SLOVENSKI STANDARD
SIST EN 1264-3:1997

01-november-1997

Talno ogrevaje - Sistemi in sestavni deli - 3. del: Dimenzioniranje

Floor heating - Systems and components - Part 3: Dimensioning

Fußboden-Heizung - Systeme und Komponenten - Teil 3: Auslegung

Chauffage par le sol - Systemes et composants - Partie 3: Dimensionnement

Ta slovenski standard je istoveten z: **EN 1264-3:1997**

ICS:

91.140.10	Sistemi centralnega ogrevanja	Central heating systems

SIST EN 1264-3:1997 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1264-3

August 1997

ICS 91.140.10

Descriptors: heating, hot water heating, heated floors, design, temperature, variation curves, limits, computation, thermal insulation, heat emission, specific area

English version

Floor heating - Systems and components - Part 3: Dimensioning

Chauffage par le sol - Systèmes et composants - Partie 3: Dimensionnement

Fußboden-Heizung - Systeme und Komponenten - Teil 3: Auslegung

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Ref. No. EN 1264-3:1997 E

Contents

Foreword

This European Standard 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of an identical text or by endorsement, at the latest by February 1998, and conflicting national standards shall be withdrawn at the latest by February 1998.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard for floor heating systems consists of the following parts :

- Part 1 : Definitions and Symbols
- Part 2 : Determination of the thermal output
- Part 3 : Dimensioning
- Part 4 : Installation

1 Scope

This standard is applicable to hot water floor heating systems as defined in EN 1264-1.

Physiological limitations are taken into account when specifying the floor surface temperature. The design is based on performance characteristic curves and limit curves calculated in accordance with EN 1264-2.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate place 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 :

EN 1264 - 1:1997	Floor heating - Systems and components - Part 1 : Definitions and Symbols
EN 1264 - 2:1997	Floor heating - Systems and components - Part 2 : Determination of the thermal output
pr EN 1264 - 4:1993	Floor heating - Systems and components - Part 4 : Installation

3 Definitions and symbols

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

4 Basic principles

4.1 Heating medium differential temperature

The heating medium differential temperature $\Delta\theta_H$ is calculated using equation (1) (see EN 1264-2). In doing so, the effect of the temperature drop is taken into account.

$$\Delta\theta_H = \frac{\theta_V - \theta_R}{\ln \dfrac{\theta_V - \theta_i}{\theta_R - \theta_i}} \qquad (1)$$

4.2 Performance characteristic curve

The performance characteristic curve describes the relationship between the heat flow density q of a system and the required heating medium differential temperature.

As a simplification, the heat flow density is taken to be directly proportional to the differential temperature of the heating medium:

$$q = K_H \cdot \Delta\theta_H \qquad (2)$$

where $K_H = B \cdot \prod_i (a_i^{m_i})$ in accordance with Part 2 of this European Standard.

4.3 Field of system characteristic curves

The field of characteristic curves of a floor heating system with a specific pipe spacing T shall at least contain performance characteristic curves for $R_{\lambda,B} = 0$ and three different values of floor covering thermal resistances in accordance with clause 9 of EN 1264-2:1997 including the limit curves (see Figure 1).

4.4 Limit curves

The limit curves in the field of system characteristic curves describe the relationship between the heating medium differential temperature and the heat flow density for the limit case temperature drop, where $\sigma = 0$ and at which the maximum floor surface temperature reaches the physiologically agreed limit value $\theta_{F,max}$ (29 °C for residence areas, 35 °C for peripheral areas)[1]. During design they apply for the determination of heat flow densities and associated differential temperatures where

$0\ K < \sigma \leq 5\ K$

(see also to 6.2).

The limit curves are used to specify the maximum permissible supply temperature (refer also to Figure 1).

The limit curve for $(\theta_{F,max} - \theta_i) = 9$ K is also applicable to bathrooms ($\theta_i = 24$ °C)[1].

[1]) National regulations can limit the temperature to a lower value

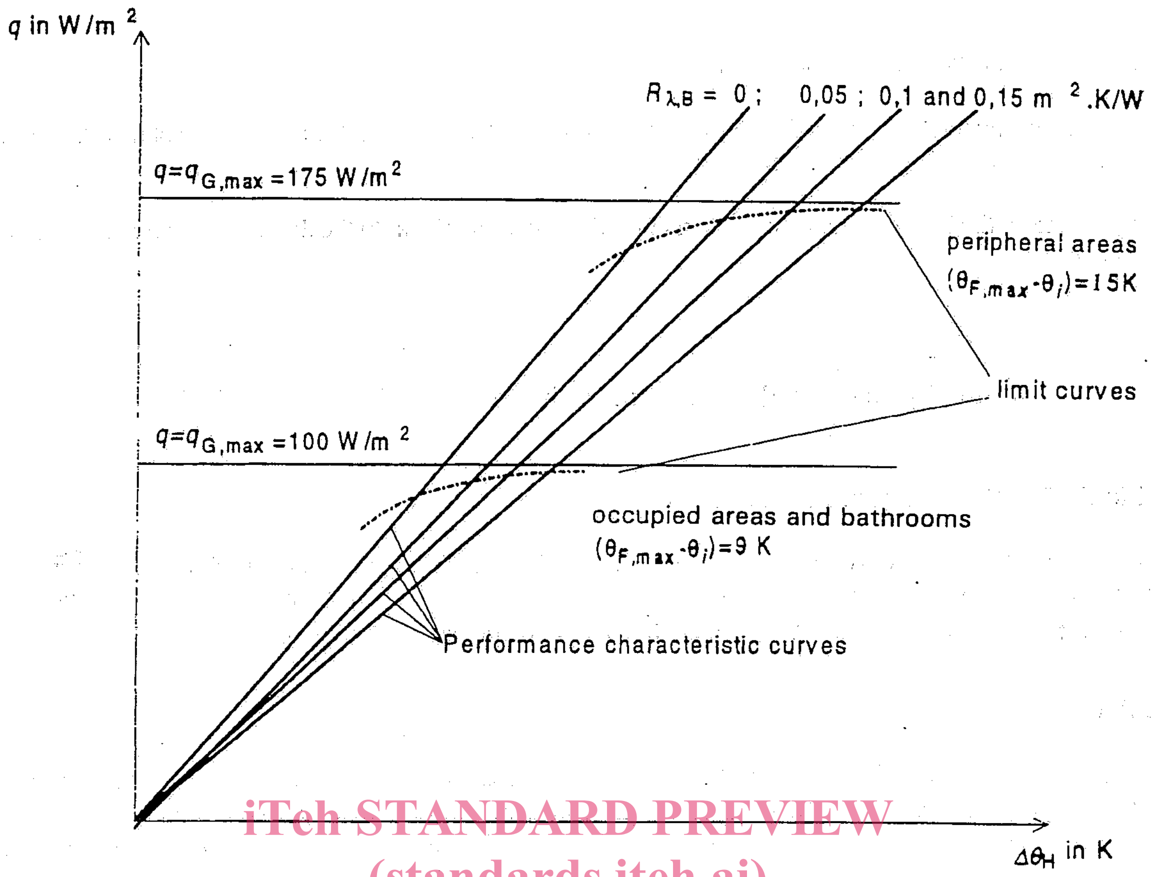

Figure 1: Field of system characteristic curves for T = const. showing limit curves

4.5 Thermal inertia

The difference between the minimum and the maximum surface temperature of a floor heating system is so low that no consideration of thermal inertia is required.

5 Boundary conditions and limits

5.1 Supply pipes to adjacent rooms

Pipes passing through to adjacent rooms (supply pipes) are taken into account in the heating if the same type of usage can be assumed. The heat output of the supply pipes may also be taken into account for adjacent rooms.

5.2 Downward thermal insulation

To limit the heat flow through the floor to rooms below, the required thermal resistance of the insulating layer $R_{\lambda,ins}$[2)] shall be at minimum in accordance with Table 1 of prEN 1264-4:1993
It is calculated according to equation (3).

$$R_{\lambda,ins} = \frac{s_{ins}}{\lambda_{ins}} \tag{3}$$

2) A higher heat conduction resistance between the heating plane and the underside of the floor (surface of the ceiling) also improves the chances of achieving the required temperature reduction in the room below (e.g. bedroom). It is recommended, particularly in multi-family houses, that a higher thermal resistance be selected than given here.

where

s_{ins} is the thickness of the insulating layer in m and

λ_{ins} is the thermal conductivity of the insulating layer in W/(m·K).

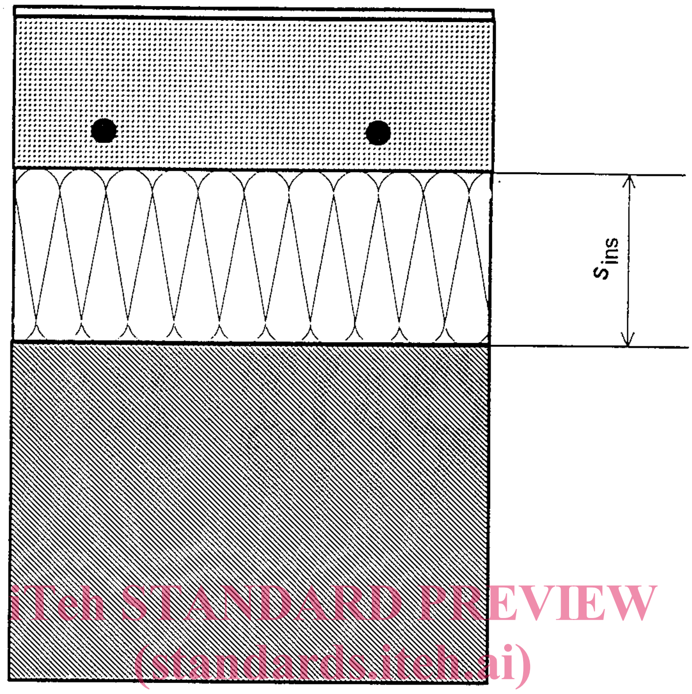

Figure 2: Average thickness of insulating layer for flat thermal insulating panels

Depending on the construction of the floor heating system, the effective thickness of the insulating layer s_{ins} is determined differently.

For floor heating systems with flat thermal insulating panels (see Figure 2), s_{ins} is identical with the thickness of the thermal insulating panel.

For floor heating systems with profiled thermal insulating panels (see Figure 3), a surface-related weighted calculation is made for the effective thickness of the insulating layer s_{ins} :

$$s_{ins} = \frac{s_h \cdot (T - D) + s_l \cdot D}{T} \quad (4)$$