



SLOVENSKI STANDARD
SIST EN 14037-2:2004
01-januar-2004

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Ceiling mounted radiant panels supplied with water at temperature below 120 °C - Part 2: Test method for thermal output

Deckenstrahlplatten für Wasser mit einer Temperatur unter 120 °C - Teil 2: Prüfverfahren für die Wärmeleistung

Panneaux rayonnants de plafond alimentés en eau a une température inférieure a 120 ° C - Partie 2: Méthode d'essai pour la détermination de la puissance thermique

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Ta slovenski standard je istoveten z: EN 14037-2:2003

ICS:

91.140.10	Sistemi centralnega ogrevanja	Central heating systems
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SIST EN 14037-2:2004	en,fr,de
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14037-2

April 2003

ICS 91.140.10

English version

**Ceiling mounted radiant panels supplied with water at
temperature below 120 °C - Part 2: Test method for thermal
output**

Panneaux rayonnants de plafond alimentés en eau à une
température inférieure à 120 °C - Partie 2: Méthode d'essai
pour la détermination de la puissance thermique

Deckenstrahlplatten für Wasser mit einer Temperatur unter
120 °C - Teil 2: Prüfverfahren für die Wärmeleistung

This European Standard was approved by CEN on 20 February 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This document EN 14037-2:2003 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 October 2003 and conflicting national standards shall be withdrawn at the latest by October 2003.

Annexes A, C and D are normative. Annex B is informative.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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EN 14037-2:2003 (E)**Introduction**

This European Standard results from the recognition that the ceiling mounted radiant panels falling into the field of application hereinafter stated are traded on the basis of their thermal output. To evaluate and compare different ceiling mounted radiant panels it is therefore necessary to refer to a single stipulated value.

This European Standard of ceiling mounted radiant panels consists of the following parts:

- Part 1: Technical specifications and requirements
- Part 2: Test method for thermal output
- Part 3: Rating method and evaluation of radiant thermal output

1 Scope

This European Standard describes the test method and the test installation for determining the thermal output of ceiling mounted radiant panels.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 442-2:1996, *Radiators and convectors – Part 2: Test methods and rating.*

EN 14037-1:2003, *Ceiling mounted radiant panels supplied with water at temperatures below 120 °C - Part 1: Technical specifications and requirements.*

EN 14037-3:2003, *Ceiling mounted radiant panels supplied with water at temperatures below 120 °C - Part 3: Rating method and evaluation of radiant thermal output.*

EN ISO/IEC 17025:2000, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999).*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 14037-1:2003 apply.

4 Testing of thermal output

The test is carried out in a testing system, which consists of a closed booth with controlled temperatures of the inside surfaces plus a set of two master panels built according to clause 6.

The method for measuring the thermal output consists of the measurement of mass flow and enthalpy difference between inlet and outlet (by weighing method). All other measurement methods shall guarantee in minimum the precision obtained by weighing method.

All laboratories that make tests according this standard have to make comparable measurements with the other laboratories (according to clause 6 of this standard).

5 Test booth

The booth for testing ceiling mounted radiant panels shall be constructed in a way that all six surrounding surfaces can be cooled.

Figure 1 shows the schematic lay-out of a test booth with a six-wall cooling. The walls are defined as follows:

Wall 1: the wall parallel to the inlet header

Wall 2: the wall to the right of wall 1

Wall 3: the wall opposite of wall 1

Wall 4: the wall to the left of wall 1

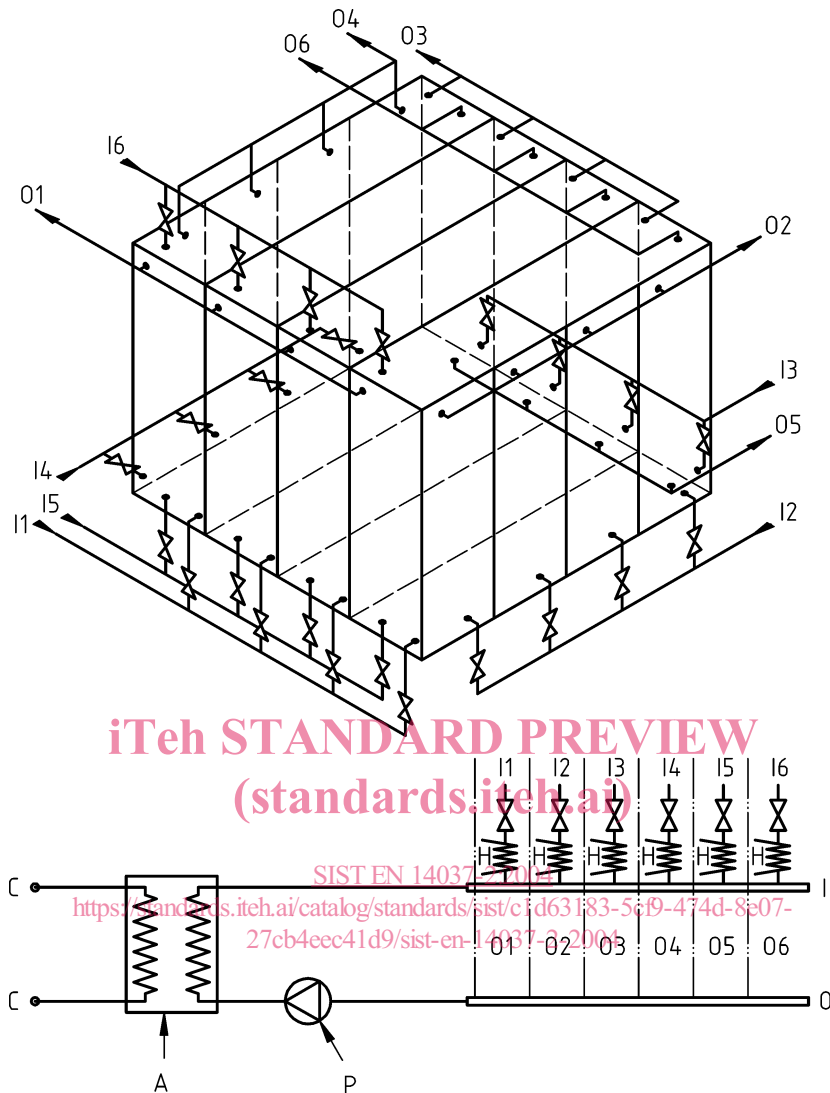
Wall 5: the floor

Wall 6: the ceiling

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**Key**

- C Cooling circuit connection
- I Inlet cooling water
- O Outlet cooling water
- A Cooling water accumulator
- P Circulating pump
- H After heater
- 1....6 Designation of the surrounding inside surfaces

Figure 1 — Example of the hydraulic system of a test booth

5.1 Dimensions of the test booth

The test booth has to have the following inside dimensions:

Length: $(4 \pm 0,02)$ m

Width: $(4 \pm 0,02)$ m

Height: $(3 \pm 0,02)$ m

5.2 Emissivity of the inside surrounding surfaces

Walls, ceiling and floor shall have smooth inside surfaces covered with a coat of mat paint having a degree of emissivity of minimum 0,9.

5.3 Tightness of the test booth

The test booth construction shall be sufficiently tight to prevent air infiltration.

5.4 Cooling system

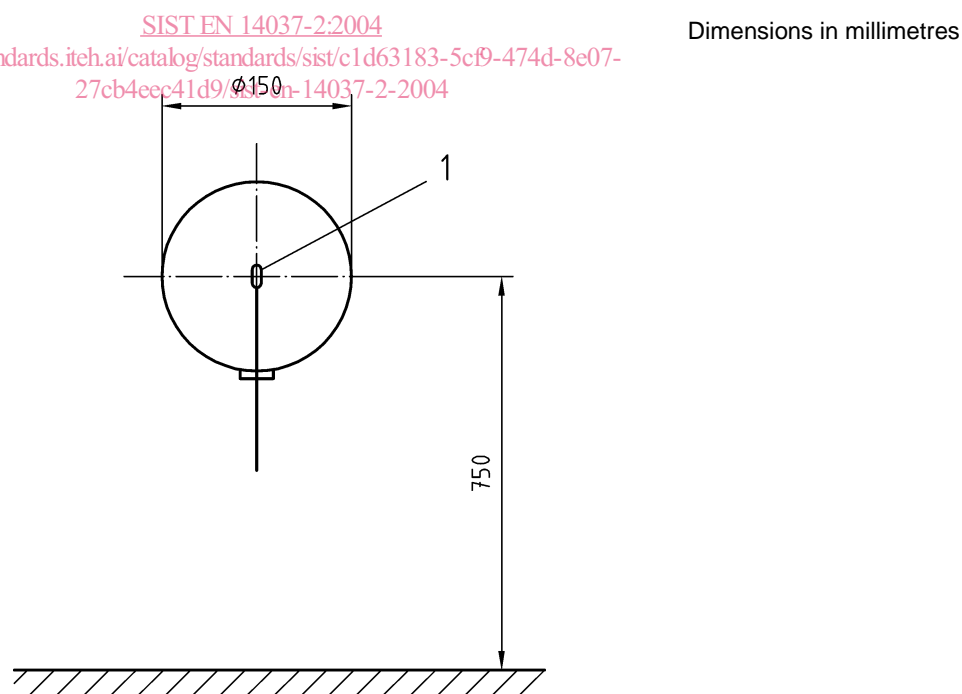
The cooling system is to be carried out in order, that the difference between the 6 cooled surrounding inside surfaces of the test booth and the average temperature of all 6 surfaces is not higher than 0,5 K. The temperature difference between inlet and outlet shall not be higher than 0,5 K.

That condition shall be maintained at the tests for the determination of the characteristic equation. During the measurement a reference temperature of $(20 \pm 0,5)$ °C shall be maintained in steady condition, during min. 0,5 h.

5.5 Temperature measuring points

5.5.1 Reference temperature

The reference temperature is measured on at a height of 0,75 m above the floor of the test booth by means of a globe thermometer (see Figure 2). The measuring point is situated on the vertical axis through the central point of the ceiling mounted radiant panel.



Key

- 1 Temperature measuring point

Figure 2 — Globe thermometer

Temperature sensor with blackened light metal sphere (diameter 150 mm, emissivity 0,9). The measuring point is arranged in the centre of the sphere. The penetration of the temperature sensor through the surface of the sphere runs horizontally and is air tight. The hollow sphere is attached to the temperature sensor.

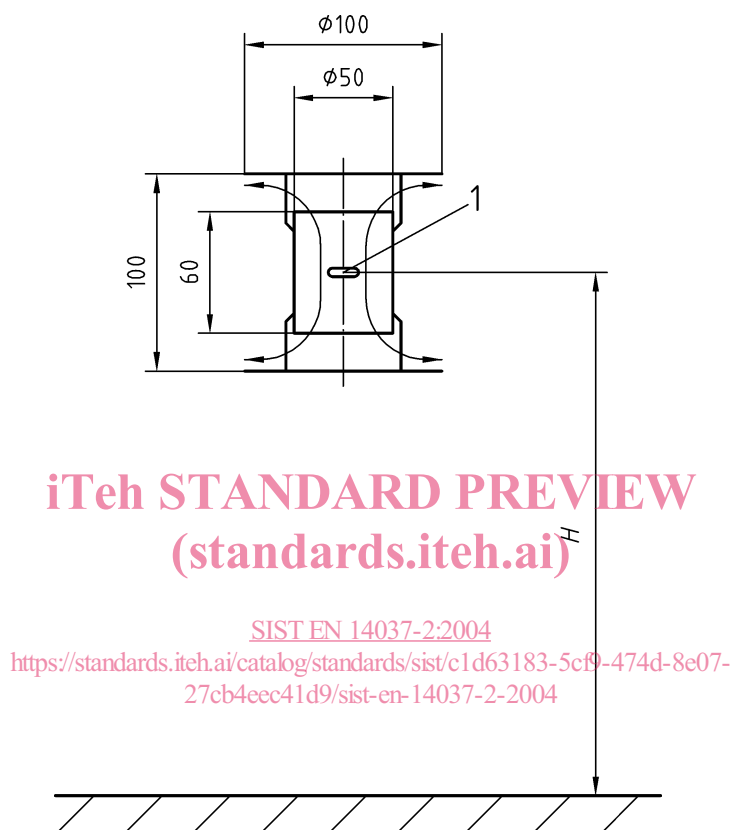
EN 14037-2:2003 (E)

5.5.2 Air temperature

The air temperature is measured with sensors protected against radiation (see Figure 3).

The measuring points are situated on 2 vertical axes at 3 different heights as shown in Figure 4.

Dimensions in millimetres

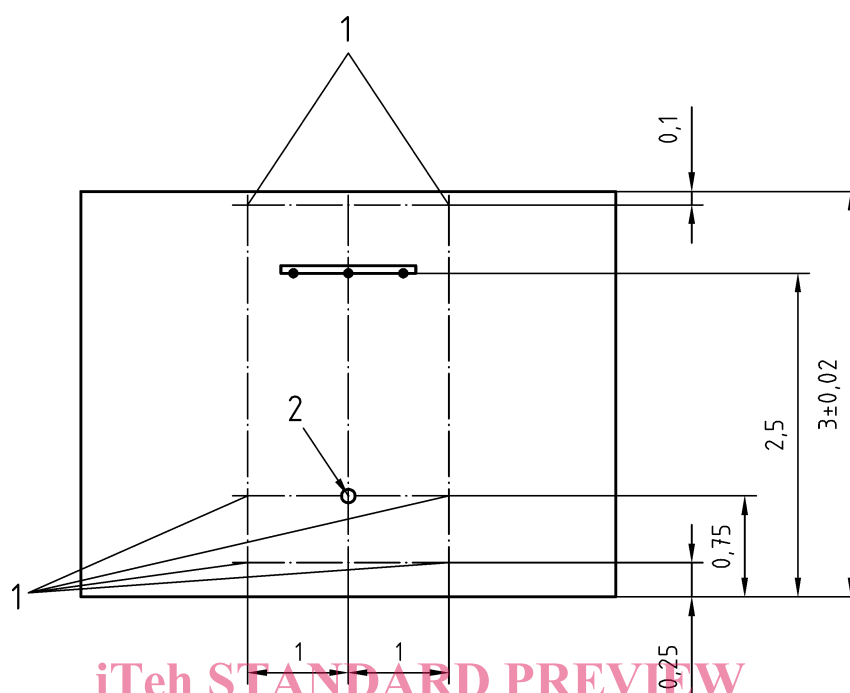


Key

- 1 Temperature measuring point
- H Height of the measuring point

Figure 3 — Example of a measuring point protected against radiation

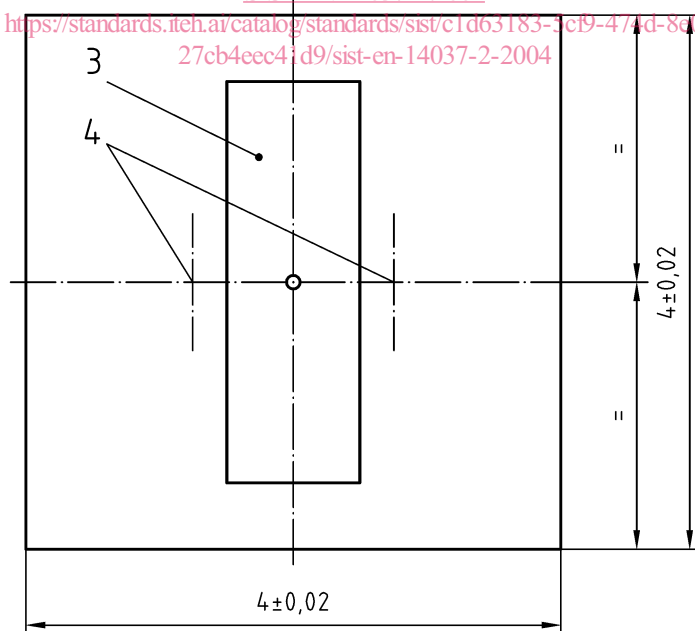
Dimensions in millimetres



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**Key**

- 1 Air temperature measuring points
- 2 Reference temperature measuring point
- 3 Ceiling mounted radiant panel
- 4 Axes of air temperature measuring points

Figure 4 — Arrangement of measuring points for the reference temperature and for air temperatures

EN 14037-2:2003 (E)**5.5.3 Surface temperature of the inside surfaces**

The surface temperatures of the inside walls is calculated as average value of the inlet and outlet water temperature of each single surface wall.

6 Master Panels

The master panels which are part of the testing system consist of a model with a full direct heating surface with a width of 1190 mm (master panel 1) and of a model with 2 tubes and a radiant sheet as indirect heating surface with a width of 300 mm (master panel 2).

6.1 General

The purpose of the master panels is the following:

- a) to verify if the reproducibility of test values among test laboratories is within the limits set by this European Standard;
- b) to establish a common basis for all test installations to verify that the repeatability of test values in each test installation is within the limits set by this European Standard.

To verify the reproducibility among test installations built to the present European Standard a single set of master panels constructed and verified according to the present European Standard will be circulated among test installations to determine the relevant $\Phi_{M,s}$ and $\Phi_{O,s}$ values. This single set of master panels is named "primary set".

Each laboratory shall equip itself with the master panel 2 constructed and verified to the present European Standard. This panel named "secondary set" shall be used to verify the repeatability of the test installation.

6.2 Determination of the value $\Phi_{M,s}$ of master panels (Primary set)

The method of determination the value $\Phi_{M,s}$ of the master panel is contained in annex A of this European Standard.

6.3 Construction details**6.3.1 Dimensions**

The main dimensions of the two master panels are given in the drawings Figures 5 to 8.