INTERNATIONAL STANDARD

ISO 11855-3

Second edition
2021-08

AMENDMENT 1
2023-10

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

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

Reference number
ISO 11855-3:2021/Amd.1:2023(E)

© ISO 2023

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

 © ISO 2023 – All rights reserved

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

Building environment design — Embedded radiant heating and cooling systems —

Part 3: Design and dimensioning

AMENDMENT 1

5.1.4

Modify to the following:

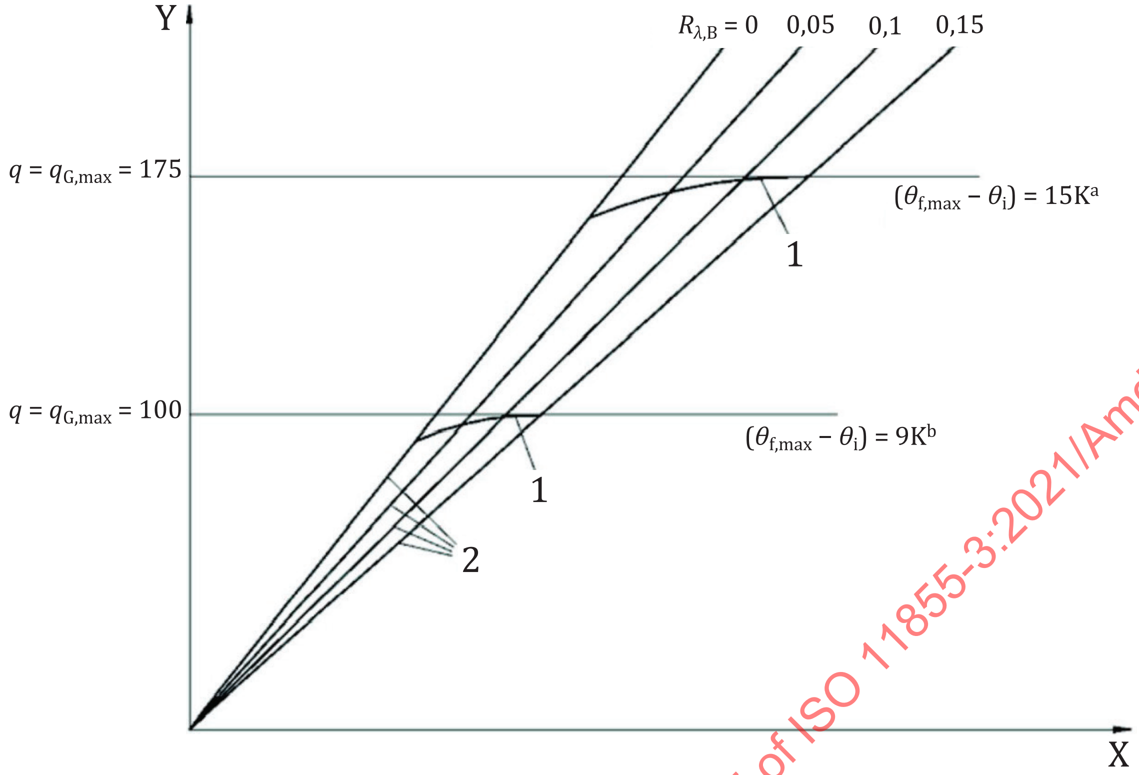
The field of characteristic curves of a floor heating system with a specific pipe spacing W shall at least contain the characteristic curves for values of the thermal resistance of surface covering $R_{\lambda,B}$ = 0, $R_{\lambda,B}$ = 0,05, $R_{\lambda,B}$ = 0,10 and $R_{\lambda,B}$ = 0,15 (m^{2}K/W),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

5.1.5 Figure 1

Modify to the following:

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

© ISO 2023 – All rights reserved



Key

X $\Delta\theta_H$ K

Y q W/m^2

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

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

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.

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

 © ISO 2023 – All rights reserved

$$\lambda_{ins} = \lambda_i \frac{l_p - l_{ws}}{l_{ps}} + \lambda_{ws} \frac{l_{ws}}{l_{ps}} \tag{8}$$

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

© ISO 2023 – All rights reserved

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).

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

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:

$$\lambda_{ins} = \lambda_i \frac{l_p - l_w}{l_p} + \lambda_w \frac{l_w}{l_p} \tag{10}$$

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).

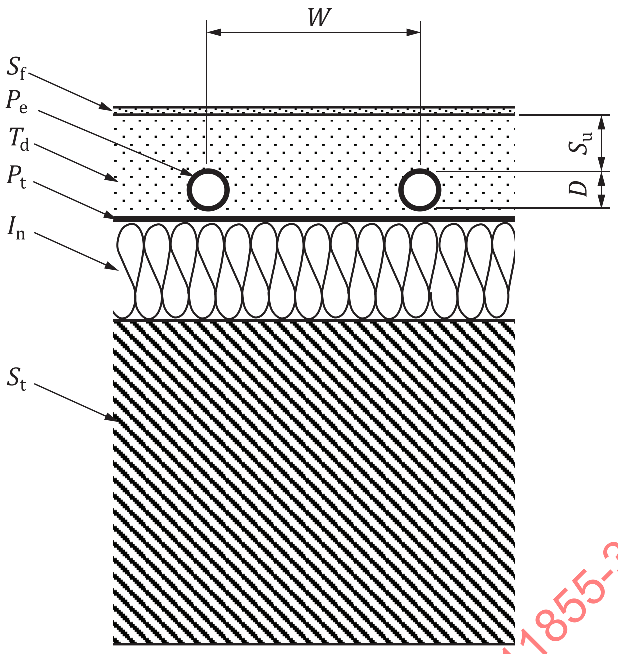
For system type IV systems with air cavities, see ISO 11855-2:2021, Annexes C and E.

5.1.6, Figure 2

Modify to the following:

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

© ISO 2023 – All rights reserved



Key

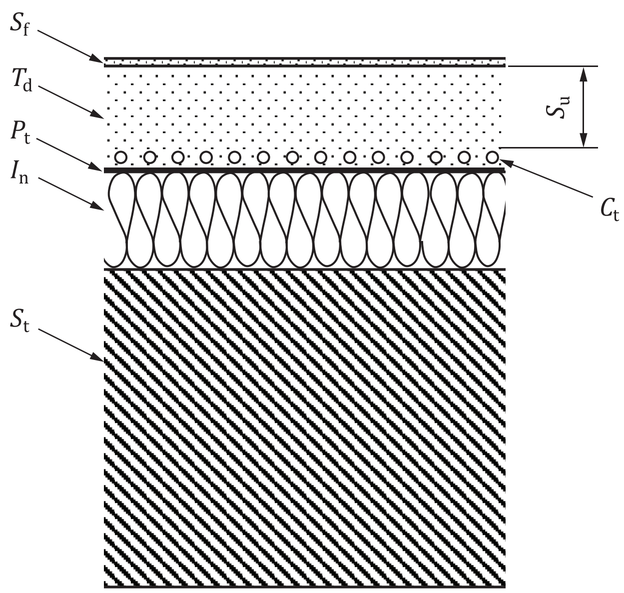
D external diameter of the pipe
I_n thermal insulation layer
P_e pipes or electric cables
P_t protection layer
S_f surface layer
S_t structural layer
s_u thickness of the layer above the pipe
T_d thermal diffusion layer
W pipe spacing

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:

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023



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

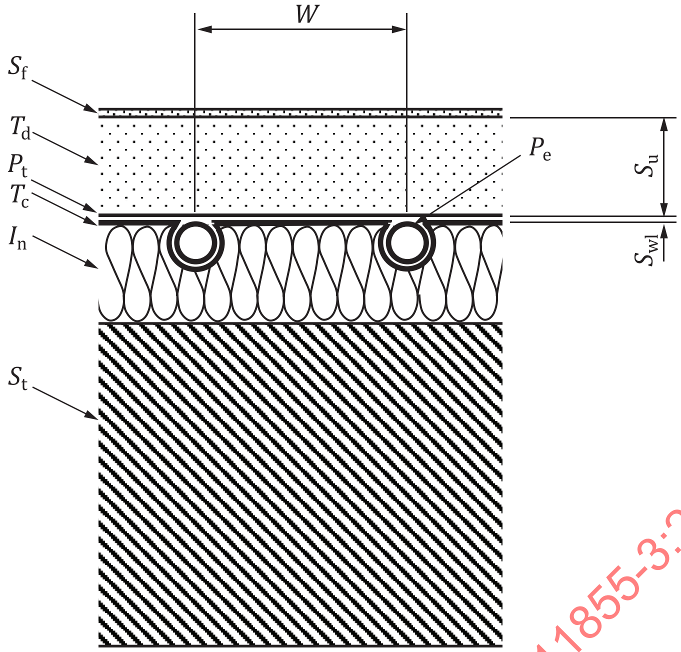
Figure 3 — Effective thickness and effective thermal conductivity of thermal insulating layer of flat thermal insulating panel — System type III

5.1.6, Figure 4

Modify to the following:

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

 © ISO 2023 – All rights reserved



Key

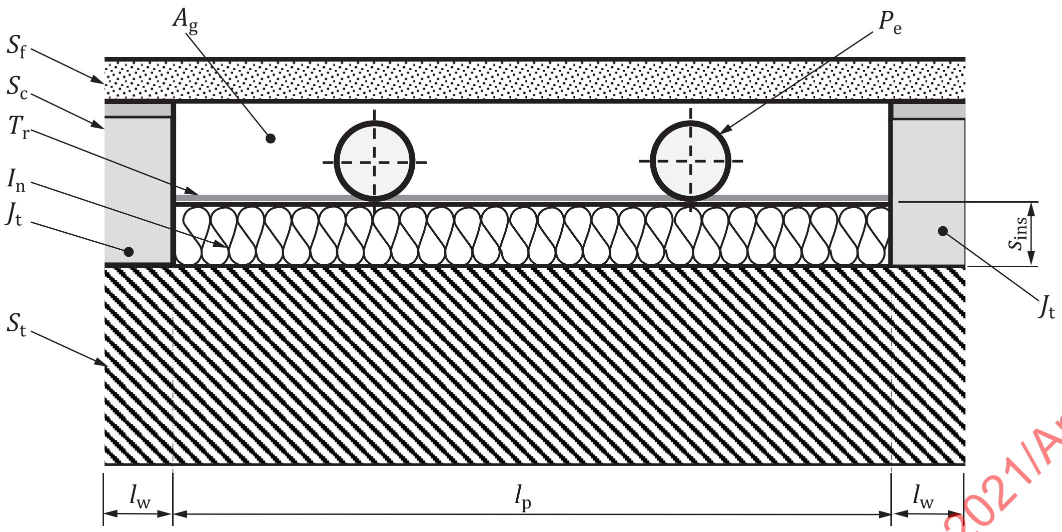
I_n thermal insulation layer
P_e pipes or electric cables
P_t protection layer
S_f surface layer
S_t structural layer
s_u thickness of the layer above the pipe
s_{wl} thickness of heat conducting device
T_c thermal conduction layer
T_d thermal diffusion layer
W pipe spacing

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:

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023



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:

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

c_{Wa} is the specific heat capacity of water; $c_{Wa} = 4\,190$ J/(kg·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:

STANDARDSISO.COM : Click to view the full PDF of ISO 11855-3:2021/Amd 1:2023

© ISO 2023 – All rights reserved