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S.R. CEN/TS 12977-5:2010

Thermal solar systems and components - Custom built systems - Part 5: Performance test methods for control equipment

S.R. CEN/TS 12977-5:2010

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English Version

Thermal solar systems and components - Custom built systems - Part 5: Performance test methods for control equipment

Installations solaires thermiques et leurs composants -
Installations personnalisées - Partie 5 : Méthodes d'essai
de performances des systèmes de régulation

Thermische Solaranlagen und ihre Bauteile -
Kundenspezifisch gefertigte Anlagen - Teil 5: Prüfmethode
von Regeleinrichtungen

This Technical Specification (CEN/TS) was approved by CEN on 9 September 2008 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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Foreword

This document (CEN/TS 12977-5:2010) has been prepared by Technical Committee CEN/TC 312 “Thermal solar systems and components”, the secretariat of which is held by ELOT.

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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

One purpose of this document is to define how to check that a controller is behaving as it is intended when in combination with associated equipment (e.g. sensors, pumps and other actuators). In addition, function testing of differential thermostats and so-called "multi-function" controllers are described in order to determine switch on and switch off temperature differentials as well as control algorithms where dependent on temperature differences, temperature levels or operating conditions of the system. For all functions and operations it should be tested and documented, whether the controller and control equipment comply with the manufacturer's guidance.

In addition, the capability for all sensors to resist extreme operating conditions and to determine any significant drift in accuracy caused by this should be tested. The energy consumption of the controller and the associated control equipment should be documented, e.g. actuators.

Performance predictions for the associated system that the control equipment belongs to are considered. For the determination of the component parameters according to the CTSS method, as specified in CEN/TS 12977-2, a detailed investigation of all relevant algorithms, features and parameters controlling the system is relevant.

NOTE The most widely used control equipment for solar heating systems is described in CEN/TS 12977-5. For control equipment not widely used in solar heating systems or auxiliary heaters, if part of the system, accompanying standards should be applied.

In respect of potential adverse effects human health or life (e.g. drinking water quality) caused by the products covered by CEN TS 12977-5 it should be noted that:

- this document provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;
- while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

1 Scope

This Technical Specification specifies performance test methods for control equipment. Furthermore this document contains requirements on accuracy, durability and reliability of control equipment.

The tests described in this document are limited to components delivered with or for the system by the final supplier. For the purposes of this document controller and control equipment for solar heating systems and auxiliary heaters, if part of the system, are restricted to:

- a) controllers as:
 - 1) system clocks, timers and counters;
 - 2) differential thermostats;
 - 3) multi-function controllers;
- b) sensors as:
 - 1) temperature sensors;
 - 2) irradiance sensors (for short wave radiation);
 - 3) pressure sensors;
 - 4) level sensors;
 - 5) flow meters; or
 - 6) heat meters;
- c) actuators as:
 - 1) pumps;
 - 2) solenoid and motor valves; or
 - 3) relays.

Furthermore combinations of controllers, sensors and actuators listed above.

An additional objective of the procedures described in this document is to verify control algorithms and, together with the accuracy of sensors, to determine control parameters. In addition to verifying the functioning of a controller, its equipment and actuators, the determined parameters may be used for numerical system simulations.

Typically electrical anodes are not part of the control equipment and are not controlled by the control equipment. However, because they are electrical appliances, electrical anodes are included in this document.

This document is valid for control equipment of solar heating systems for the purpose of hot water preparation and/or space heating. If the solar system is connected to or part of a conventional heating system, the validity is extended to the entire system. In combination with the standards EN 12976-1, EN 12976-2 as well as CEN/TS 12977-1, CEN/TS 12977-2, EN 12977-3 and CEN/TS 12977-4 this document is valid for:

- d) factory made solar heating systems;
- e) small custom built solar heating systems;

- f) large custom built solar heating systems; and
- g) auxiliary heater equipment used in connection with d), e) and f).

NOTE Factory Made and Custom Built solar heating systems.

EN 12976-1, EN 12976-2 as well as CEN/TS 12977-1, CEN/TS 12977-2, EN 12977-3, and CEN/TS 12977-4 distinguish two categories of solar heating systems:

- Factory Made solar heating systems; and
- Custom Built solar heating systems.

As defined in CEN/TS 12977-1, the classification of a system as factory made or custom built is a choice of the final supplier.

Custom Built solar heating systems are subdivided into two categories:

- 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;
- Large Custom Built systems are uniquely designed for a specific situation.

2 Normative references

The following referenced documents are indispensable for the application 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 809, *Pumps and pump units for liquids — Common safety requirements*

EN 982, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*

EN 1151-1, *Pumps — Rotodynamic pumps — Circulation pumps having a rated power input not exceeding 200 W for heating installations and domestic hot water installations — Part 1: Non-automatic circulation pumps, requirements, testing, marking*

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

EN 12976-1:2006, *Thermal solar systems and components — Factory made systems — Part 1: General requirements*

CEN/TS 12977-1:2010, *Thermal solar systems and components — Custom built systems — Part 1: General requirements for solar water heaters and combisystems*

EN 60255 (all parts), *Electrical relays*

EN 60335-1, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2001, modified)*

EN 60335-2-21, *Household and similar electrical appliances — Safety — Part 2-21: Particular requirements for storage water heaters (IEC 60335-2-21:2002, modified)*

EN 60730 (all parts), *Automatic electrical controls for household and similar use*

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

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