SLOVENSKI STANDARD
SIST EN 14037-4:2017

01-april-2017

Prosto viseče grelne in hladilne površine za vodo s temperaturo do 120 °C - 4. del: Predizdelane stropne sevalne plošče - Metoda preskušanja hladilne moči

Free hanging heating and cooling surfaces for water with a temperature below 120°C - Part 4: Pre-fabricated ceiling mounted radiant panels - Test method for cooling capacity

An der Decke frei abgehängte Heiz- und Kühlflächen für Wasser mit einer Temperatur unter 120 °C - Teil 4: Vorgefertigte Deckenstrahlplatten zur Raumheizung - Prüfverfahren für die Kühlleistung

Panneaux rayonnants de chauffage et de rafraîchissement alimentés avec une eau à une température inférieure à 120 °C - Partie 4: Méthode d'essai pour la détermination de la puissance de rafraîchissement des panneaux rayonnants préfabriqués

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English Version

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

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European foreword

This document (EN 14037-4:2016) has been prepared by Technical Committee CEN/TC 130 “Space heating appliances without integral heat sources”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by March 2017, and conflicting national standards shall be withdrawn at the latest by March 2017.

The European Standard EN 14037, *Free hanging heating and cooling surfaces for water with a temperature below 120°C*, consists of the following parts:

— *Part 1: Prefabricated ceiling mounted radiant panels for space heating - Technical specifications and requirements;*

— *Part 2: Prefabricated ceiling mounted radiant panels for space heating - Test method for thermal output;*

— *Part 3: Prefabricated ceiling mounted radiant panels for space heating - Rating method and evaluation of radiant thermal output;*

— *Part 4: Prefabricated ceiling mounted radiant panels for space heating - Test method for cooling capacity;*

— *Part 5: Open or closed heated ceiling surfaces - Test method for thermal output.*

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Introduction

This European Standard results from the recognition, that heated and chilled ceiling radiant panels falling into the field of application hereinafter stated are traded on the basis of their thermal output. For evaluating and comparing different heated and chilled ceiling surfaces it is therefore necessary to refer to a heating stipulated value.

As installations with ceiling mounted radiant panels can also be used in practice for space cooling, it is necessary to have a test method for evaluating the cooling capacity. Installations with different free hanging heating and cooling surfaces need, for the use of space heating a test method for evaluating the heating output. The test method differs from the method for ceiling mounted radiant panels.

1 Scope

This European Standard defines the technical specifications and requirements for the definition of the cooling capacity of pre-fabricated ceiling mounted radiant panels according to the specifications of EN 14037-1:2016, 3.3.1. The test according to this standard requires the measurement of the thermal output according to EN 14037-2:2016 of the model.

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 14037-1:2016, *Pre-fabricated ceiling mounted radiant panels for space heating - Technical specifications and requirements*

EN 14037-2:2016, *Pre-fabricated ceiling mounted radiant panels for space heating - Test method for thermal output*

EN ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14037-1:2016 and the following apply.

3.1
water temperature rise
temperature difference between the outlet and inlet water temperature of the cooling appliance

3.2
standard temperature difference for the cooling capacity of ceiling mounted radiant panels
reference room temperature 32°C and mean water temperature 17 °C, determined temperature difference 15 K

3.3
nominal temperature difference
determined temperature difference 8 K between room temperature and mean water temperature

3.4
indirect cooling surface (dry surface)
portion of the cooling surface of the panel which is in contact with air only (e.g. radiant sheet between the tubes)

3.5
direct cooling surface (wet surface)
portion of the cooling surface of the panel which is in contact with the water

3.6
standard cooling capacity
cooling capacity at standard temperature difference and standard air pressure

3.7
nominal cooling capacity
cooling capacity at nominal temperature difference 8 K

3.8
characteristic equation
equation that gives the thermal cooling capacity as a function of the temperature difference at constant water flow rate

3.9
modular cooling capacity
cooling capacity of one module calculated from the cooling capacity of the active length of a ceiling mounted radi ant panel

3.10
standard modular cooling capacity
cooling capacity of one module at standard conditions

3.11
nominal modular cooling capacity
cooling capacity of one module at nominal temperature difference

4 Symbols and units

For the purposes of this document, the symbols and units given in EN 14037-1:2016 and the following apply.

Table 1 — Symbols and units

No.	Quantity	Symbol	Unit
1	Constant of the characteristic equation of the active length	K_{Cact}	W/ K $^{n_{act}}$ -
2	Exponent of the characteristic equation of the active surface	n_{Cact}	-
3	Heat transfer coefficient (air–insulation–wall)	u	W/(m² K)
4	Total heat flow in all enclosure walls	Φ_B	W
5	Standard modular cooling capacity	Φ_{CLs}	W/m
6	Nominal modular cooling capacity	Φ_{CLN}	W/m
7	Measured cooling capacity of a ceiling mounted radiant panel	Φ_{Cme}	W
8	Nominal cooling capacity of a ceiling mounted radiant panel	Φ_{CN}	W
9	Standard cooling capacity of a ceiling mounted radiant panel	Φ_{CS}	W
10	Total thermal output of simulators	Φ_S	W
11	Nominal temperature difference (8 K) of a ceiling mounted radiant panel when cooling	ΔT_{cn}	K
12	Standard temperature difference (15 K) of a ceiling mounted radiant panel when cooling	ΔT_{cs}	K

5 Testing of cooling capacity

5.1 Short description

The cooling capacity of the test sample shall be determined in its steady condition with measurements of the water flow and the temperature increase in the water. The cooling capacity shall be quoted as function of the temperature difference between the reference temperature and the average water temperature.

The test is carried out in a testing system according to EN 14037-2:2016 which consists of a closed booth with controlled temperatures of the inside surfaces plus master panel 1 (according to EN 14037-2:2016, Clause 6). All laboratories performing tests according to this standard shall participate in inter-laboratory comparison exercises (according to EN 14037-2:2016, Clause 6).

For covering the cooling capacity, the test booth will be heated with a number of electrical heated cooling load simulators which are positioned on the floor of the test booth. To get reproducible results, the simulators have to be arranged according to 5.2.

5.2 Test booth

The test is carried out in a test booth according to EN 14037-2:2016, Clause 5.

Differing from these definitions the surfaces, floor and ceiling of the test booth shall be insulated in the way that the average heat flow in those surfaces is lower than 0,40 W/m² during the test. This heat flow shall be determined by preliminary calibration tests of the booth or by calculations.

Differing from EN 14037-2:2016, 5.5, the reference temperature during the measurement shall be 32 °C ± 0,5K in steady condition for minimum 30 min.

The temperature(s) of inner surfaces of walls, floor and ceiling of the test booth (under the insulation) shall be controlled and be kept on a value, which is necessary to guarantee a max. temperature difference between these surfaces and the reference temperature of less than 1,0 K.

The radiant emissivity of the surface of the insulation has to be at least 0,9.

The test booth will be heated with 6 electrical heated cooling load simulators (see Figures 1 and 2), which are positioned on the floor of the test booth.

The output of each simulator shall not exceed 180 W and shall be continuously adjustable, e.g. with an adjustable transformer or a thyristor. Each simulator shall have an identical heat output and the same number of heaters.

The housing of the simulators consists of painted steel sheet. The emissivity of the inside and outside surface shall be at least 0,9. The active power of the simulators shall be measured with a measuring instrument of the accuracy class 1,0 % or better.