# SLOVENSKI STANDARD
# SIST EN ISO 11855-4:2021/oprA1:2023

**01-marec-2023**

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**Načrtovanje notranjega okolja v stavbah - Vgrajeni sevalni ogrevalni in hladilni sistemi - 4. del: Dimenzioniranje in izračun zmogljivosti dinamičnega ogrevanja in hlajenja toplotnoaktivnih delov stavbe (TABS) - Dopolnilo A1 (ISO 11855-4:2021/DAM 1:2023)**

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 (ISO 11855-4:2021/DAM 1:2023)

Umweltgerechte Gebäudeplanung - Flächenintegrierte Strahlungsheiz- und -kühlsysteme - Teil 4: Auslegung und Berechnung der dynamischen Heiz- und Kühlleistung für thermoaktive Bauteilsysteme (TABS) - Änderung 1 (ISO 11855-4:2021/DAM 1:2023)

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 (ISO 11855-4:2021/DAM 1:2023)



**Ta slovenski standard je istoveten z:** **EN ISO 11855-4:2021/prA1**

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**ICS:**

| | | |
|---|---|---|
| 91.140.10 | Sistemi centralnega ogrevanja | Central heating systems |
| 91.140.30 | Prezračevalni in klimatski sistemi | Ventilation and air-conditioning systems |

**SIST EN ISO 11855-4:2021/oprA1:2023** **en,fr,de**

DRAFT AMENDMENT
**ISO 11855-4:2021/DAM 1**

ISO/TC **205** Secretariat: **ANSI**

Voting begins on: **2023-01-19** Voting terminates on: **2023-04-13**

# 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*



ICS: 91.040.01

This document is circulated as received from the committee secretariat.

**ISO/CEN PARALLEL PROCESSING**



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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

**Foreword**

*Modify to the following:*

The main changes compared to the previous edition are as follows:

— the radiant system types have been redefined and figures are updated based on the amendment;

— editorial corrections.



**Introduction**

*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.

### 1 Scope

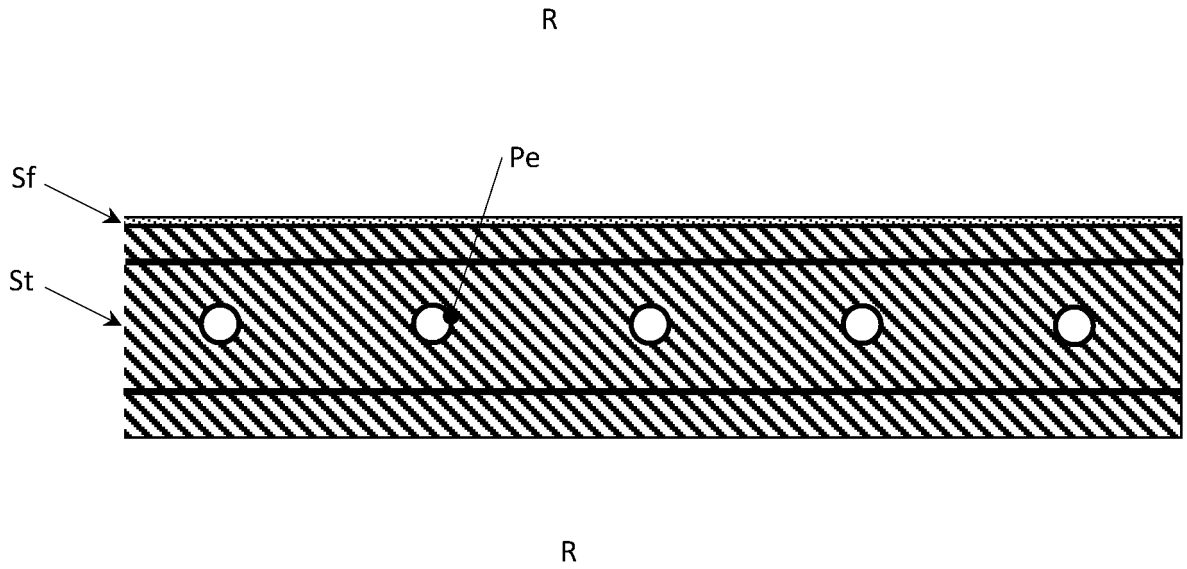
*Modify to the following:*

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 the chiller size, fluid flow rate, etc.

### 5 The concept of thermally active building surfaces (TABS)

**Figure 1**

*Modify to the following:*




**Key**

Pe pipes or electric cables
St structural layer
Sf surface layer
R room

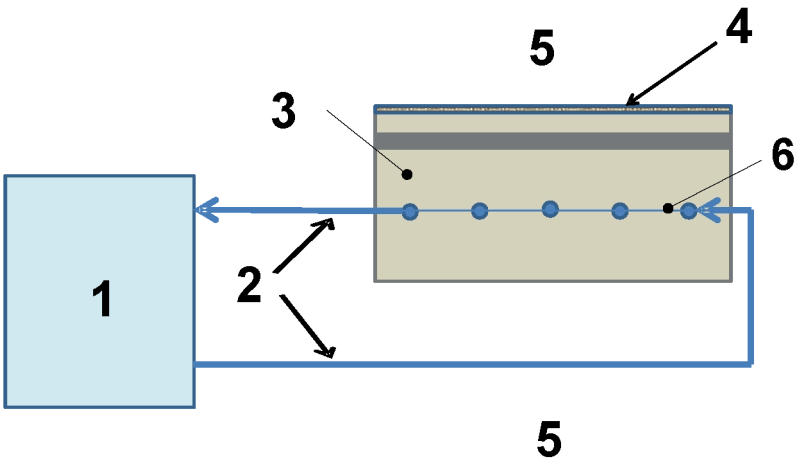


**Figure 1 — Example of position of pipes in TABS**



**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

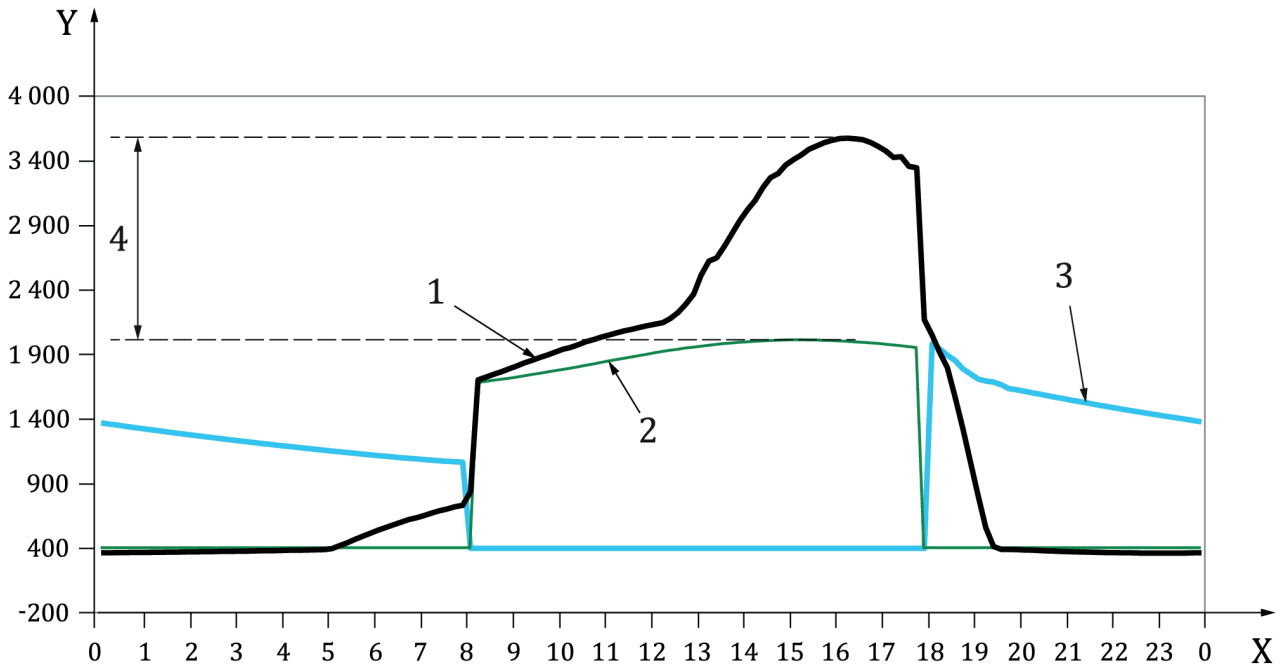


**Figure 2 — Simple scheme of a TABS**



**Figure 3**

*Modify to the following:*




**Key**

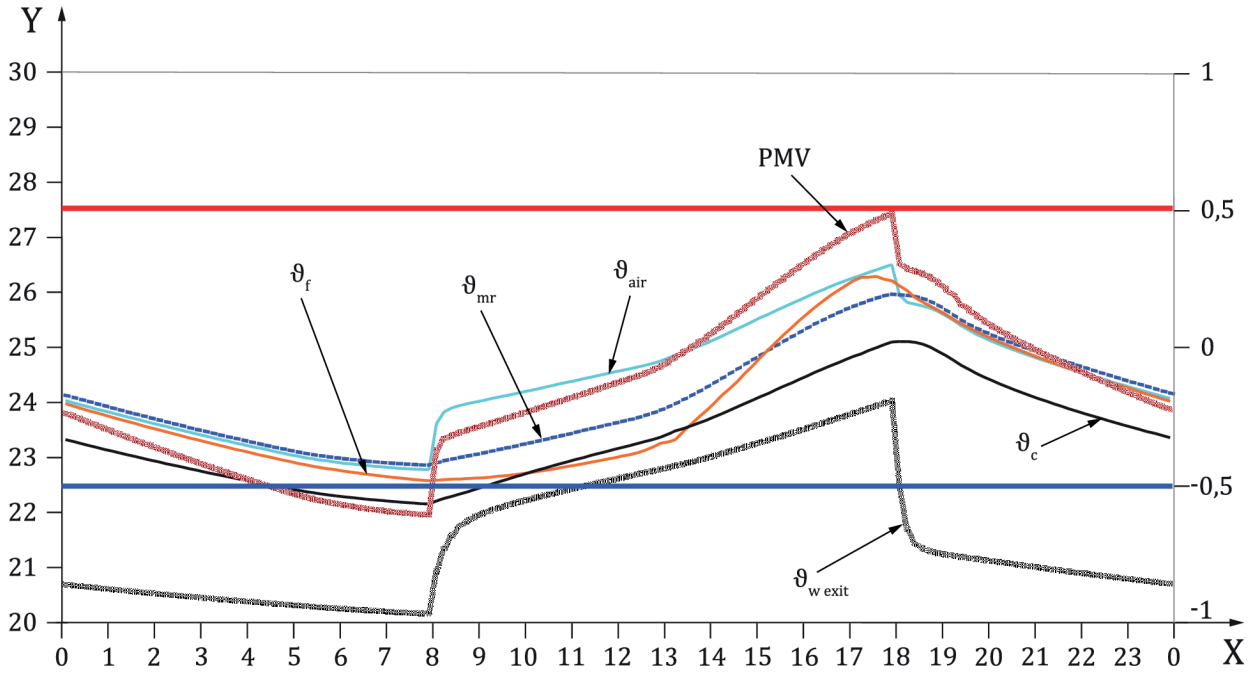
X time, h
Y cooling power, W
1 heat gain
2 cooling power needed for conditioning the ventilation air
3 cooling power needed on the water side
4 reduction of the required peak power



**Figure 3 — Example of peak-shaving effect**

**Figure 4**

*Modify to the following:*




**Key**

| | |
|---|---|
| X | time, h |
| Y | temperature, °C |
| PMV | predicted mean vote |
| $\theta_{air}$ | air temperature |
| $\theta_c$ | ceiling temperature |
| $\theta_{mr}$ | mean radiant temperature |
| $\theta_f$ | floor temperature |
| $\theta_{w\ exit}$ | water return temperature |



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

## 8 Input for computer simulations of energy performance

*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 this formula:

Equivalent resistance:

$$R = \Delta\theta/q - 1/h_t \quad (5)$$

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/(m$^2$·K