



BSI Standards Publication

Free hanging heating and cooling surfaces for water with a temperature below 120°C

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

National foreword

This British Standard is the UK implementation of EN 14037-3:2016. It supersedes BS EN 14037-3:2003 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RHE/6, Air or space heaters or coolers without combustion.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Free hanging heating and cooling surfaces for water with a temperature below 120°C - Part 3: Prefabricated ceiling mounted radiant panels for space heating - Rating method and evaluation of radiant thermal output

Panneaux rayonnants de chauffage et de rafraîchissement alimentés avec une eau à une température inférieure à 120 °C - Partie 3 : Méthode d'évaluation et calcul de la puissance thermique radiative des panneaux rayonnants de plafond préfabriqués destinés au chauffage des locaux

An der Decke frei abgehängte Heiz- und Kühlflächen für Wasser mit einer Temperatur unter 120 °C - Teil 3: Vorgefertigte Deckenstrahlplatten zur Raumheizung - Wärmetechnische Umrechnungen, Bewertungsmethoden und Festlegung der Strahlungs-Wärmeleistung

This European Standard was approved by CEN on 19 March 2016.

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European foreword

This document (EN 14037-3:2016) 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 document supersedes EN 14037-3:2003.

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of an identical text or by endorsement, at the latest by March 2017, and conflicting national standards shall be withdrawn at the latest by March 2017.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

- the title has been changed,
- the scope has been changed,
- the introduction has been changed,
- some editorial updates have been added.

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 describes the procedure to determine the rated thermal output (Φ_D) and the mean surface temperature (t_{rp}) of pre-fabricated ceiling mounted radiant panels.

Pre-fabricated ceiling mounted radiant panels exchange heat mainly by radiation.

The test methods for determining the thermal output of pre-fabricated ceiling mounted radiant panels, as described in EN 14037-2:2016, give reliable results for comparing different products, but these results understate the output obtained under real operating conditions.

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, *Prefabricated ceiling mounted radiant panels for space heating - Technical specifications and requirements*

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

3 Terms and definitions

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

4 Testing of the mean surface temperature and the emissivity of the panel

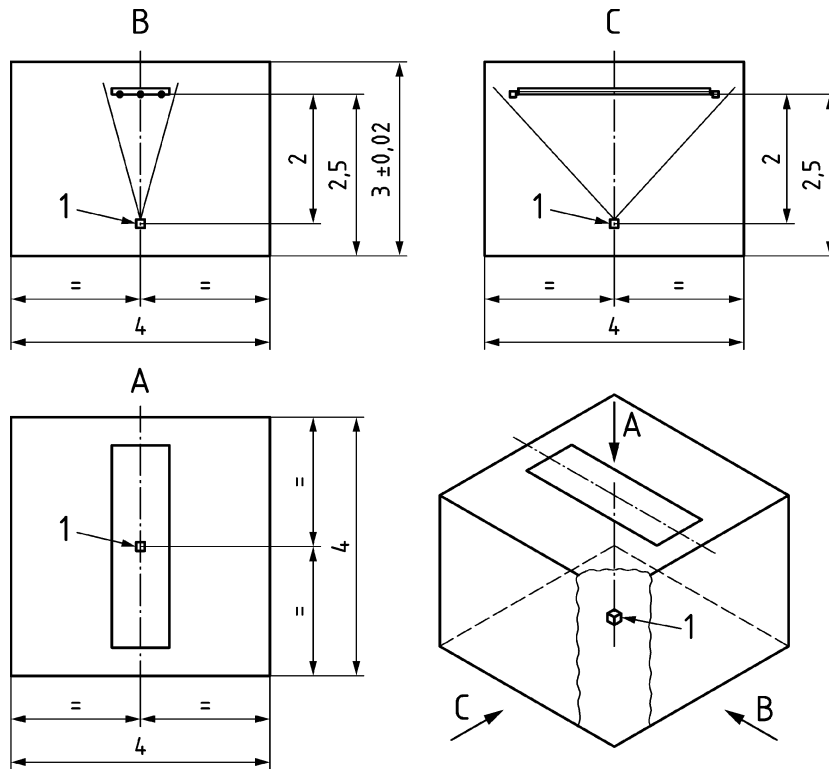
4.1 Determination of the mean surface temperature of the active length

The mean surface temperature shall be determined by an Infra-Red (IR) system with the following features: automatic mean temperature of the measured surface including the emissivity, the distance and the ambient temperature.

The test is made in the same test booth and under the same test conditions described in EN 14037-2:2016, Clauses 5, 7 and 8. While testing the mean surface temperature, the connecting components shall be insulated.

The mean surface temperature shall be determined with the IR system for each testing point according to EN 14037-2:2016, 8.10.

The IR system shall be installed with the sensitive probe directed towards the central vertical axis of the ceiling mounted radiant panel (see Figure 1).



Key

- 1 IR system
- A top view
- B side view over the width of the ceiling panel
- C side view over the length of the ceiling panel

Figure 1 — Arrangement of the IR system and the ceiling panel in the test booth during determination with only one testing point

The distance between the surface of the ceiling mounted radiant panel and the sensor shall be two meters.
The field of view shall be not less than 80° over the length and not less than 60° over the width of the panel.
The tolerance of mean surface temperature shall be not more than 1,0 K.

The results of the determination of the radiant output shall be reported in accordance with EN 14037-2:2016, Clause 9.

4.2 Determination of the emissivity

The determination of the emissivity shall be carried out with samples of the original sheet covered with the surface coating used at production.

The test shall be done by laboratories which comply with EN 14037-2:2016, Clause 4.

5 Thermal output conversion – Determination of the rated thermal output

Practical experiments under real conditions and simulation exercises indicate that test booth results under-state output from radiant ceiling mounted panels by a factor of about 10 %. In order to ensure that designers are able to use test data for correct sizing of products a correction factor is applied to test data to give rated thermal output Φ_D .

The factor of 1,1 shall be introduced in the characteristic equation determined according to EN 14037-2:2016, 8.13. The rated thermal output shall be taken from this equation in correspondence of standard temperature difference.

6 Evaluation of the thermal radiant output of a tested panel

The radiant output of the tested panel can be calculated for each measuring point as follows:

$$\Phi_{\text{rad}} = \sigma \cdot \varepsilon_{\text{rp}} \cdot (T_{\text{rp}}^4 - T_{\text{w}}^4) \cdot A_{\text{rp}}$$

The referred percentage of radiant output is calculated for each measuring point as follows:

$$r = \frac{\Phi_{\text{rad}}}{\Phi_{\text{act}}} \cdot 100$$

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK