SLOVENSKI STANDARD
SIST EN ISO 22975-3:2014

01-september-2014

Sončna energija - Sestavni deli in materiali sprejemnikov sončne energije - 3. del: Obstojnost površine absorberja (ISO 22975-3:2014)

Solar energy - Collector components and materials - Part 3: Absorber surface durability (ISO 22975-3:2014)

Thermische Solaranlagen und ihre Bauteile - Kollektoren - Teil 3: Qualifizierung der Beständigkeit von Solarabsorberflächen (ISO 22975-3:2014)

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Energie solaire - Composants et matériaux du collecteur - Partie 3: Durabilité de la surface de l'absorbeur (ISO 22975-3:2014)

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27.160	Sončna energija	Solar energy engineering

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2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 22975-3

July 2014

ICS 27.160

English Version

Solar energy - Collector components and materials - Part 3: Absorber surface durability (ISO 22975-3:2014)

Energie solaire - Composants et matériaux du collecteur - Partie 3: Durabilité de la surface de l'absorbeur (ISO 22975-3:2014)

Thermische Solaranlagen und ihre Bauteile - Kollektoren - Teil 3: Qualifizierung der Beständigkeit von Solarabsorberflächen (ISO 22975-3:2014)

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Foreword

The text of ISO 22975-3:2014 has been prepared by Technical Committee ISO/TC 180 “Solar energy” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 22975-3:2014 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of an identical text or by endorsement, at the latest by January 2015, and conflicting national standards shall be withdrawn at the latest by January 2015.

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.

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INTERNATIONAL STANDARD

ISO 22975-3

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Solar energy — Collector components and materials —

Part 3: Absorber surface durability

Energie solaire — Composants et matériaux du collecteur —

Partie 3: Durabilité de la surface de l'absorbeur

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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The committee responsible for this document is ISO/TC 180, *Solar energy*.

ISO 22975 consists of the following parts, under the general title *Solar energy — Collector components and materials*:

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— *Part 3: Absorber surface durability*

The following parts are under preparation:

— *Part 1: Evacuated tubes – Durability and performance*

— *Part 2: Heat-pipe for solar thermal application — Durability and performance*

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Introduction

To effectively select, use and maintain a material in a given application, its degradation under service conditions must be predicted prior to use. Preferably, the durability of the material should be expressed quantitatively in terms of an expected service life. Durability in this case is the ability of a material to withstand deterioration caused by external factors in the environment, which may influence the performance of the material under service conditions. Service life is defined as the period of time after installation during which specific material properties important for the performance of the material meet or exceed minimum acceptable values.

The service life of a material is, thus, not solely dependent on its physical and chemical properties, but also on its performance requirement in the application considered, and on the external environmental factors, which influence performance under service conditions. In design work, the important question is if a specific material can be expected to have a service life longer than a certain value, the so-called design service life; the latter dictated by life cost considerations taking into account the total system. Service life assessment may be based on feed-back data from practice or on results from so-called qualification or acceptance durability tests.

The present recommended qualification procedure for solar absorber surface durability is based on the conduct of a series of short-term durability tests. During a test the optical performance of the absorber surface tested is determined by measuring its solar absorptance and thermal emittance. From the loss in optical performance of the absorber surface, its failure time in the test performed is assessed and compared with the shortest acceptable failure time set by the design service life of the absorber. Design service life, performance requirement defining failure time in terms of loss in optical performance, classification of type and levels of environmental stress are set under the assumption, that the absorber surface tested will be installed in a vented flat plate solar collector for use in domestic hot water systems and combisystems or under similar operating conditions.

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The recommended qualification procedure may favourably be used in the development and validation of new kinds of absorber surfaces. From the results of tests, it can be concluded whether it is likely that an absorber surface tested may meet the requirement for an acceptable service life also in practice. The recommended durability testing procedure has proved to give results in fairly good agreement, both qualitatively and quantitatively, with what has actually been observed on absorber surfaces tested for longer time periods in solar collectors working under conditions corresponding to that in a typical domestic solar hot water system or combisystem. Nevertheless, if the tested absorber could not be qualified by present procedure, a more comprehensive investigation on durability is recommended and can still lead to a qualification.

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The present procedure consists of three parts to test the absorber with respect to its stability against high temperature, against high humidity and condensation and against corrosion caused by atmospheric sulfur dioxide. The three parts are independent and can be assessed individually.

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Solar energy — Collector components and materials —

Part 3:
Absorber surface durability

1 Scope

This part of ISO 22975 is applicable to the determination of the long term behaviour and service life of selective solar absorbers for use in vented flat plate solar collectors working under conditions corresponding to that in a typical solar domestic hot water system or combisystem.

This part of ISO 22975 specifies a failure criterion of a solar absorber based on changes in optical performance of the absorber. The optical properties of interest are solar absorptance and thermal emittance.

This part of ISO 22975 specifies durability testing procedures focused on resistance to high temperatures and condensation of water on the absorber surface as well as high humidity in the presence of sulfur dioxide.

2 Normative references

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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.

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ISO 4624, *Paints and varnishes — Pull-off test for adhesion*

ISO 8407, *Corrosion of metals and alloys — Removal of corrosion products from corrosion test specimens*

ISO 9050, *Glass in building — Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors*

ISO 10062, *Corrosion tests in artificial atmosphere at very low concentrations of polluting gas(es)*

3 Terms and definitions

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

3.1
design service life
time period of exposure under service conditions after installation during which the absorber surface is expected to meet the performance requirement

3.2
failure time
time period of exposure in the test at which the performance requirement limit is reached

3.3
solar absorptance, α_S
fraction of solar radiation energy absorbed by an absorber surface

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