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**Building environment design —  
Embedded radiant heating and cooling  
systems —**

Part 2:

**Determination of the design heating  
and cooling capacity**

AMENDMENT 1

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

*Partie 2: Détermination de la puissance calorifique et frigorifique à la  
conception*

AMENDEMENT 1

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This document was prepared by Technical Committee ISO/TC 205, *Building environment design*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 228, *Heating systems and water based cooling systems in buildings*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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# Building environment design — Embedded radiant heating and cooling systems —

## Part 2:

## Determination of the design heating and cooling capacity

### AMENDMENT 1

Clause 4, Table 1

Modify the following rows:

**Table 1 — Symbols**

Symbol	Unit	Quantity
$s_h$	m	In system type II, thickness of thermal insulation from the outward edge of the insulation to the inward edge of the pipes (see Figure 2)
$s_l$	m	In system type II, thickness of thermal insulation from the outward edge of the insulation to the outward edge of the pipes (see Figure 2)
$S$	m	Thickness of the screed (excluding the pipes in system type I)

Clause 7, second paragraph

Modify to the following:

A given system construction can only be calculated with one of the simplified methods. The correct method to apply depends on the system type I to IV (position of pipes, concrete or wooden construction) and the boundary conditions listed in Table 2.

Delete the NOTE.

Table 2

Modify to the following:

**Table 2 — Criteria for selection of simplified calculation method**

Pipe position	New system type	Old system type	Figure	Boundary conditions	Reference to method
In screed Thermally decoupled from the structural base of the building by thermal insulation	I	A, C, H, I, J	2 a)	$W \geq 0,050 \text{ m}$ $s_u \geq 0,01 \text{ m}$ $0,008 \text{ m} \leq d \leq 0,03 \text{ m}$ $s_u/\lambda_e \geq 0,01$	7.1 A.2.2
In insulation, conductive devices Not wooden constructions except for weight bearing and thermal diffusion layer	II	B	2 b)	$0,05 \text{ m} \leq W \leq 0,45 \text{ m}$ $0,014 \text{ m} \leq d \leq 0,022 \text{ m}$ $0,01 \text{ m} \leq s_u/\lambda_e \leq 0,18 \text{ m}$	7.1 A.2.3

**Table 2 (continued)**

Pipe position	New system type	Old system type	Figure	Boundary conditions	Reference to method
In concrete slab	V	E	4	$S_T/W \geq 0,3$	7.2, B.1
Capillary tubes in concrete surface	III	F	5	$d_a/W \leq 0,2$	7.2, B.2
Wooden constructions, pipes in sub floor or under sub floor, conductive devices	IV	G	6	$\lambda_{wl} \geq 10 \lambda$ $S_{WL,\lambda} \geq 0,01$	7.2, Annex C

7.1, second and third paragraphs

Delete the following:

This calculation method is given in Annex A for the following four types of systems:

- type A with pipes embedded in the screed or concrete (see Figure 2 and A.2.2);
- type B with pipes embedded outside the screed (see Figure 2 and A.2.3);
- type C with pipes embedded in the screed (see Figure 2 and A.2.2);
- type D plane section systems (see A.2.4).

Figure 2 shows the types as embedded in the floor, but the methods can also be applied for wall and ceiling systems with a corresponding position of the pipes.

Replace with the following:

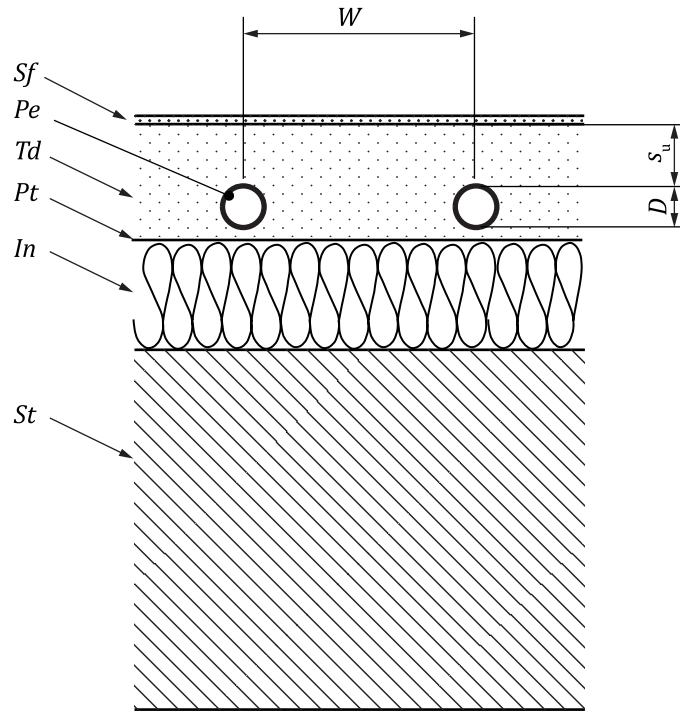
This calculation method is given in Annex A for the following five types of system:

- type I: pipes directly included in a thermal diffusion layer (see Figure 2);
- type II: pipes included in thermal insulation layer with additional thermal conduction layer (see Figure 3);
- type III: capillary tubes directly included in a thermal diffusion layer (see Figure 4);
- type IV: pipes with a thermal reflection layer and an air gap to floor covering (see Figure 5);
- type V: pipes included directly in the structural construction (TABS) (see Figure 6).

Figure 3 shows the types as embedded in the floor, but the methods can also be applied for wall and ceiling systems with a corresponding position of the pipes.

7.1, Figure 2 a)

Replace Figure 2 a) with the new Figure 2.



**Key**

*D* external diameter of the pipe

*In* thermal insulation layer

*Pe* pipes or electric cables

*Pt* protection layer

*Sf* surface layer

*St* structural layer

*s<sub>u</sub>* thickness of the layer above the pipe

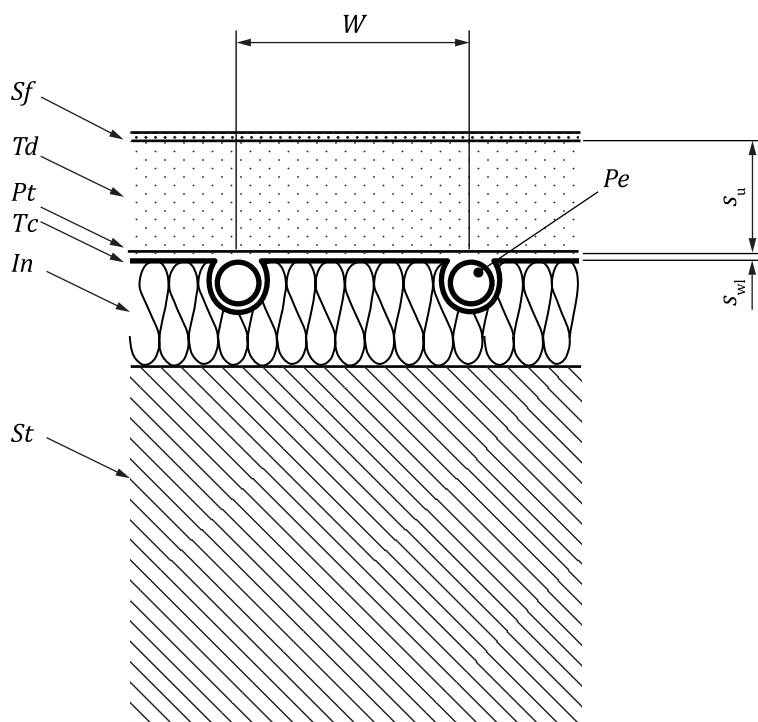
*Td* thermal diffusion layer

*W* pipe spacing

**Figure 2 — Radiant system type I: pipes directly included in a thermal diffusion layer**

7.1, Figure 2 b)

Replace Figure 2 b) with the new Figure 3.



**Key**

*In* thermal insulation layer

*Pe* pipes or electric cables

*Pt* protection layer

*Sf* surface layer

*St* structural layer

$s_u$  thickness of the layer above the pipe

$s_{wl}$  thickness of heat conducting device [ISO 11855-2:2021/PRF Amd 1](https://standards.iteh.ai/ISO-11855-2:2021/PRF-Amd-1)

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*Tc* thermal conduction layer

*Td* thermal diffusion layer

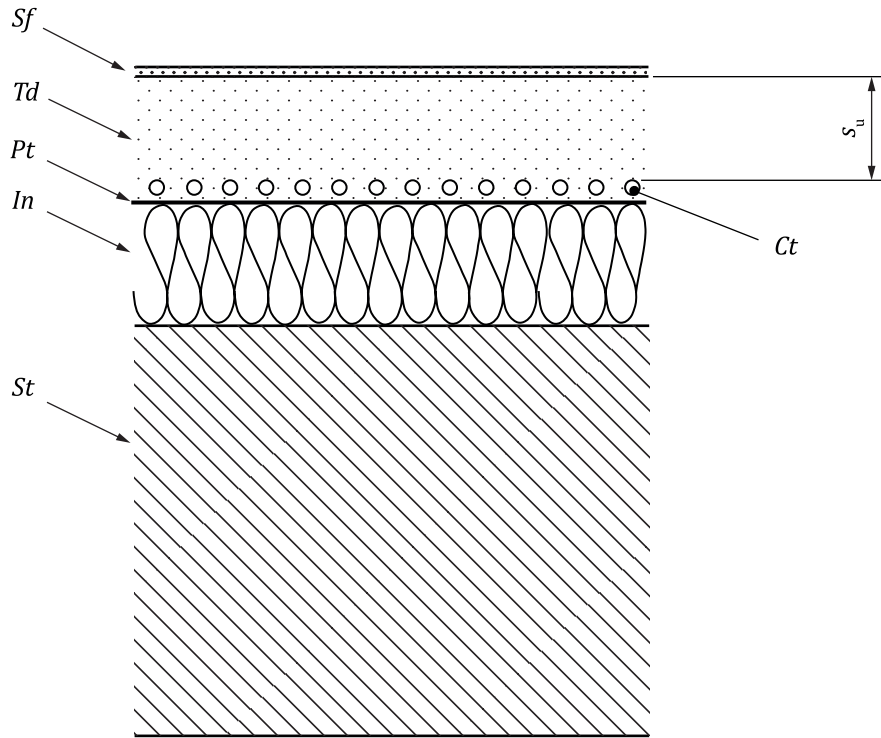
*W* pipe spacing

**Figure 3 — Radiant system type II: pipes included in a thermal insulation layer with additional thermal conduction layer**

7.1, Figure 2 c)

Replace Figure 2 c) with the new Figure 4.





**Key**

- Ct* capillary tubes
- In* thermal insulation layer
- Pt* protection layer
- Sf* surface layer
- St* structural layer
- $s_u$  thickness of the layer above the pipe
- Td* thermal diffusion layer

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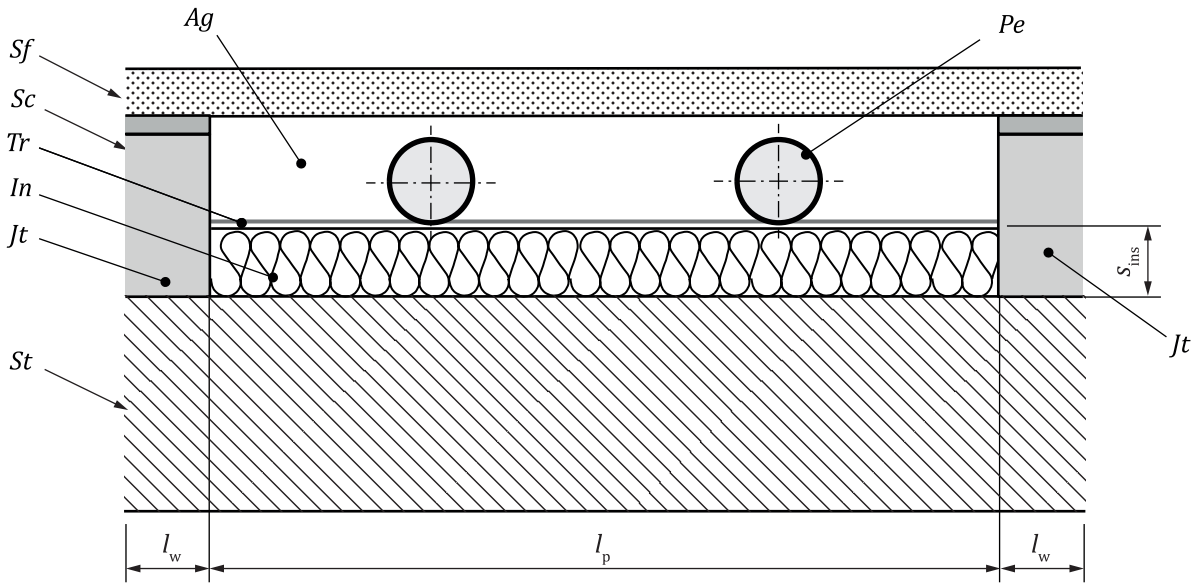
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**Figure 4 — Radiant system type III: capillary tubes directly included in a thermal diffusion layer**

7.1, Figure 2 d)

Replace Figure 2 d) with the new Figure 5.



**Key**

- Ag* air gap
- In* thermal insulation layer
- Jt* joist
- $l_p$  distance between the joists
- $l_w$  thickness of the joist
- Pe* pipes or electric cables
- Sc* structural construction
- Sf* surface layer (floor covering)
- $s_{ins}$  thickness of thermal insulation
- St* structural layer
- Tr* thermal reflection layer

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**Figure 5 — Radiant system type IV: pipes with a thermal reflection layer and an air gap to floor covering**

7.1, Figure 2 e)

Replace Figure 2 e) with the new Figure 6.