



# SLOVENSKI STANDARD

## SIST EN 1264-5:2009

01-januar-2009

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### **Ploskovni sistemi za gretje in hlajenje z vodo - 5. del: Grelne in hladilne površine, vgrajene v tla, strop ali stene - Ugotavljanje oddaje toplote**

Water based surface embedded heating and cooling systems - Part 5: Heating and cooling surfaces embedded in floors, ceilings and walls - Determination of the thermal output

Raumflächenintegrierte Heiz und Kühlsysteme mit Wasserdurchströmung - Teil 5: Heiz- und Kühlflächen in Fußböden, Decken und Wänden - Bestimmung der Wärmeleistung und der Kühlleistung

Systèmes de surfaces chauffantes et rafraîchissantes hydrauliques intégrées - Partie 5: Surfaces chauffantes et rafraîchissantes intégrées dans les sols, les plafonds et les murs - Détermination de l'émission thermique

**Ta slovenski standard je istoveten z: EN 1264-5:2008**

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#### **ICS:**

91.140.10	Sistemi centralnega ogrevanja	Central heating systems
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**SIST EN 1264-5:2009**

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EUROPEAN STANDARD

EN 1264-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2008

ICS 91.140.10

English Version

## Water based surface embedded heating and cooling systems - Part 5: Heating and cooling surfaces embedded in floors, ceilings and walls - Determination of the thermal output

Systèmes de surfaces chauffantes et rafraîchissantes  
hydrauliques intégrées - Partie 5: Surfaces chauffantes et  
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Raumflächenintegrierte Heiz- und Kühlsysteme mit  
Wasserdurchströmung - Teil 5: Heiz- und Kühlflächen in  
Fußböden, Decken und Wänden - Bestimmung der  
Wärmeleistung und der Kühlleistung

This European Standard was approved by CEN on 13 September 2008.

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 CEN 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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 United Kingdom.



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

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<b>Contents</b>		Page
Foreword.....		3
Introduction .....		4
1 Scope .....		5
2 Normative References .....		5
3 Definitions and symbols .....		5
4 Calculation method.....		5
5 Prove report.....		6
Annex A (normative) Figures and tables.....		8
Annex B (informative) Explanations concerning the specification of the heat exchange coefficients of Table A.1 .....		11
Bibliography .....		12

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## Foreword

This document (EN 1264-5:2008) 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 April 2009, and conflicting national standards shall be withdrawn at the latest by April 2009.

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.

This draft European Standard, *Water based surface embedded heating and cooling systems*, consists of the following parts:

- Part 1: Definitions and symbols
- Part 2: Floor heating: Prove methods for the determination of the thermal output using calculation and test methods
- Part 3: Dimensioning
- Part 4: Installation
- Part 5: Heating and cooling surfaces embedded in floors, ceilings and walls — Determination of the thermal output

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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

This draft European Standard is based on the realisation that in the field of commercial trade the thermal output of heating and cooling systems represents the basis of rating. In order to be able to evaluate and compare different heating and cooling systems, it is, therefore, necessary to refer to values determined using one single, unambiguously defined method. The basis for doing so are the prove methods for the determination of the thermal output of floor heating systems described in Part 2 of this European Standard. In analogy to the European Standard EN 442-2 (Radiators and convectors — Part 2: Test methods and rating), this prove method provides characteristic partial load curves under defined boundary conditions as well as the characteristic output of the system represented by the standard thermal output together with the associated standard temperature difference between the heating medium and the room temperature.

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## 1 Scope

This European Standard applies to water based heating and cooling systems embedded into the enclosure surfaces of the room to be heated or to be cooled. Part 5 of this standard deals with the recalculation of values determined in Part 2 of this European Standard for the system in question, using it for floor heating applications. The recalculation method described in this part of the standard enables the conversion of the calculation and test results of Part 2 into results for other surface orientations in the room, i.e. for ceiling and wall heating, as well as for the application as cooling surfaces, i.e. for floor, ceiling and wall cooling. It has to be emphasised that the test results of Part 2 of this European Standard are the basis of all calculation. Therefore the use of this prove method is necessary whether or not the system in question is used for heating or cooling application.

This European Standard shall be applied to commercial trade and practical engineering if proved and certifiable values of the thermal output shall be used.

## 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 1264-1:1997, *Floor heating — Systems and components — Part 1: Definitions and symbols*

EN 1264-2:2008, *Water based surface embedded heating and cooling systems — Part 2: Floor heating: Prove methods for the determination of the thermal output using calculation and test methods*

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## 3 Definitions and symbols

For the purposes of this document, the definitions and symbols given in EN 1264-1:1997 apply.

## 4 Calculation method

The calculation method [1] is based on the results obtained in EN 1264-2. The method enables the conversion of these results into results for other surfaces in the room (ceiling and wall heating). The method is also applicable for all the cooling surfaces (floor, ceiling, wall cooling). The change in the surface thermal resistance  $\Delta R_\alpha = \Delta(1/\alpha)$  influences the temperature field within the system in the same way as a change in the thermal resistance of the surface covering  $\Delta R_{\lambda,B}$  [1]. This is based on the assumptions that all other boundary conditions are unchanged and that the dew point is not reached. This leads to the Equation (1).

$$K_H = K_H(\Delta R_\alpha, R_{\lambda,B}) = \frac{K_{H,Floor}}{1 + \frac{\Delta R_\alpha + R_{\lambda,B}}{R_{\lambda,B}^*} \left( \frac{K_{H,Floor}}{K_{H,Floor}^*} - 1 \right)} \quad (1)$$

The gradient of the characteristic curve  $K_H$  (Equation (2)) is also referred to as equivalent heat transmission coefficient. The characteristic curve gives the relationship between the specific thermal output  $q$  and the temperature difference  $\Delta\vartheta$  between the heating medium and the room (heating system) or between the room and the cooling medium (cooling system):

$$q = K_H \cdot \Delta\vartheta \quad (2)$$

## EN 1264-5:2008 (E)

where

$K_H = K_H(\Delta R_\alpha, R_{\lambda,B})$  is the gradient of the characteristic curve, see Equation 2, of the heating/cooling system which shall be calculated, with the actual thermal resistance of the covering  $R_{\lambda,B} \geq 0$  and the respective value  $\Delta R_\alpha$  (see Table A.1);

$K_{H,Floor} = K_{H,Floor}(R_{\lambda,B}=0)$  is the gradient of the characteristic curve of the same system with the thermal resistance of the covering  $R_{\lambda,B} = 0$  obtained from EN 1264-2;

$K^*_{H,Floor} = K^*_{H,Floor}(R^*_{\lambda,B})$  is the gradient of the characteristic curve of the same system with a higher thermal resistance of the covering  $R^*_{\lambda,B} > R_{\lambda,B}$ , obtained from EN 1264-2. In this European Standard, generally  $R^*_{\lambda,B} = 0,15 \text{ m}^2 \cdot \text{K/W}$  applies;

$\Delta R_\alpha$  is the additional thermal transfer resistance to be calculated for the surface in question, see Equation (3) and Table A.1.

$$\Delta R_\alpha = 1/\alpha - 1/10,8 \text{ m}^2 \cdot \text{K/W} \quad (3)$$

In the case of wall heating and cooling systems, the results of the calculation method described above stringently are valid only for heating or cooling surfaces which fully cover the respective wall. But the accuracy is also sufficient for cases where the wall is partially covered.

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### 5 Prove report

For floor heating systems EN 1264-2 applies. For other systems which are recalculated the following applies.

For a given construction the results shall be documented for each scheduled pipe spacing  $T$  and each scheduled thickness  $s_U$  above the pipe. The testing body presents this valid calculation results in a prove report. The following equations and the standard values (see below) represent the results.

$$q_H = f(\Delta\vartheta_H, R_{\lambda,B}) \quad (4)$$

$$q_C = f(\Delta\vartheta_C, R_{\lambda,B}) \quad (5)$$

where

$q_H$  is the specific thermal output of the heating surface

$\Delta\vartheta_H$  is the temperature difference between the average medium temperature and the room

$q_C$  is the specific thermal output of the cooling surface

$\Delta\vartheta_C$  is the temperature difference between the room and the average medium temperature

The Equation (4) and/or Equation (5) are shown in a field of characteristic curves with linear coordinates, see Figure A.1 and Figure A.2. The characteristic curves are drawn for values of the thermal resistance  $R_{\lambda,B} = 0$ ,  $R_{\lambda,B} = 0,05$ ,  $R_{\lambda,B} = 0,10$  and  $R_{\lambda,B} = 0,15 \text{ m}^2 \cdot \text{K/W}$ . Values of  $R_{\lambda,B} > 0,15 \text{ m}^2 \cdot \text{K/W}$  are not in accordance with this standard.

The values of standard specific thermal output  $q_{H,N}$  and  $q_{C,N}$  are calculated with Equation (2). For heating systems a standard temperature difference

$$\Delta\vartheta_{H,N} = 10 \text{ K},$$



for cooling systems a standard temperature difference

$$\Delta\vartheta_{C,N} = 8 \text{ K}$$

applies. A graphic description is given in Figure A.1 and Figure A.2.

The proved system shall be identified by a construction drawing and a technical description in accordance with EN 1264-2:2008 Clause 5. These documents shall contain all dimensions and materials which influence the thermal properties. The results are valid for that system defined in such a way. If any change is made by the supplier of the system which affects the principles of the thermal proving, a new proving shall be carried out.

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