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TEHADES VALMISTATUD SÜSTEEMID. OSA 2:
KATSEMEETODID

Thermal solar systems and components - Factory made
systems - Part 2: Test methods

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 12976-2:2019 sisaldab Euroopa standardi EN 12976-2:2019 ingliskeelset teksti.	This Estonian standard EVS-EN 12976-2:2019 consists of the English text of the European standard EN 12976-2:2019.
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English Version

Thermal solar systems and components - Factory made systems - Part 2: Test methods

Installations solaires thermiques et leurs composants -
Installations préfabriquées en usine - Partie 2 :
Méthodes d'essai

Thermische Solaranlagen und ihre Bauteile -
Vorgefertigte Anlagen - Teil 2: Prüfverfahren

This European Standard was approved by CEN on 30 December 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 12976-2:2019) has been prepared by Technical Committee CEN/TC 312 “Thermal solar systems and components”, the secretariat of which is held by ELOT.

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of an identical text or by endorsement, at the latest by September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

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.

This document supersedes EN 12976-2:2017.

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 Annexes ZA, ZB or ZC, which are an integral part of this document.

Most significant changes in EN 12976-1:2019 and EN 12976-2:2019 since the 2017 editions of both parts:

The first edition of the EN 12976 series was published in 2000. The standard series provided an important basis for the assessment of the performance as well as the reliability and durability of Factory made solar thermal systems. In the past 15 years or so, several important technological developments and changes of the framework conditions, such as e.g. the aspect of requiring “Energy Labelling”, the EN 12976 series underwent several important changes.

The following modifications are the most important ones that have been implemented in this new edition of EN 12976-2:

- beside few editorial changes, more clarification with respect to testing requirements of reverse flow protection (Clause 5.11) and mechanical load testing (Clause 5.5).
- confusion about different Q_{ref} values in Table B.5 has been solved by using the complete equation for the annual loads. Finally, there should only be one Q_{ref} value.
- main changes related to ErP and the new mechanical load test;
- Annex ZA (new): harmonisation with Regulation (EC) No 811/2013;
- Annex ZB (new): harmonisation with Regulation (EC) No 812/2013;
- Annex ZC (new): harmonisation with Regulation (EC) No 814/2013.

It is worth to notice that, based on these changes and developments, the need for the elaboration of a future strategy of the structure of the EN 12976 series is foreseen.

EN 12976, *Thermal solar systems and components — Factory made systems*, is currently composed with the following parts:

- *Part 1: General requirements;*
- *Part 2: Test methods.*

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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 document:

- 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 EN 12976-1, EN 12976-2, EN 12977-1, EN 12977-2, EN 12977-3, EN 12977-4 and EN 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 EN 12976-1 and EN 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 EN 12977-1; test methods are specified in EN 12977-2, EN 12977-3, EN 12977-4 and EN 12977-5. 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 (EN 12976-1 and EN 12976-2)	Custom Built Solar Heating Systems (EN 12977-1, EN 12977-2 and EN 12977-3)
Integrated 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 an assortment 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 Forced circulation systems can be classified either as Factory Made or as Custom Built, depending on the market approach chosen by the final supplier.

Both Factory Made and Custom Built systems are performance tested under the same set of reference conditions as specified in Annex B of the present standard and EN 12977-2:2018, Annex A. In practice, the installation conditions may differ from these reference conditions.

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 document specifies test methods for validating the requirements for Factory Made Thermal Solar Heating Systems as specified in EN 12976-1. The document also includes two test methods for thermal performance characterization by means of whole system testing.

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 1489:2000, *Building valves - Pressure safety valves — Tests and requirements*

EN 1717:2000, *Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow*

EN ISO 4126-1, *Safety devices for protection against excessive pressure — Part 1: Safety valves (ISO 4126-1)*

EN 12976-1:2017, *Thermal solar systems and components — Factory made systems — Part 1: General requirements*

EN 12977-2:2018, *Thermal solar systems and components — Custom built systems — Part 2: Test methods for solar water heaters and combisystems*

EN 15502-1, *Gas-fired heating boilers — Part 1: General requirements and tests*

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

EN ISO 9806:2017, *Solar energy — Solar thermal collectors — Test methods (ISO 9806:2017)*

ISO 9459-1:1993, *Solar heating — Domestic water heating systems — Part 1: Performance rating procedure using indoor test methods*

ISO 9459-2:1995, *Solar heating — Domestic water heating systems — Part 2: Outdoor test methods for system performance characterization and yearly performance prediction of solar-only systems*

ISO 9459-5:2007, *Solar heating — Domestic water heating systems — Part 5: System performance characterization by means of whole-system tests and computer simulation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 9488:1999 and EN 12976-1:2017 apply.