the hot water drain shall be constructed in such a way that no damage is done to the system or any other materials in the house by the drained hot water. The construction shall be such that there is no danger to inhabitants from steam or hot water from the drain (see 4.6.2).

When the overheating protection of the system is dependent on electricity supply and/or cold water supply, this shall be stated clearly in the instructions and on the system (see 4.6.3 and 4.7).

4.1.5.2 Scald protection

When the system is tested in accordance with 5.2 of prEN 12976-2:2012, no steam shall escape from any tapping point. When this test has been performed with other than the highest irradiations this shall be mentioned in the documentation for the user (see 4.6.3).

For systems in which the temperature of the domestic hot water delivered to the user can exceed 60 °C, the assembly instructions shall mention that an automatic cold water mixing device or any other device to limit the tapping temperature to at most 60 °C +/- 5°C shall be installed on the solar heating system or elsewhere in the domestic hot water installation (see also 4.6.2).

This device shall be able to withstand the maximum possible domestic hot water temperature from the solar heating system.

4.1.5.3 Over temperature protection for materials

The system shall have been designed in such a way that the maximal allowed temperature of any material in the system is never exceeded.

NOTE Care should be taken in cases where under stagnation conditions steam or hot water can enter the collector pipes, pipework, distribution network or heat exchanger).

4.1.6 Reverse flow protection

The system shall contain provisions in order to prevent increased heat loss resulting from reverse flow in any circuit. This shall be checked in accordance with 5.10 of prEN 12976-2:2012.

4.1.7 Pressure resistance

The storage tank and heat exchangers in this tank shall withstand 1,5 times the manufacturer's stated maximum individual working pressures.

When tested in accordance with 5.3 of prEN 12976-2:2012 to the above pressures, there shall be no visible permanent damage or leakage of the system components and interconnections. After the waiting period in the test, the hydraulic pressure shall not have dropped more than 10 % from the value measured at the start of the waiting period.

The drinking water circuit shall withstand the maximum pressure required by national/European drinking water regulations for open or closed drinking water installations.

The system shall have been designed in such a way that the maximal allowed pressure of any materials in the system is never exceeded.

Every closed circuit in the system shall contain a safety valve. This safety valve shall withstand the highest temperature that can be reached at its location. It shall conform to EN 1489. If thermostatic valves are used, these shall conform to EN 1490.

4.1.8 Electrical safety

If the system contains any electrical devices, these shall conform to EN 60335-1 and EN 60335-2-21.

4.2 Materials

Any parts of the system to be mounted outdoors shall be resistant to UV radiation and other weather conditions over the prescribed maintenance interval. When any maintenance or replacement of system parts is required in order to maintain the system's working order over a period of 10 years, this shall be clearly stated in the documents for the user.

With respect to the materials used in the collector loop, Annex B give information to assist manufacturers in selecting them to avoid corrosion.

4.3 Components and pipework

4.3.1 Collector

For systems whose collector can be tested separately, the collector shall conform to EN 12975-1, with the exception of:

— internal pressure tests for absorber (see 5.3.2 of EN 12975-1:2006+A1:2010);

— freeze resistance test (see 5.3.10 of EN 12975-1:2006+A1:2010);