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

Part 4:

**Dimensioning and calculation of the
dynamic heating and cooling capacity
of Thermo Active Building Systems
(TABS)**

AMENDMENT 1

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

*Partie 4: Dimensionnement et calculs relatifs au chauffage
adiabatique et à la puissance frigorifique pour systèmes d'éléments de
construction thermoactifs (TABS)*

AMENDEMENT 1

PROOF / ÉPREUVE



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ISO 11855-4:2021/Amd 1

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CP 401 • Ch. de Blandonnet 8
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 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 4:

Dimensioning and calculation of the dynamic heating and cooling capacity of Thermo Active Building Systems (TABS)

AMENDMENT 1

Introduction, last paragraph

Modify to the following:

ISO 11855-1 specifies the comfort criteria which should be considered in designing embedded radiant heating and cooling systems, since the main objective of the radiant heating and cooling system is to satisfy thermal comfort of the occupants. ISO 11855-2 provides steady-state calculation methods for determination of the heating and cooling capacity. ISO 11855-3 specifies design and dimensioning methods of radiant heating and cooling systems to ensure the heating and cooling capacity. ISO 11855-4 (this document) provides a dimensioning and calculation method to design Thermo Active Building Systems (TABS) – Type V for energy saving purposes, since radiant heating and cooling systems can reduce energy consumption and heat source size by using renewable energy. ISO 11855-5 addresses the installation process for the system to operate as intended. ISO 11855-6 shows a proper control method of the radiant heating and cooling systems to ensure the maximum performance which was intended in the design stage when the system is actually being operated in a building. ISO 11855-7 presents a calculation method for input parameters to ISO 52031.

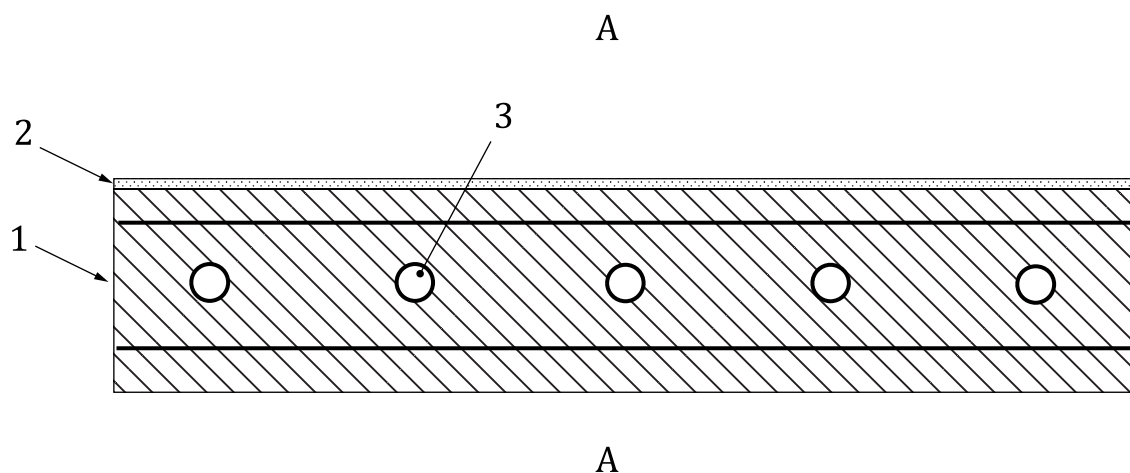
Clause 1, first paragraph

Modify to the following:

This document allows the calculation of peak cooling capacity of Thermo Active Building Systems (TABS) – Type V according to ISO 11855-1, based on heat gains, such as solar gains, internal heat gains, and ventilation, and the calculation of the cooling power demand on the water side, to be used to size the cooling system, as regards, e.g. the chiller size, fluid flow rate.

Clause 5, Figure 1

Modify to the following:



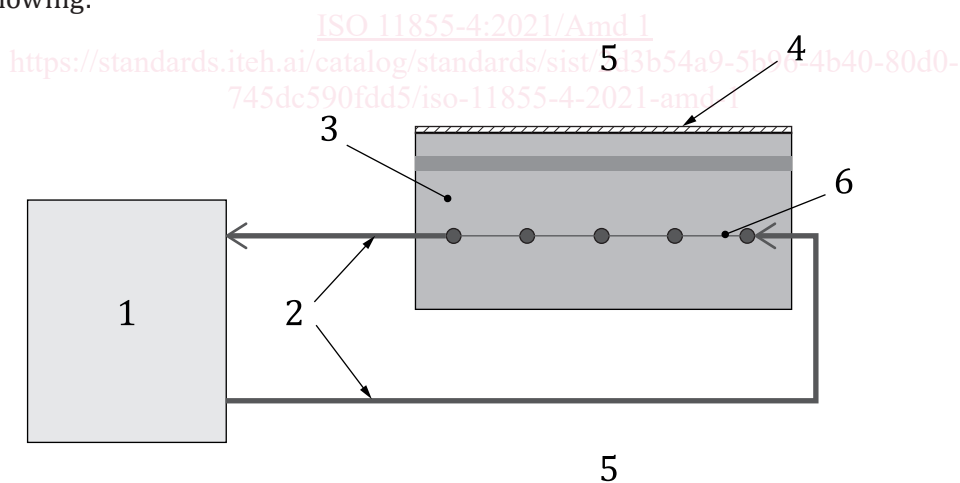
- Key**
- 1 structural layer
 - 2 surface layer
 - 3 pipes or electric cables
 - A room

Figure 1 — Example of position of pipes in TABS

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Clause 5, Figure 2

Modify to the following:

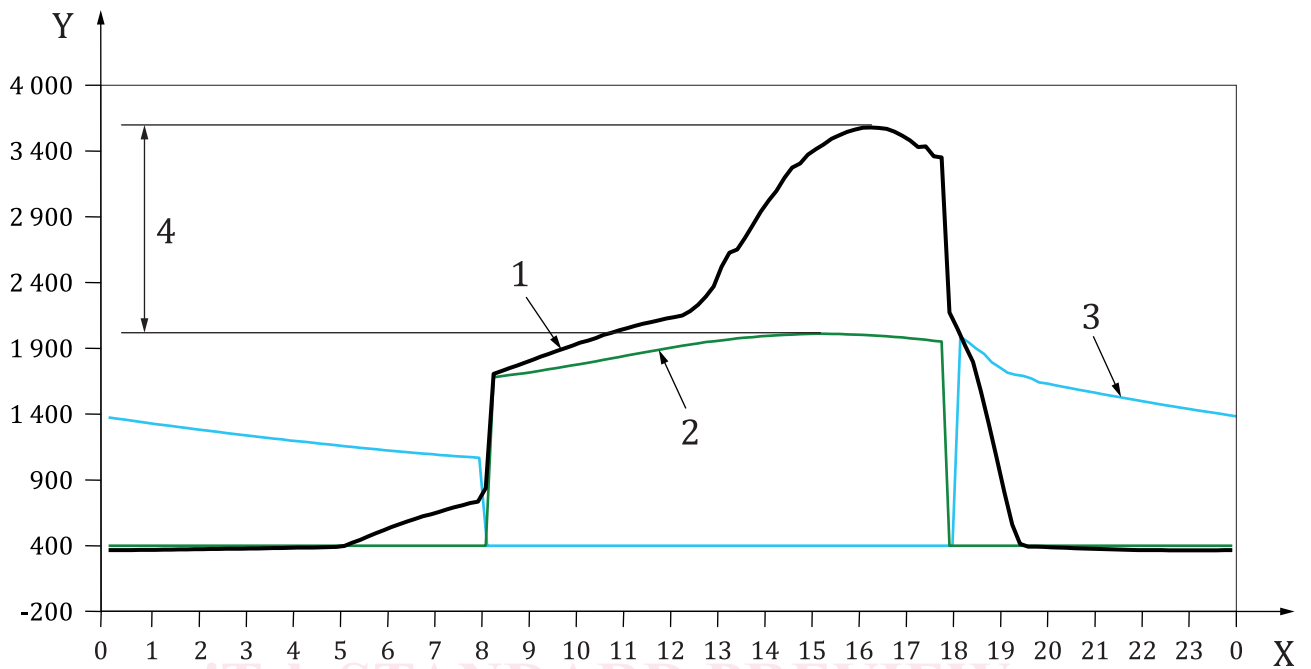


- Key**
- 1 heating and cooling equipment
 - 2 hydraulic circuit
 - 3 slab including core layer with pipes and reinforcement
 - 4 possible additional resistances (floor covering or suspended ceiling)
 - 5 room below and room above
 - 6 pipe level

Figure 2 — Simple scheme of a TABS

Clause 5, Figure 3

Modify to the following:



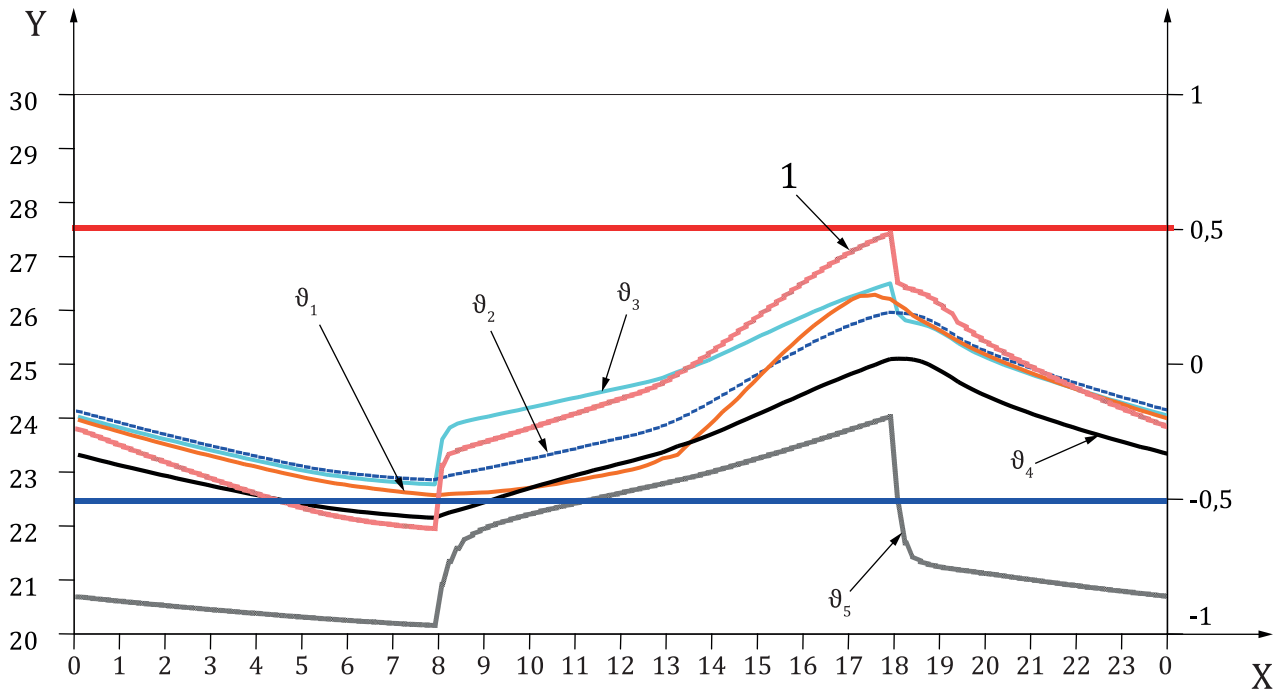
Key

- X time, h
- Y cooling power, W
- 1 heat gain
- 2 cooling power needed for conditioning the ventilation air
- 3 cooling power needed on the water side
- 4 reduction of the required peak power

Figure 3 — Example of peak-shaving effect

Clause 5, Figure 4

Modify to the following:



- Key**
- X time, h
 - Y temperature, °C
 - 1 predicted mean vote
 - θ_1 floor temperature
 - θ_2 mean radiant temperature
 - θ_3 air temperature
 - θ_4 ceiling temperature
 - θ_5 water return temperature

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Figure 4 — Example of temperature profiles and PMV values vs. time

Clause 8

Modify to the following:

To facilitate dynamic computer simulations of buildings with embedded radiant heating and cooling systems, the equivalent resistances between the heat conduction layer (pipe level) and the upward and downward surfaces can be used.

For type V, III, and IV systems (in ISO 11855-1), this resistance is directly calculated. Both the equivalent inward and outward resistance is calculated.

For type I and II systems (in ISO 11855-1) the equivalent resistance is calculated from the inward specific heat flux, q_i , and outward specific heat flux, q_u , taking into account the surface resistance according to [Formula \(5\)](#):

Equivalent resistance:

$$R = \Delta\theta/q - 1/h_t \tag{5}$$

where

$\Delta\theta$ is the heating and cooling medium temperature difference in K;

h_t is the total heat transfer coefficient (convection + radiation) between surface and space in W/(m²·K).

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