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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.

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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](#)

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*:

— *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.

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.

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.