BS EN IEC 60335-2-96:2021+A11:2021



BSI Standards Publication

Household and similar electrical appliances — Safety

Part 2-96: Particular requirements for flexible sheet heating elements for room heating

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Full document details: BS EN IEC 60335-2-96:2021+A11:2021

National foreword

This British Standard is the UK implementation of EN IEC 60335-2-96:2021+A11:2021. It is dervied from IEC 60335-2-96:2019. It supersedes BS EN 60335-2-96:2002+A2:2009, which will be withdrawn on 20 September 2024.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to text carry the number of the CENELEC amendment. For example, text altered by CENELEC amendment A11 is indicated by ⟨A11⟩ ⟨A11⟩.

The UK participation in its preparation was entrusted to Technical Committee CPL/61/7, Safety of electrical appliances - Heated appliance group.

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

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association. It is intended to support requirements of the EU legislation detailed in the European Foreword. A European Annex, usually Annex ZA or ZZ, describes how this publication relates to that EU legislation.

For the Great Britain market (England, Scotland and Wales), if UK Government has designated this publication for conformity with UKCA marking (or similar) legislation, it may contain an additional National Annex. Where such a National Annex exists, it shows the correlation between this publication and the relevant UK legislation. If there is no National Annex of this kind, the relevant Annex ZA or ZZ in the body of the European text will indicate the relationship to UK regulation applicable in Great Britain. References to EU legislation may need to be read in accordance with the UK designation and the applicable UK law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60335-2-96:2021+A11

November 2021

ICS 97.100.10; 13.120

Supersedes EN 60335-2-96:2002 and all of its amendments and corrigenda (if any)

English Version

Household and similar electrical appliances - Safety - Part 2-96: Particular requirements for flexible sheet heating elements for room heating (IEC 60335-2-96:2019)

Appareils électrodomestiques et analogues - Sécurité - Partie 2-96: Exigences et particulières pour les films souples chauffants pour le chauffage des locaux (IEC 60335-2-96:2019)

Sicherheit elektrischer Geräte für den Hausgebrauch und ähnliche Zwecke - Teil 2-96: Besondere Anforderungen an Flächenheizelemente (IEC 60335-2-96:2019)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document EN IEC 60335-2-96:2021 consists of the text of IEC 60335-2-96:2019 prepared by IEC/TC 61 "Safety of household and similar electrical appliances".

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022-09-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-09-20

This document supersedes EN 60335-2-96:2002 and all of its amendments and corrigenda (if any).

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

This document is read in conjunction with EN IEC 60335-2-96:2021/A11:2021.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZZA, which is an integral part of EN IEC 60335-2-96:2021/A11:2021.

Endorsement notice

The text of the International Standard IEC 60335-2-96:2019 was approved by CENELEC as a European Standard.

European Foreword to amendment A11

This document (EN IEC 60335-2-96:2021/A11:2021) has been prepared by CLC/TC 61 "Safety of household and similar electrical appliances".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022-09-20
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2024-09-20

This document is read in conjunction with EN IEC 60335-2-96:2021.

The numbering system for European clauses, subclasses, notes, tables, figures and annexes that are additional to those in the IEC standard are prefixed with the letter "Z".

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For the relationship with EU Directive see informative Annex ZZA, which is an integral part of this document.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-96: Particular requirements for flexible sheet heating elements for room heating

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60335-2-96 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This second edition cancels and replaces the first edition published in 2002, Amendment 1:2003 and Amendment 2:2008. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the first edition:

– aligns the text with IEC 60335-1:2010, and its Amendments 1 and 2;
– some notes have been converted to normative text or deleted (5.6, 7.12.1, 10.1, 11.2.103, 13.1, 13.2, 16.2, 16.3, 18.101, 18.102.5, 21.1, 22.103, 22.105, 22.106);
– the strength test for heating units incorporating insulated wires intended to be installed in floors has been modified a (21.103);

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– the scope and specific requirements have been added for heating units installed in walls below a height of 1,2 m (6.2, 7.1, 7.12.1, 7.12.6, 7.101, 11.2, 19.2, 22.106, 24.102, Annex AA).

The text of this International Standard is based on the following documents:

FDIS	Report on voting
61/5789/FDIS	61/5806/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) of that standard.

NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for flexible sheet heating elements for room heating.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type*;

– notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

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It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

The following additional differences exist in the countries indicated below.

– 1: Flexible sheet heating elements that are cut on site are not allowed (France).

– 1: The intended installation is not to include walls (USA).

– 7.1: The intended installation is not to include walls (USA).

– 7.12.1 c): The instructions in timber floors shall state that the heating unit is to be covered with additional insulation, be supplied through an isolating transformer, or be class II (Sweden).

– 7.12.1 c): The instructions need not refer to residual current devices (USA).

– Clause 18: The tests are different (USA).

– 22.102: The test is different (USA).

– 22.103: The test is different (USA).

– 25.3: Heating units are not allowed to incorporate supply cords (USA).

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INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features which impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

〈A11〉 Whit this European amendment A11, the standard EN 60335-2-96:2002+A1:2004+A2:2009 is superseded. This European amendment A11 supplements or modifies the corresponding clauses of the standards below:

– EN 60335-1:2012+A11:2014+ A13:2017+A1:2019+A14:2019+A2:2019 (Part 1)

– EN IEC 60335-2-96:2021 (Part 2) 〈A11〉

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-96: Particular requirements for flexible sheet heating elements for room heating

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of **flexible sheet heating elements** intended to be incorporated into floors and walls below 1,2 m and above 2,3 m and in ceilings, their **rated voltage** being not more than 250 V for single-phase installations and 480 V for other installations.

Flexible sheet heating elements are converted into **heating units** that are incorporated in the building in accordance with the instructions after which the required level of protection against hazards is achieved.

NOTE 101 Attention is drawn to the fact that

– in many countries, different wiring rules apply;

– for **heating units** intended to be used in vehicles or on board ships or aircraft, additional requirements can be necessary;

– in many countries, additional requirements are specified by the national authorities for fire protection, the national authorities for building regulations, the national health authorities, the national authorities responsible for the protection of labour and similar authorities.

NOTE 102 This standard does not apply to

– **heating units** intended exclusively for industrial purposes;

– **heating units** intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);

– blankets, pads, clothing and similar flexible heating appliances (IEC 60335-2-17);

– foot warmers and heating mats (IEC 60335-2-81);

– heated carpets and for heating units for room heating installed under removable floor coverings (IEC 60335-2-106);

– **flexible sheet heating elements** incorporated in other appliances.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60364-7-701:2006, *Low-voltage electrical installations – Part 7-701: Requirements for special installations or locations – Locations containing a bath or shower*

IEC 60884-1:2002, *Plugs and socket-outlets for household and similar purposes – Part 1: General requirements*
IEC 60884-1:2002/AMD1:2006
IEC 60884-1:2002/AMD2:2013[1]

[1] There exists a consolidated edition 3.2:2013 that includes edition 3:2002, its Amendment 1:2006 and Amendment 2:2013.

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ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

Replacement:

3.1.9
normal operation
operation of the **heating unit** after incorporation into the building in accordance with the instructions.

Flexible sheet heating elements, the current of which can vary depending on the length of the **flexible sheet heating elements** and those that can supply other **flexible sheet heating elements** are loaded so that the current marked on the **flexible sheet heating elements** flows through the **heating unit**.

Heating units for **storage heating applications** are charged for 75 % of the **rated charging period**.

3.1.101
rated charging period
longest uninterrupted charging period assigned to the **heating unit** by the manufacturer

3.2 Definitions relating to means of connection

Replacement:

3.2.1
supply leads
set of wires intended for connecting the appliance to fixed wiring

3.5 Definitions relating to types of appliances

3.5.4 *Addition:*

Heating units are considered to be **fixed appliances**.

3.5.101
flexible sheet heating element
heating element consisting of sheets of electrical insulation laminated with electrical resistance material, or a base material on which electrically insulated heating wires are fixed

Note 1 to entry: This definition does not preclude other methods of combining the insulation and resistance materials.

3.5.102
heating unit
flexible sheet heating element equipped with means of connection to the supply and with insulation surrounding **live parts**

Note 1 to entry: The **heating unit** can be partly or completely prefabricated.

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3.5.103
modular heating unit
prefabricated assembly consisting of a **heating unit** and other materials to form a rigid construction for mounting on a ceiling

3.5.104
storage heating application
use of **heating units** to heat thermal accumulating material

Note 1 to entry: The heat is discharged naturally, the heat output being varied by adjusting the energy input.

3.6 Definitions relating to parts of an appliance

3.6.101
electrode
conductive part incorporated in a **flexible sheet heating element** for supplying the heating material

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Replacement:*

In general, eight samples are required for the tests.

The tests of 13.3 and of Clauses 15 and 16 are carried out on one sample.

The tests of 18.101 and of Clause 30 are carried out on one sample.

The test of 21.102 is carried out on two samples. One of these samples is also used for the test of 22.101.

The test of 22.103 is carried out on one sample.

The remaining tests are carried out on the sixth sample. The other two samples are required for incorporating into the test arrangement to create the necessary thermal environment.

NOTE 101 Additional samples can be necessary if tests have to be repeated.

Nine samples of **modular heating units** are necessary for the tests of 11.2.102.

Additional samples are necessary if the tests of 18.102 are carried out.

Additional samples can be necessary for testing different sizes of **heating units**.

The test of 22.105 is carried out on the same sample as that used for the test of 13.2.

*Two samples of the additional layer of material, of sufficient size to cover the **heating unit**, are required if the test of 21.104 is carried out.*

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5.3 *Addition:*

The test of 22.105 is carried out after the test of 13.2.

5.6 *Addition*:

***Thermostats** sensitive to room air temperature or outdoor air temperature are short circuited. However, the **thermostat** is not short circuited if it can be set so that it does not cycle.*

5.10 *Addition:*

*However, for **flexible sheet heating elements** that are cut on site, the tests are carried out after connecting the **supply leads** and protecting the edges in accordance with the instructions.*

5.101 ***Heating units** intended to be installed in walls above a height of 2,3 m are subjected to the tests for installation in ceilings.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Addition:*

Heating units need not be classified. However, if a **heating unit** is classified, the relevant requirements apply.

6.2 *Addition:*

Heating units for installation in concrete or similar material shall be at least IPX7.

Other **heating units** shall be at least IPX1.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Modification:*

Instead of the marking of **rated power input** or **rated current** the following applies:

– **heating units** shall be marked with their **rated power input**;
– **flexible sheet heating elements** without connection between adjacent elements shall be individually marked with their **rated power input**;
– other **flexible sheet heating elements** shall be marked with their **rated power input** per metre length.

Flexible sheet heating elements shall be marked with their maximum current if

– the current can vary depending on the length of the **flexible sheet heating element**;
– other **flexible sheet heating elements** can be supplied through them.

Addition:

Flexible sheet heating elements shall be marked with:

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– the indication of orientation, unless **heating units** are symmetrical;
– the intended installation (ceilings, walls between 0,2 m and 1,2 m and/or above 2,3 m, or floors);
– the heating mode (direct heating or storage heating), unless intended for both modes.

If the **heating unit** is only intended for application in floors of concrete or similar materials, it shall be marked with the symbol for installation in concrete or similar materials.

The marking shall be repeated at least once every 0,5 m of the **flexible sheet heating element** or on every section that can be cut to form a **heating unit**.

Flexible sheet heating elements that can be cut on site and have to be cut at specified places shall be marked appropriately.

Appliances with separate controls, without a control, or with **detachable controls** shall be marked with the reference number or by other means of identification of the control.

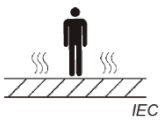
7.6 *Addition:*



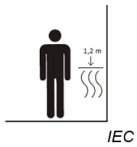
direct ceiling heating



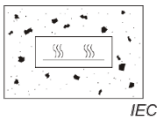
direct floor heating



floor storage heating



wall heating



installation in concrete or similar material

These symbols are information signs and, except for the colours, the rules of ISO 3864-1 apply.

7.12.1 *Addition:*

Instructions shall be provided. They shall include

a) explanation of the marking and symbols, if necessary;
b) information for incorporating the **heating units** into the building, in particular the following:
   – precautions to be taken to avoid damage during installation, such as dropping sharp objects or stepping on the **heating unit**, or careless pouring of concrete;

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- dimensions and distances to be taken into account;
- a statement that the **heating units** have to be separated from other heat sources such as luminaires and chimneys;
- description of the fixing areas of the **heating unit** and the separate screen, if applicable;
- guidance on how to avoid air gaps between the **flexible sheet heating element** and the screed of concrete floors;
- guidance on how to avoid damage to a **flexible sheet heating element** and its terminations in timber constructions due to relative movement after installation;
- the lowest ambient temperature at which **heating units** may be installed;
- the minimum radius for bending the **flexible sheet heating element**, if applicable;
- a statement that **heating units** shall not cross expansion joints of the building or structure;
- a statement to ensure that attachment of room fittings does not restrict heat emission from heated areas.

Except for **modular heating units**, the instructions shall include the following:

- precautions to be taken to avoid creasing the **flexible sheet heating element**;
- a statement that the **heating unit** is not to be installed on irregular surfaces;
- a description of the intended orientation and a statement that the **heating unit** is to be installed in this way (for **heating units** having non-symmetric construction);

c) a statement that the installation is to be in accordance with the national wiring rules. The substance of the following information shall be included:

- the **heating units** are to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA. The RCD shall not be of the time delayed type. Alternatively, except for installations in floors surrounding swimming pools or walls below a height of 2,3 m, they may be supplied through an isolating transformer. This statement is not required for **class III heating units** and for applications in
  - timber floors provided that the instructions for installation state that there is to be an air gap between the **heating unit** and the floor;
  - timber ceilings;
  - floors of concrete or similar material in dry locations (dry locations are areas outside zone 3 as defined in IEC 60364-7-701) as long as the **basic insulation** and additional electrical insulation each withstand the electric strength test of 16.3 for **reinforced insulation**;
- how to connect **heating units** to the supply, giving the cross-sectional area of the leads, if applicable;
- how to interconnect the **heating units**, giving the cross-sectional area of the leads, if applicable;
- **heating units** shall be installed to avoid increasing the ambient temperature of any existing electrical installation;

d) the maximum current allowed to flow through one **heating unit** when other units are supplied through it or when the current can vary depending on its length;

e) list of controls, unless they are incorporated into the **heating unit**;

f) the maximum thermal resistance between the **heating unit** and the room;

g) the type of covering materials that are allowed to be used in conjunction with the **heating units** with a statement that the advice of the manufacturer is to be requested before materials other than those recommended are used; the thickness of covering materials, which for floors shall be at least 5 mm;

h) characteristics of the thermal insulation that is to be inserted between separate **heating units** installed to heat a floor and the ceiling below it;

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