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AMENDMENT 1
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Building environment design — Embedded radiant heating and cooling systems —

Part 3: Design and dimensioning

AMENDMENT 1

*Conception de l'environnement des bâtiments — Systèmes intégrés de
chauffage et de refroidissement par rayonnement —*

Partie 3: Conception et dimensionnement

AMENDEMENT 1



Reference number
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Part 3: Design and dimensioning

AMENDMENT 1

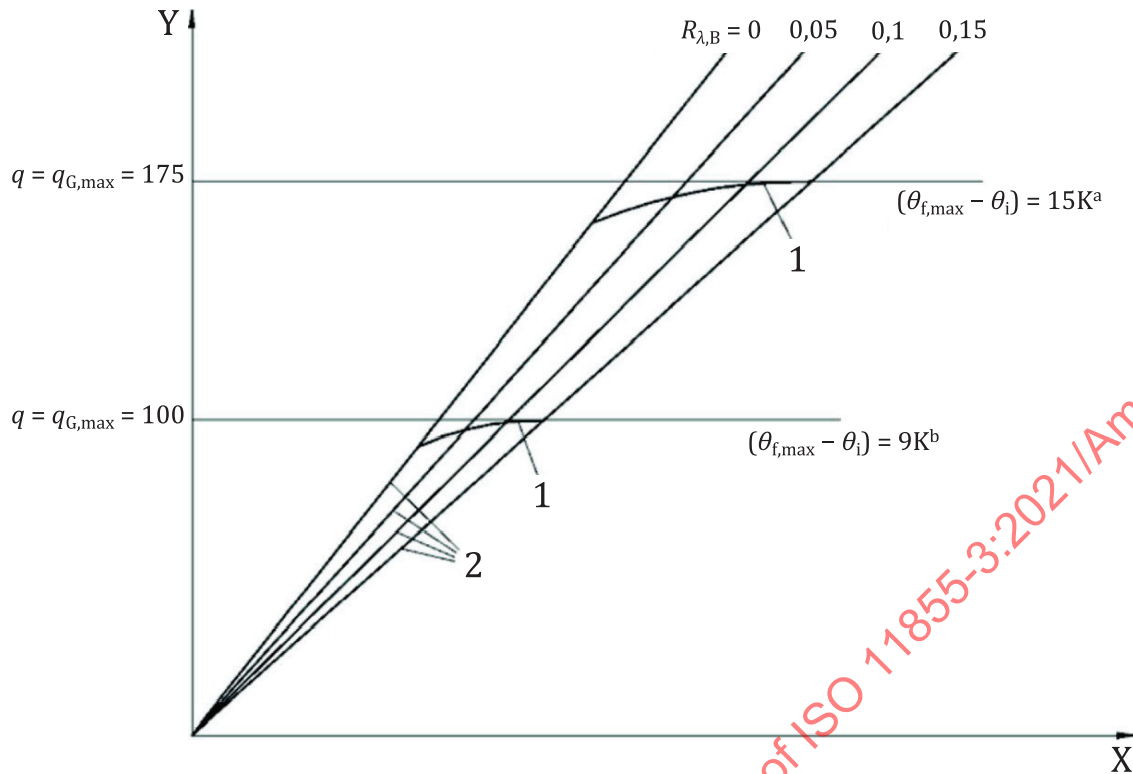
5.1.4

Modify to the following:

The field of characteristic curves of a floor heating system with a specific pipe spacing W shall at least contain the characteristic curves for values of the thermal resistance of surface covering $R_{\lambda,B} = 0$, $R_{\lambda,B} = 0,05$, $R_{\lambda,B} = 0,10$ and $R_{\lambda,B} = 0,15$ ($\text{m}^2\text{K/W}$), in accordance with ISO 11855-2 (see Figure 1). In order to apply values of $R_{\lambda,B} > 0,15$ ($\text{m}^2\text{K/W}$), it is possible only when the values are verified.

5.1.5 Figure 1

Modify to the following:



Key

- X $\Delta\theta_H$ K
Y q W/m²
1 limit curves
2 performance characteristic curves
a Peripheral area.
b Occupied area.

Figure 1 — Field of characteristic curves, including limit curves for floor heating, for constant pipe spacing

5.1.6

Modify to the following:

In order to limit the heat flow through the floor towards the space below, the required back-side thermal resistance of the insulating layer $R_{\lambda,ins}$ shall be specified in the design to be not lower than the value in ISO 11855-5:2021, 5.1.2.3.2.

For systems which have a flat insulating layer (system types I, II and IV in ISO 11855-1), the back-side thermal resistance of the insulating layer $R_{\lambda,ins}$ is calculated by Formula (7) where there is no stud and the effective thickness of thermal insulating layer s_{ins} is identical to the thickness of the thermal insulating panel and the effective thermal conductivity of the thermal insulation layer λ_{ins} is calculated by Formula (8) where there are studs.

$$R_{\lambda,ins} = \frac{s_{ins}}{\lambda_{ins}} \quad (7)$$

$$\lambda_{\text{ins}} = \lambda_i \frac{l_p - l_{\text{ws}}}{l_{\text{ps}}} + \lambda_{\text{ws}} \frac{l_{\text{ws}}}{l_{\text{ps}}} \quad (8)$$

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where

λ_i is thermal conductivity of the thermal insulation layer between the studs;

λ_{ws} is thermal conductivity of the stud;

l_{ps} is the distance between the studs (see Figure 2);

l_{ws} is the thickness of the stud (see Figure 2).

Depending on the construction of the floor heating system, the effective thickness of thermal insulating layer s_{ins} and effective thermal conductivity of the thermal insulation layer λ_{ins} are determined differently.

For floor heating systems with flat thermal insulating panels of system types I in ISO 11855-1, the effective thickness of thermal insulating layer s_{ins} is identical to the thickness of the thermal insulation, and the effective thermal conductivity of the thermal insulation layer λ_{ins} is identical to the thermal conductivity of the thermal insulation (ISO 11855-1:2021, Figure 2). For floor heating systems with thermal insulation panels with studs according to ISO 11855-1:2021, Figure A.1 (system type I systems), only the flat part of the panel (without studs) shall be considered in the calculation of s_{ins} .

For the system with profiled thermal insulating panels of system type II in ISO 11855-1:2021, Figure 3, the effective thickness of the insulating layer shall be determined by Formula (9).

$$s_{ins} = \frac{s_h \cdot (W - D) + s_l \cdot D}{W} \quad (9)$$

For the system with the light wooden radiant panel on the joist of system type IV in ISO 11855-1:2021, Figure 5, the effective thickness of thermal insulating layer s_{ins} is identical to the thickness of the thermal insulating panel, and the effective thermal conductivity of the thermal insulation layer λ_{ins} is:

$$\lambda_{ins} = \lambda_i \frac{l_p - l_w}{l_p} + \lambda_w \frac{l_w}{l_p} \quad (10)$$

where

λ_i is thermal conductivity of the thermal insulation layer between the joists;

λ_w is thermal conductivity of the joist;

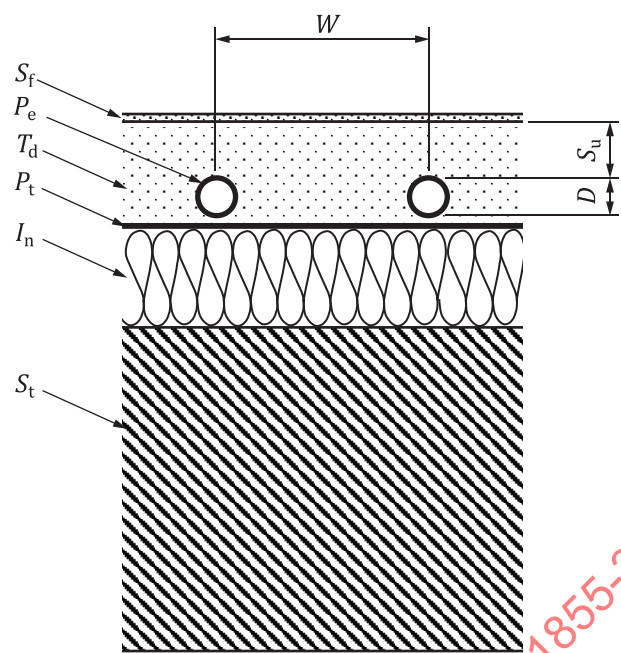
l_p is the distance between the joist (see Figure 5);

l_w is the thickness of the joist (see Figure 5).

For system type IV systems with air cavities, see ISO 11855-2:2021, Annexes C and E.

5.1.6, Figure 2

Modify to the following:



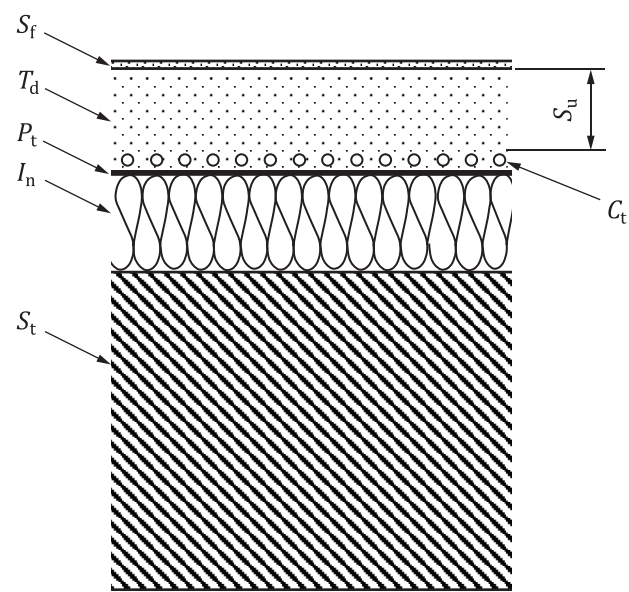
Key

- D external diameter of the pipe
- I_n thermal insulation layer
- P_e pipes or electric cables
- P_t protection layer
- S_f surface layer
- S_t structural layer
- s_u thickness of the layer above the pipe
- T_d thermal diffusion layer
- W pipe spacing

Figure 2 — Effective thickness and effective thermal conductivity of thermal insulating layer of flat thermal insulating panel — System types I

5.1.6, Figure 3

Modify to the following:

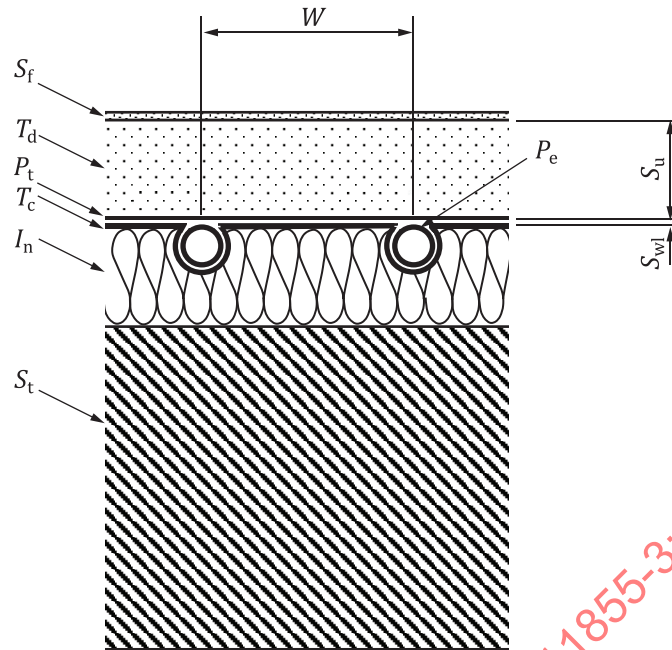


- Key**
- C_t capillary tubes
 - I_n thermal insulation layer
 - P_t protection layer
 - S_f surface layer
 - S_t structural layer
 - s_u thickness of the layer above the pipe
 - T_d thermal diffusion layer

Figure 3 — Effective thickness and effective thermal conductivity of thermal insulating layer of flat thermal insulating panel — System type III

5.1.6, Figure 4

Modify to the following:



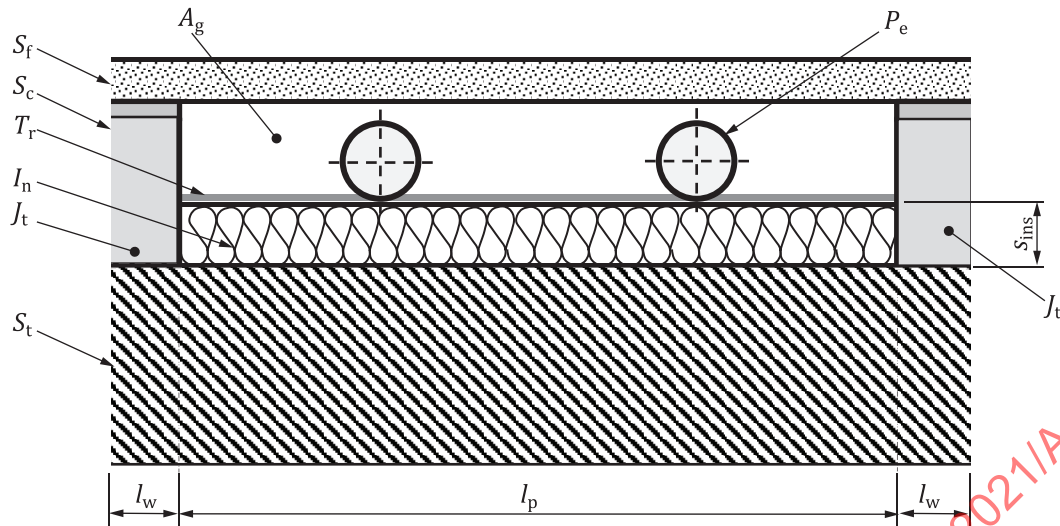
Key

- I_n thermal insulation layer
- P_e pipes or electric cables
- P_t protection layer
- S_f surface layer
- S_t structural layer
- s_u thickness of the layer above the pipe
- s_{wl} thickness of heat conducting device
- T_c thermal conduction layer
- T_d thermal diffusion layer
- W pipe spacing

Figure 4 — Effective thickness and effective thermal conductivity of thermal insulating layer of profiled thermal insulating panel — System type II

5.1.6, Figure 5

Modify to the following:



Key

- A_g air gap
- I_n thermal insulation layer
- J_t joist
- l_p distance between the joists
- l_w thickness of the joist
- P_e pipes or electric cables
- S_c structural construction
- S_f surface layer
- s_{ins} thickness of thermal insulation
- S_t structural layer
- T_r thermal reflection layer

Figure 5 — Effective thickness and effective thermal conductivity of thermal insulating layer of flat thermal insulating panel with joist — System type IV

5.1.8

Modify Formula (23) to the following:

$$m_H = \frac{A_F \cdot q}{\sigma \cdot c_{Wa}} \left(1 + \frac{R_o}{R_u} + \frac{\theta_i - \theta_u}{q \cdot R_u} \right) \quad (23)$$

c_{Wa} is the specific heat capacity of water; $c_{Wa} = 4\,190 \text{ J}/(\text{kg} \cdot \text{K})$
(using this value together with q in W/m^2 in Formula (23), m is provided in kg/s);

R_o is the upwards partial heat transmission resistance of the floor structure [see Formula (24)];

R_u is the downwards partial heat transmission resistance of the floor structure [see Formula (25)];

θ_i is the standard indoor room temperature in accordance with ISO 11855-1;

θ_u is the indoor temperature of a room under the floor heated room.

5.1.8 Figure 7

Modify to the following: