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AMENDMENT 1
2023-11

**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*

ISC 021/Amd 1:2023

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CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
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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:

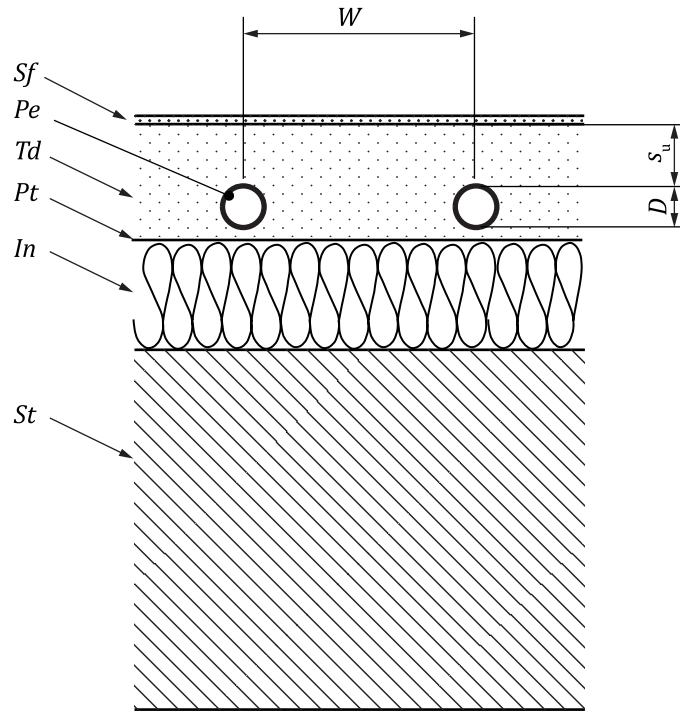
This calculation method is given in Annex A for the following five types of system:

- 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.



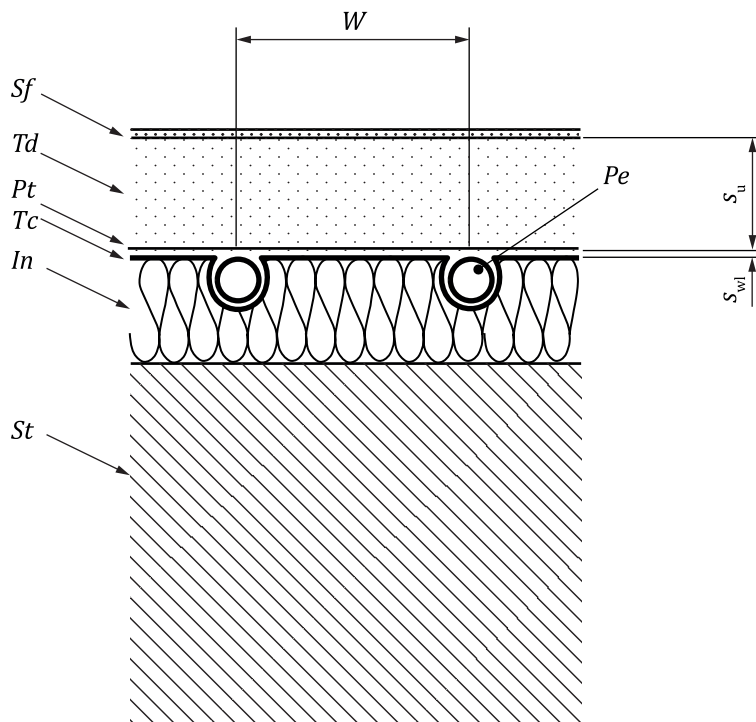
Key

- 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_u* 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/Amd 1:2023](https://standards.iteh.ai/ISO-11855-2:2021/Amd-1:2023)

Tc thermal conduction layer [standards/sist/8245d031-a9cd-44ad-acc3-3dece96a71cd/iso-11855-2-2021-amd-1-2023](https://standards.iteh.ai/standards/sist/8245d031-a9cd-44ad-acc3-3dece96a71cd/iso-11855-2-2021-amd-1-2023)

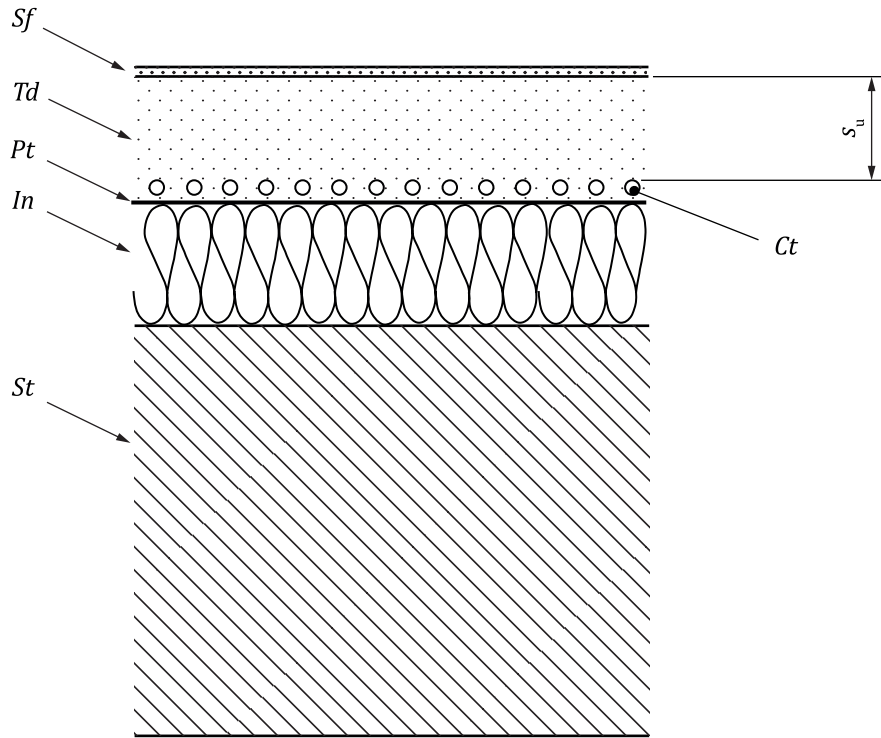
Td thermal diffusion layer

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

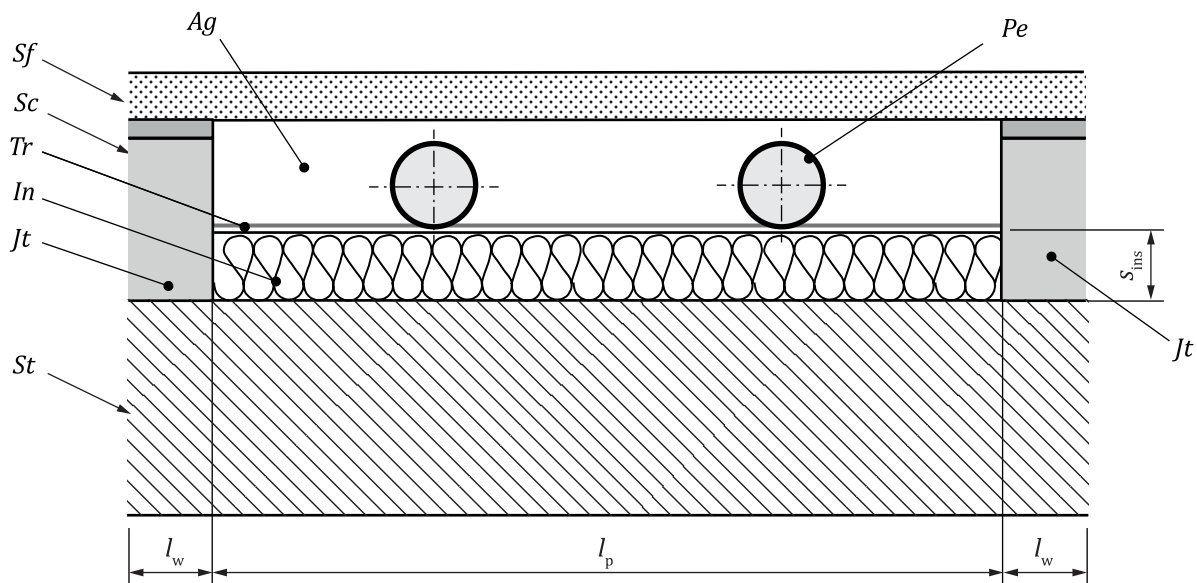
- Ct* capillary tubes
- In* thermal insulation layer
- Pt* protection layer
- Sf* surface layer
- St* structural layer
- s_u thickness of the layer above the pipe
- Td* thermal diffusion layer

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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.