

STN	Tepelné solárne systémy a komponenty Priemyselne vyrábané systémy Časť 1: Všeobecné požiadavky	STN EN 12976-1 74 7202
------------	---	--

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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 06/17

Obsahuje: EN 12976-1:2017

Oznámením tejto normy sa od 31.07.2017 ruší
STN EN 12976-1 (74 7202) zo septembra 2006

125044

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2017
Podľa zákona č. 264/1999 Z. z. o technických požiadavkách na výrobky a o posudzovaní zhody a o zmene a doplnení niektorých zákonov v znení neskorších predpisov sa slovenská technická norma a časti slovenskej technickej normy môžu rozmnožovať alebo rozširovať len so súhlasom slovenského národného normalizačného orgánu.

EUROPEAN STANDARD

EN 12976-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2017

ICS 27.160

Supersedes EN 12976-1:2006

English Version

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

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

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

This European Standard was approved by CEN on 15 April 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of 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 United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
European foreword	4
Introduction	5
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
4 Requirements	9
4.1 General	9
4.1.1 Safety	9
4.1.2 Suitability for drinking water	9
4.1.3 Water contamination	9
4.1.4 Testing of resistance towards mechanical load	9
4.1.5 Freeze resistance	9
4.1.6 Over temperature protection	10
4.1.7 Reverse flow protection	11
4.1.8 Pressure resistance	11
4.1.9 Electrical safety	11
4.2 Materials	11
4.3 Components and pipework	12
4.3.1 Collector	12
4.3.2 Supporting frame	12
4.3.3 Piping	12
4.3.4 Heat Exchangers	13
4.3.5 Control system	13
4.4 Safety equipment	13
4.4.1 Safety valves	13
4.4.2 Safety lines and expansion lines	13
4.4.3 Blow-off lines	13
4.4.4 Expansion vessels	13
4.5 Resistance to external influences	14
4.6 Documentation	14
4.6.1 General	14
4.6.2 Documents for the installer	14
4.6.3 Documents for the user	17
4.7 Energy Labelling	18
4.8 System performance	19
Annex A (informative) Conformity assessment	20
Annex B (informative) Material combination with regard to corrosion	21
Annex C (normative) System families	24
C.1 System family, system subtype	24
C.2 Requirements for grouping different system configurations into one system family	24
C.3 Testing requirements	27
C.4 Procedure	28
C.4.1 General	28
C.4.2 Evaluation of the validity of the test result	29

C.4.3	Determination of the system parameters.....	30
C.4.4	Calculation of annual performance.....	32
	Bibliography	33

Tables

Table 1	— Division for factory made and custom built solar heating systems	6
Table A.1	— Guidelines for repetition of tests in case that components have been changed	20
Table B.1	— Material/fluid combination for closed systems.....	21
Table B.2	— Material/fluid combination for closed systems.....	22
Table B.3	— Material combinations for open systems (related to internal surfaces).....	23
Table B.4	— Material combinations for open systems (related to internal surfaces).....	23

Figures

Figure C.1	— Principle of method II (DST).....	29
-------------------	--	-----------

European foreword

This document (EN 12976-1:2017) 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 July 2017, and conflicting national standards shall be withdrawn at the latest by July 2017.

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 12976-1:2006.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

Most significant changes in EN 12976-1:2017 and EN 12976-2:2017 since the 2006 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 12976-1:

- safety valves: new requirement that safety valves shall conform with EN 1489;
- resistance to external influences: consideration that the solar components can impact on the performance and durability of essential building elements, e.g. roofs and facades;
- labelling: harmonisation with ErP;
- Annex C (new): definition of system families; possible range of variations within one system type.

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 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 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 EN 12976-2:2017, Annex B, and in EN 12977-2:2012, 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 European Standard specifies requirements on durability, reliability and safety for Factory Made solar heating systems. The standard also includes provisions for evaluation of conformity to these requirements. Concept of system families is included, as well.

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

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 draw-off 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, last paragraph) is not considered to be part of the system.

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 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 — Common 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 1991-1-1, *Eurocode 1: Actions on structures — Part 1-1: General actions — Densities, self-weight, imposed loads for buildings*

EN 1991-1-3:2003, *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 12897, *Water supply — Specification for indirectly heated unvented (closed) storage water heaters*

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*

EN 12976-1:2017 (E)

EN 12976-2:2017, *Thermal solar systems and components — Factory made systems — Part 2: Test methods*

EN 12977-3, *Thermal solar systems and components — Custom built systems — Part 3: Performance test methods for solar water heater stores*

EN 12977-5:2012, *Thermal solar systems and components — Custom built systems — Part 5: Performance test methods for control equipment*

EN 13831:2007, *Closed expansion vessels with built in diaphragm for installation in water*

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

CEN/TR 16355, *Recommendations for prevention of Legionella growth in installations inside buildings conveying water for human consumption*

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

EN 60335-2 (all parts), *Household and similar electrical appliances — Safety (IEC 60335-2 series)*

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

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

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

koniec náhľadu – text ďalej pokračuje v platenej verzii STN