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BS EN ISO 11855-1:2015



BSI Standards Publication

Building environment design — Design, dimensioning, installation and control of embedded radiant heating and cooling systems

Part 1: Definition, symbols, and comfort
criteria (ISO 11855-1:2012)

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This British Standard is the UK implementation of EN ISO 11855-1:2015. It is identical to ISO 11855-1:2012. It supersedes BS EN 15377-1:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RHE/24, Central heating installations.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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English Version

Building environment design - Design, dimensioning, installation
and control of embedded radiant heating and cooling systems -
Part 1: Definition, symbols, and comfort criteria (ISO 11855-
1:2012)

Conception de l'environnement des bâtiments - Conception,
construction et fonctionnement des systèmes de chauffage
et de refroidissement par rayonnement - Partie 1: Définition,
symboles et critères de confort (ISO 11855-1:2012)

Umweltgerechte Gebäudeplanung - Planung, Auslegung,
Installation und Steuerung flächenintegrierter
Strahlheizungs- und -kühlsysteme - Teil 1: Definitionen,
Symbole und Komfortkriterien (ISO 11855-1:2012)

This European Standard was approved by CEN on 30 July 2015.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

The text of ISO 11855-1:2012 has been prepared by Technical Committee ISO/TC 205 “Building environment design” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 11855-1:2015 by Technical Committee CEN/TC 228 “Heating systems and water based cooling systems in buildings” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2016, and conflicting national standards shall be withdrawn at the latest by February 2016.

This standard is applicable for design, construction and operation of radiant heating and cooling systems. The methods defined in part 2 are intended to determine the design heating or cooling capacity used for the design and evaluation of the performance of the system.

For identifying product characteristics by testing and proving the thermal output of heating and cooling surfaces embedded in floors, ceilings and walls the standard series EN 1264 can be used.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 15377-1:2008.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 11855-1:2012 has been approved by CEN as EN ISO 11855-1:2015 without any modification.

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11855-1 was prepared by Technical Committee ISO/TC 205, *Building environment design*.

ISO 11855 consists of the following parts, under the general title *Building environment design — Design, dimensioning, installation and control of embedded radiant heating and cooling systems*:

- Part 1: *Definition, symbols, and comfort criteria*
- Part 2: *Determination of the design and heating and cooling capacity*
- Part 3: *Design and dimensioning*
- Part 4: *Dimensioning and calculation of the dynamic heating and cooling capacity of Thermo Active Building Systems (TABS)*
- Part 5: *Installation*
- Part 6: *Control*

Part 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. Part 2 provides steady-state calculation methods for determination of the heating and cooling capacity. Part 3 specifies design and dimensioning methods of radiant heating and cooling systems to ensure the heating and cooling capacity. Part 4 provides a dimensioning and calculation method to design Thermo Active Building Systems (TABS) for energy-saving purposes, since radiant heating and cooling systems can reduce energy consumption and heat source size by using renewable energy. Part 5 addresses the installation process for the system to operate as intended. Part 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.

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Introduction

The radiant heating and cooling system consists of heat emitting/absorbing, heat supply, distribution, and control systems. The ISO 11855 series deals with the embedded surface heating and cooling system that directly controls heat exchange within the space. It does not include the system equipment itself, such as heat source, distribution system and controller.

The ISO 11855 series addresses an embedded system that is integrated with the building structure. Therefore, the panel system with open air gap, which is not integrated with the building structure, is not covered by this series.

The ISO 11855 series shall be applied to systems using not only water but also other fluids or electricity as a heating or cooling medium.

The object of the ISO 11855 series is to provide criteria to effectively design embedded systems. To do this, it presents comfort criteria for the space served by embedded systems, heat output calculation, dimensioning, dynamic analysis, installation, operation, and control method of embedded systems.

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Building environment design — Design, dimensioning, installation and control of embedded radiant heating and cooling systems —

Part 1: Definition, symbols, and comfort criteria

1 Scope

This part of ISO 11855 specifies the basic definitions, symbols, and a comfort criteria for radiant heating and cooling systems.

The ISO 11855 series is applicable to water based embedded surface heating and cooling systems in residential, commercial and industrial buildings. The methods apply to systems integrated into the wall, floor or ceiling construction without any open air gaps. It does not apply to panel systems with open air gaps which are not integrated into the building structure.

The ISO 11855 series also applies, as appropriate, to the use of fluids other than water as a heating or cooling medium. The ISO 11855 series is not applicable for testing of systems. The methods do not apply to heated or chilled ceiling panels or beams.

2 Normative references

ISO 7726:1998, *Ergonomics of the thermal environment — Instruments for measuring physical quantities*

ISO 7730:2005, *Ergonomics of the thermal environment — Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria*

ISO 13731:2003, *Ergonomics of the thermal environment — Vocabulary and symbols*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

additional thermal resistance

thermal resistance representing layers added to the building structure and acting mostly as thermal resistances because of their own low thermal inertia

EXAMPLE Carpets, moquette, and suspended ceilings.

2.2

average specific thermal capacity of the internal walls

thermal capacity related to one square metre of the internal walls

NOTE Since internal walls are shared with other rooms, then just half of the total specific thermal capacity of the wall must be taken into account, since the second half is influenced by the opposite rooms that are considered to be at the same thermal conditions as the one under consideration.

2.3

average surface temperature

$\theta_{s,m}$

average value of all surface temperatures in the occupied or peripheral area