

INTERNATIONAL STANDARD

IEC
60335-2-30

Fourth edition
2002-09

Household and similar electrical appliances – Safety –

Part 2-30: Particular requirements for room heaters

*Appareils électrodomestiques et analogues –
Sécurité –*

*Partie 2-30:
Règles particulières pour les appareils de chauffage
des locaux*



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Withdrawn

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –**

Part 2-30: Particular requirements for room heaters

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

This part of International Standard IEC 60335 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition cancels and replaces the third edition published in 1996 and its amendment 1 (1999). It constitutes a technical revision.

The text of this part of IEC 60335 is based on the following documents:

FDIS	Report on voting
61/2166/FDIS	61/2246/RVD

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

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 fourth edition (2001) 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: Safety requirements for electric room heaters.

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 publication will remain unchanged until 2004. At this date, the publication will be

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

The following differences exist in the countries indicated below.

- 3.105: The immediate surround of a fireguard is extended to 50 mm (Austria, Germany and United Kingdom).
- 7.1: All heaters, except those for mounting at high level, are to be marked with a warning against covering (Norway).
- 7.1: All heaters, except those for permanent connection to fixed wiring, are to be marked with the minimum distances to combustible surfaces (Norway).
- 7.1: Appliances are not required to be marked "Do not cover" (USA).
- 7.12: Some of the instructions specified are to be marked on the heater (Norway and USA).
- Clause 11: The test methods are different (USA).
- 11.8: For other metal surfaces accessible to the test rod, the limit is 95 K (Australia).
- 11.8: For all fixed heaters, other than those for mounting at high level, the limit is 115 K for metallic air-outlet grilles and their surrounds (France).
- 11.8: For heaters used in hygiene rooms of dwellings, nurseries or after-school centres, the temperatures of surfaces accessible to the test finger of Figure 1 are not to exceed 60 °C (Sweden).
- Clause 19: The tests are different (Canada and USA).
- 19.103: Visibly glowing radiant heaters, other than those for mounting at high level, have to withstand the test of this subclause (Sweden).
- 20.1: The test is different (USA).
- 22.7: The test is different (USA).
- 22.24: The test is different (USA).
- 22.101: The requirement is different (Canada and USA).
- 22.102: The requirement is different (Canada and USA).
- 22.103: The requirement is different (Canada and USA).
- 22.105: The requirement is different (USA).
- 22.108: The requirement is different (USA).
- 24.1.3: The number of cycles of operation is 6 000 (USA).
- 24.1.4: Thermal cut-outs that protect heating elements against overheating, incorporated in fan heaters and in stationary heaters intended to be mounted on or near to a wall, other than those for mounting at high level, are to be of the non-self-resetting type (Sweden).
- 25.3: Fixed appliances are to be appliances intended to be permanently connected to fixed wiring (France).

A bilingual version of this publication may be issued at a later date.

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.

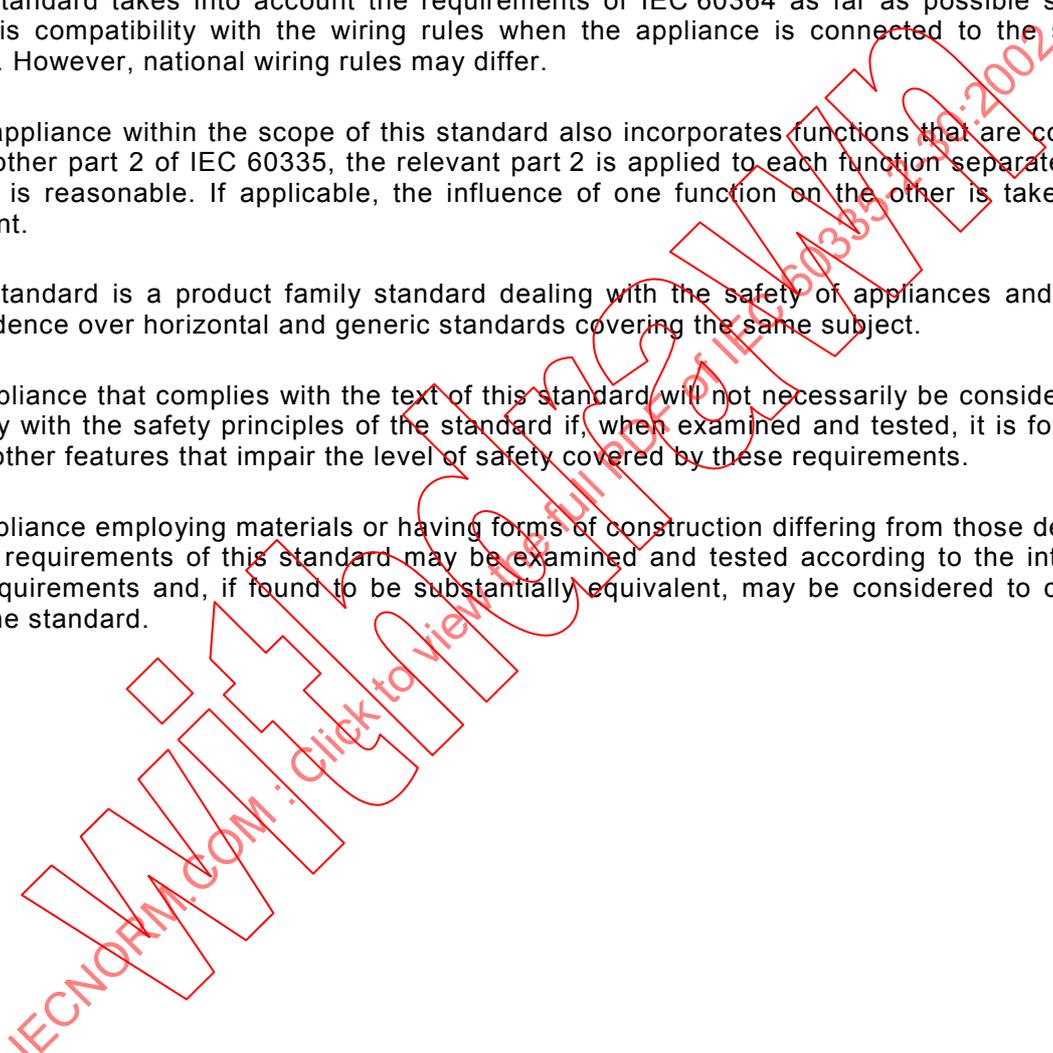
This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

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.

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.

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 that 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.



HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-30: Particular requirements for room heaters

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric room heaters for household and similar purposes, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

NOTE 101 Examples of appliances that are within the scope of this standard are

- convector heaters;
- **fan heaters**;
- heaters for use in greenhouses.
- liquid-filled radiators;
- panel heaters;
- radiant heaters;
- tubular heaters;

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in the shops, in light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances which are encountered by all persons in and around the home. However, in general, it does not take into account

- the use of appliances by young children or infirm persons without supervision;
- playing with the appliance by young children.

NOTE 102 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
- in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour and similar authorities;
- for appliances intended to be used in the presence of combustible dust, for example in barns or stables, additional requirements may be necessary.

NOTE 103 This standard does not apply to

- appliances intended exclusively for industrial purposes;
- appliances intended to be used where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- heaters that are built into air conditioners (IEC 60335-2-40);
- clothes dryers and towel rails (IEC 60335-2-43);
- heaters for saunas (IEC 60335-2-53);
- thermal-storage room heaters (IEC 60335-2-61);
- heating appliances for breeding and rearing animals (IEC 60335-2-71);
- foot warmers and heating mats (IEC 60335-2-81);
- flexible sheet heating elements for room heating (IEC 60335-2-96);
- heated carpets;
- central heating systems;
- heating cables (IEC 60800).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-43, *Household and similar electrical appliances – Safety – Part 2-43: Particular requirements for clothes dryers and towel rails*

ISO 2758, *Paper – Determination of bursting strength*

3 Definitions

This clause of Part 1 is applicable except as follows.

3.101

visibly glowing radiant heater

heater incorporating at least one **visibly glowing heating element**

3.102

fan heater

heater in which the movement of the air over the heating element is assisted by a fan

3.103

heater for mounting at high level

heater intended to be fixed at a height of at least 1,8 m above the floor

3.104

fireguard

that part of the enclosure of a **visibly glowing radiant heater** through which the heating element is normally visible and which is intended to guard against direct access to the heating element

3.105

immediate surround

any surface within 25 mm of the boundary of an air-outlet grille or **fireguard**

NOTE Details of the way in which this distance is determined are shown in Figure 101 for air-outlet grilles and Figure 102 for **fireguards**.

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 *Addition:*

NOTE 101 If heaters are intended to be installed adjacent to each other, a sufficient number are required in order to determine the effects of adjacent heaters on the appliance under test.

5.3 Addition:

The appliance that is used for the tests of Clause 19 is also used for the test of 22.24. The test of 22.24 is carried out after the tests of Clause 29 if it is carried out on the same appliance.

5.6 Addition:

Thermostats sensitive to the room air temperature, such as those having a sensing element located in the air inlet, are short-circuited. However, if the **thermostat** can be set so that it does not cycle, it is not short-circuited.

NOTE 101 For electronic controls it may be necessary to render the sensing element inoperative instead of short-circuiting the **thermostat**.

5.10 Addition:

Heaters intended to be installed adjacent to each other are installed in accordance with the instructions.

5.101 Heaters intended to be used as both **portable appliances** and **fixed appliances** are subjected to the tests applicable to both types of appliances.

5.102 If the heater is a combination of two or more types, it is subjected to the tests relevant for each type, unless the tests for one type cover the other.

*Heaters for wall-mounting are tested both as **heaters for mounting at high level** and as heaters for mounting other than at high level, unless the installation instructions state that the heater has to be installed at least 1,8 m above the floor.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.2 Addition:

Heaters intended for use in greenhouses or building sites shall be at least IPX4.

7 Marking and instructions

This clause of Part I is applicable except as follows.

7.1 Addition:

Heaters intended to be filled with liquid by the user shall be marked with the maximum and minimum liquid levels.

Heaters shall be marked "Do not cover" or with symbol 5641 of IEC 60417-1. This marking is not required for

- **heaters for mounting at high level;**
- **visibly glowing radiant heaters;**
- heaters constructed so that they cannot be covered:
- heaters also intended to dry clothes and which comply with IEC 60335-2-43.

Heaters having a **fireguard** that is intended to be removed for transportation or storage shall be marked to state that the heater must not be operated without this guard in place.

7.6 Addition:



[symbol 5641 of IEC 60417-1]

do not cover

7.12 Addition:

If symbol 5641 of IEC 60417-1 is marked on the appliance, its meaning shall be explained.

The instructions for heaters marked “Do not cover” or with symbol 5641 of IEC 60417-1 shall contain the substance of the following:

WARNING: In order to avoid overheating, do not cover the heater.

The instructions shall state that the heater must not be located immediately below a socket-outlet.

The instructions for heaters with heating elements that are in direct contact with accessible glass panels shall state that the heater must not be used if the glass is damaged.

The instructions for **visibly glowing radiant heaters**, other than **heaters for mounting at high level**, shall include the substance of the following:

Do not use this heater with a programmer, timer or any other device that switches the heater on automatically, since a fire risk exists if the heater is covered or positioned incorrectly.

The instructions for **visibly glowing radiant heaters** having a **fireguard** that can be partly removed without the aid of a **tool** shall include the substance of the following:

- the fireguard of this heater is intended to prevent direct access to heating elements and must be in place when the heater is in use;
- the fireguard does not give full protection for young children and for infirm persons.

The instructions for **portable heaters** shall include the substance of the following:

Do not use this heater in the immediate surroundings of a bath, a shower or a swimming pool.

Instructions shall be provided for cleaning the reflector of **visibly glowing radiant heaters**, if appropriate.

Instructions shall be provided for replacing the lamps of fuel-effect heaters.

The instructions for oil-filled radiators shall include the substance of the following:

- this heater is filled with a precise quantity of special oil. Repairs requiring opening of the oil container are only to be made by the manufacturer or his service agent who should be contacted if there is an oil leak;
- when scrapping the heater, follow the regulations concerning the disposal of oil.

7.12.1 Addition:

The installation instructions for heaters intended to be fixed by screws or other means shall give details on the method of fixing.

The instructions for **stationary visibly glowing radiant heaters** shall warn about the possible danger of installation close to curtains and other combustible materials.

The instructions for **heaters for mounting at high level** shall state that the heater must be installed at least 1,8 m above the floor.

The instructions for **fixed heaters** likely to be used in a bathroom shall state that the heater is to be installed so that switches and other controls cannot be touched by a person in the bath or shower.

If rollers or feet are supplied separately with the heater, the installation instructions shall state how they have to be fixed to the heater.

The instructions for heaters intended to be installed in wardrobes shall give details for proper installation in a wardrobe.

7.14 Addition:

The height of symbol 5641 of IEC 60417-1 shall be at least 15 mm.

The height of the words "Do not cover" shall be at least 3 mm.

Compliance is checked by measurement.

7.15 Addition:

For **heaters for mounting at high level**, the indication of the different positions of switches shall be visible from a distance of 1 m.

The marking concerning covering shall be visible after the heater has been installed. It shall not be placed on the back of **portable heaters**.

The marking concerning removable **fireguards** shall be visible before fitting the **fireguard**.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 Addition:

Detachable fireguards are not removed if their removal requires the use of a **tool**, provided that

- the instructions state that the plug must be removed from the socket-outlet before cleaning the reflector, or
- the heater incorporates a switch having a contact separation in all poles that provides full disconnection under overvoltage category III conditions.

8.1.3 Not applicable.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 Replacement:

Heaters normally placed on the floor are placed in a test corner as follows:

- **portable fan heaters** are placed with the back 150 mm from one of the walls and away from the other wall;
- other heaters are placed on the floor with their back as near to one of the walls as possible and away from the other wall. However, circular and similar heaters that emit heat in several directions are placed 300 mm from one of the walls and away from the other wall. Heaters containing **PTC heating elements** are placed away from the walls if this results in higher temperatures.

NOTE 101 If the back of the heater is not obvious, the heater is orientated in the most unfavourable position.

NOTE 102 For circular and similar heaters, the distance is measured between the wall and the enclosure of the heater.

Fixed heaters are installed in the test corner as follows, unless otherwise specified in the installation instructions:

- **heaters for mounting at high level** are fixed to one of the walls and as near as possible to the other wall and ceiling;
- other heaters for wall mounting are fixed to one of the walls and as near as possible to the other wall and floor. A shelf having a depth of 200 mm and of sufficient length to cover the heater is fixed over the heater. It is positioned as close as possible to the heater;
- heaters for ceiling mounting are fixed to the ceiling as near as possible to the walls.

Built-in heaters are installed as close as possible to a floor or ceiling, unless otherwise specified in the installation instructions.

Dull black-painted plywood approximately 20 mm thick is used for the test corner, the shelf and for installation of **built-in heaters**.

The ceiling of the test corner is covered with insulating material having a coefficient of thermal insulation of approximately 3,2 m²K/W.

If a **fixed heater** has an opening at floor level, a felt pad 20 mm thick is placed on the floor and pushed flat into the opening as far as the construction will permit. If a guard is provided or if the opening is too small to permit the entry of the pad, the pad is pushed as close as possible against the opening.

NOTE 103 The purpose of the felt pad is to simulate a carpet that might restrict the airflow.

Heaters having an air-outlet grille intended to be recessed in a floor, a window-sill or similar location are also tested with the air outlets covered with the felt strips specified in 19.103. The strips are applied at right angles to the longest side of the outlet grilles. The strips are applied to each half of the grille in turn and then to the complete grille.

11.3 Addition:

The temperature rise of the felt pad is determined by means of thermocouples attached to small blackened disks of copper or brass, 15 mm in diameter and 1 mm thick. The disks are placed on the surface of the pad.

11.4 Addition:

If the temperature rise limits are exceeded in appliances incorporating motors, transformers or **electronic circuits**, and the power input is lower than the **rated power input**, the test is repeated with the appliance supplied at 1,06 times **rated voltage**.

11.6 Replacement:

Combined appliances are operated as **heating appliances**.

11.7 Replacement:

Appliances are operated until steady conditions are established.

11.8 Addition:

In Table 3, **stationary heaters** are considered liable to be operated continuously for long periods.

The temperature rise limits of motors, transformers and components of **electronic circuits**, including parts directly influenced by them, may be exceeded when the appliance is operated at 1,15 times **rated power input**.

For liquid-filled radiators, the temperature rise of parts in contact with oil is not measured. However, for unvented liquid-filled radiators, the temperature rise of the outer surface of the liquid container is measured. It shall be at least 50 K less than the boiling point of the liquid.

NOTE 101 The measurement is made even if the container is inside the enclosure of the appliance.

The temperature rise of surfaces of heaters shall not exceed the values shown in Table 101.

Table 101 – Temperature rises for surfaces

Surface	Temperature rise K
Heaters for mounting at high level and fireguards and their immediate surrounds	no limit
Air-outlet grilles ^a and their immediate surrounds that are of metal and accessible to the test rod ^b :	
– fan heaters	175
– other heaters	130
Other surfaces that are accessible to the test rod ^b :	
– if of metal	85
– if of glass, ceramic or similar material	100
Air-outlet grilles of built-in heaters having air outlets in the floor, window-sill or similar locations:	
– if of metal	45
– if of other material	50
Surface of the felt pad	60
<p>^a If the air-outlet grille cannot be identified and the air is emitted through a substantial part of the enclosure, the temperature rise limit of 85 K applies.</p> <p>^b The test rod is 75 mm in diameter, of unrestricted length and with a hemispherical end.</p>	

For heaters intended to be fixed under benches, the temperature rise of surfaces accessible to the test rod shall not exceed the limits specified in Table 3 for parts that are held for short periods only.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 Modification:

Instead of the tests specified, appliances are subjected to the tests of 19.6, 19.11, 19.12 and 19.101 to 19.114, as applicable.

19.13 Addition:

During the test of 19.106, the temperature of the motor windings shall not exceed the values specified in Table 8.

19.101 *Appliances are operated as specified in Clause 11 but the power input is 1,24 times rated power input.*

All thermal controls that operate during the test of Clause 11 are short-circuited simultaneously.

NOTE The pressure in liquid-filled radiators is measured for the test of 22.7.

19.102 *Circular and similar portable heaters that emit heat in several directions are placed as close as possible to one of the walls of the test corner and operated at 1,24 times rated power input.*

NOTE Thermal controls that operate during the test of Clause 11 are allowed to operate.

19.103 *Heaters are operated as specified in Clause 11 but with the appliance covered. This does not apply to*

- **heaters for mounting at high level**, except those intended to be installed in wardrobes;
- **visibly glowing radiant heaters**;
- **portable fan heaters**.

The covering is made with felt strips each having a width of 100 mm and which are lined with a single layer of textile material. The felt has a specific mass of $4 \text{ kg/m}^2 \pm 0,4 \text{ kg/m}^2$ and a thickness of 25 mm. The textile material consists of prewashed double-hemmed cotton sheet having a specific mass between 140 g/m^2 and 175 g/m^2 in the dry condition.

Thermocouples are attached to the back of small blackened disks of copper or brass, 15 mm in diameter and 1 mm thick. The disks are spaced 50 mm apart and placed between the textile material and the felt on the vertical centre line of each strip. The disks are supported to prevent them from sinking into the felt.

The strips are applied with the textile material in contact with the heater so that they cover the top and front surface down to the floor.

The rear surface of the heater is completely covered with strips down to the floor if

- the heater is constructed to stand away from the wall;
- for **fixed heaters**, the gap between the heater and the wall exceeds 30 mm, and the horizontal distance
 - **between** any two fixing points or spaces exceeds 200 mm, or
 - **between** any fixing point or spaces and the end of heater exceeds 100 mm, otherwise the rear surface is covered to a distance of approximately one-fifth of the height of the heater from the top.

The top rear surface of other heaters is covered to a distance of approximately one-fifth of the height of the heater.

The strips are applied to each half of the heater in turn and then to the complete heater.

The temperature rise of the strips shall not exceed 150 K but an over-shoot of 25 K is allowed during the first hour.

NOTE 1 Thermal controls that operate during the test of Clause 11 are allowed to operate.

NOTE 2 The pressure in liquid-filled radiators is measured for the test of 22.7.

Heaters intended to be installed in wardrobes, including **heaters for mounting at high level**, shall comply with the test with any **self-resetting thermal cut-out** short-circuited.

19.104 Built-in heaters having air outlets in the floor, window-sill or similar locations are operated as specified in Clause 11 with the grilles covered. Thermal controls that operate during the test of Clause 11 are short-circuited.

The temperature rise of the strips shall not exceed 150 K but an overshoot of 25 K is allowed during the first hour.

19.105 Heaters having a liquid container that is intended to be filled by the user are operated as specified in Clause 11 but with the container empty.

NOTE Thermal controls that operate during the test of Clause 11 are allowed to operate.

19.106 Fan heaters and other heaters incorporating motors are operated as specified in Clause 11. However, the heater is supplied at **rated voltage** with the motor rotor locked.

NOTE Thermal controls that operate during the test of Clause 11 are allowed to operate.

19.107 Fan heaters having an enclosure substantially of non-metallic material are operated at their **working voltage** as specified in Clause 11 except that the motor is supplied separately at its **working voltage**. Thermal controls that operate during the test of Clause 11 are short-circuited.

When steady conditions are established, the voltage applied to the motor is reduced until the running speed of the motor is just sufficient to prevent a **thermal cut-out** from operating, the voltage applied to the heating elements being maintained at the value used for 11.4.

Under these conditions the heater is again operated until steady conditions are established or for 1 h, whichever is longer.

After this period, the airflow is further restricted to verify that a **thermal cut-out** operates.

NOTE The reduced voltage applied to the motor may be determined as follows. The voltage is reduced by 5 % and the motor is operated under this condition for 5 min. This procedure is repeated until a **thermal cut-out** operates. The voltage is then increased by 5 %, this being the reduced voltage to be used for the test.

19.108 Portable fan heaters are operated as specified in Clause 11.

A rectangular sheet of paper is held against air inlets, without additional pressure. The paper has an area sufficient to cover the surface where air inlets are situated and is moved in any direction in order to restrict the airflow so that the most unfavourable conditions are established.

The paper has a specific mass of $72 \text{ g/m}^2 \pm 2 \text{ g/m}^2$ and a burst index of $3,7 \text{ kPa m}^2/\text{g}$ according to ISO 2758.

The test is carried out for 4 h.

If the enclosure has more than one surface where air inlets are situated, these surfaces are covered in turn.

NOTE 1 Surfaces on the same side of the heater are assumed to be one surface.

NOTE 2 The most unfavourable conditions are usually obtained by positioning the paper so that the **thermal cut-out** is prevented from operating.

NOTE 3 When moving the paper downwards, care is to be taken to ensure that the supporting surface does not limit its movement.

NOTE 4 Thermal controls that operate during the test of Clause 11 are allowed to operate.

19.109 Portable fan heaters are operated as specified in Clause 11, but placed so that the airflow is directed against one of the walls of the test corner. The heater is then moved as near as possible to the wall without the **thermal cut-out** operating. Thermal controls that operate during the test of Clause 11 are short-circuited.

The temperature rise of the wall shall not exceed 150 K.

19.110 Portable visibly glowing radiant heaters are operated as specified in Clause 11 but placed so that the radiation is directed against one of the walls of the test corner. The heater is placed with the **fireguard** 500 mm from the wall and this distance is progressively increased so that the highest wall temperature is measured.

The temperature rise of the wall shall not exceed 70 K.

19.111 Visibly glowing radiant heaters, other than **heaters for mounting at high level**, are operated as specified in Clause 11 but at **rated power input**.

When steady conditions are established, a piece of dry bleached cotton flannelette, 100 mm wide and having a specific mass between 130 g/m^2 and 165 g/m^2 , is held taut against the central part of the **fireguard**. The flannelette is held from the top to the bottom or, for **fireguards** in the horizontal plane, from the back to the front.

The flannelette shall not smoulder or ignite within 10 s.

NOTE If smouldering has started, a hole will have formed in the material with its edge glowing red. Blackening without smouldering is ignored.

19.112 Portable heaters are operated as specified in Clause 11 but placed on a soft-wood surface that is covered with a double layer of bleached cotton gauze having a specific mass of approximately 40 g/m^2 . The heater is then pushed so that it overturns in the most unfavourable position.

NOTE 1 Thermal controls that operate during the test of Clause 11 are allowed to operate.

The cotton gauze or the wood surface shall not smoulder or ignite.

The temperature of the surface of oil-filled radiators shall be at least 40 K lower than the boiling point of the oil. There shall be no deformation of the container, leakage of oil or emission of flames.

NOTE 2 The pressure in liquid-filled radiators is measured for the test of 22.7.

NOTE 3 Subclause 19.13 does not apply.

Fuel effect heaters intended to be placed in a fireplace are not subjected to this test.

19.113 Fan heaters having an enclosure substantially of non-metallic material are operated as specified in Clause 11, except that all **self-resetting thermal cut-outs** and controls that operate during the test of Clause 11 are short-circuited and the fan motor is stalled.

NOTE Motor protectors are not short-circuited.

19.114 A quantity of oil is drained from the container of oil-filled radiators until the oil level is approximately 10 mm above the heating element. The container is then resealed and the appliance operated as specified in Clause 11 but at **rated power input**.

The temperature of the surface of the container shall be at least 40 K lower than the boiling point of the oil.

NOTE In order to avoid hazardous conditions, the test should be terminated if the temperature limit is exceeded.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 Replacement:

Portable heaters shall have adequate stability.

Compliance is checked by the following test.

Heaters incorporating an appliance inlet are fitted with a cord set. The appliance is placed in the most unfavourable normal position of use on a plane inclined at an angle of 15° to the horizontal.

The appliance shall not overturn.

Appliances having a mass exceeding 5 kg are then placed on a horizontal surface. A force of $5\text{ N} \pm 0,1\text{ N}$ is applied to the top of the appliance in the most unfavourable horizontal direction.

The appliance shall not overturn.

NOTE 101 Suitable means may be used to prevent the appliance from sliding.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

Addition:

Compliance is also checked by the tests of 21.101 and 21.102.

For appliances with heating elements that are in direct contact with accessible glass panels, the impact energy of the blows applied to the panel is $2,00 \text{ J} \pm 0,05 \text{ J}$.

21.101 Visibly glowing radiant heaters, other than heaters for mounting at high level, are placed so that the central part of the **fireguard** is horizontal. A mass of 5 kg having a flat base 100 mm in diameter is placed for 1 min on the central part of the **fireguard**.

After the test, the **fireguard** shall show no significant permanent deformation.

21.102 Fixed appliances having a hinged part, the movement of which is restricted by chains or similar means, are fixed and the hinged part is allowed to drop under its own weight. This test is carried out five times.

The heater shall show no damage that could impair compliance with this standard, in particular, compliance with 8.1 and Clause 29 shall not be impaired.

21.103 The suspension means of panel heaters for ceiling mounting shall have adequate strength.

Compliance is checked by suspending load equal to four times the mass of the appliance from the centre of the panel for 1 h. If the suspension means are adjustable, the test is carried out with the means fully extended. If the suspension means are rigid, a torque of 2,5 Nm is applied to the panel for 1 min in each direction.

The suspension means shall show no significant deformation.

22 Construction

This clause of Part 1 is applicable except as follows.

22.7 Replacement:

Appliances containing liquid shall be constructed so that they withstand the pressure likely to occur during use.

Compliance is checked by subjecting the appliance to twice the highest pressure measured during the tests of 19.101, 19.103 and 19.112.

There shall be no leakage of liquid.

22.17 Addition:

The requirement does not apply to rollers or feet if the appliance complies with Clause 19 without these parts in place.

22.24 Replacement:

Bare heating elements shall be supported to prevent excessive displacement occurring during normal use. The rupture of a heating element shall not give rise to a hazard.

Compliance is checked by inspection and by the following tests.

The heating element is cut in the most unfavourable place. The conductors shall not come into contact with **accessible metal parts** or fall out of the appliance.

If coiled heating elements are supported by a string, the conductor is cut at each end close to the points of support. A force of 5 N is applied to the string perpendicular to its axis and midway between the points of support.

The string shall not break.

22.101 Heaters, other than **heaters for mounting at high level**, shall be guarded in order to prevent contact with heating elements.

Compliance is checked by inspection and by the following tests.

Test probe 41 of IEC 61032 is applied with a force not exceeding 5 N to the guard. It shall not touch heating elements.

The openings in **fireguards** are measured and shall not exceed

- a major dimension of 126 mm and a corresponding minor dimension of 12 mm, or
- a major dimension of 53 mm and a corresponding minor dimension of 20 mm.

However, any apertures having a minor dimension of less than 5 mm are ignored. These dimensions also apply to any gap between the **fireguard** and its **immediate surround**.

22.102 **Fireguards** shall have a total open area not less than 50 % of the surface area of the **fireguard**.

Compliance is checked by measurement.

22.103 **Fireguards** shall be securely attached to the heater so that it is not possible to detach them completely without the use of a **tool**.

Compliance is checked by inspection and by manual test.

22.104 Appliances for wall mounting shall be constructed so that they can be securely fixed to a wall.

NOTE Key-hole slots, hooks and similar means, without any further provision to prevent the heater from being inadvertently lifted off the wall, are not considered to be adequate means for fixing the heater securely to the wall.

Compliance is checked by inspection.

22.105 **Accessible glass panels** in direct contact with heating elements shall withstand thermal shock.

Compliance is checked by operating the heater at 1,15 times **rated power input** until steady conditions are established. One litre of water having a temperature of $15\text{ °C} \pm 5\text{ °C}$ is directed onto the central part of the panel at a rate of approximately 10 ml/s through a 5 mm diameter tube.

The panel shall not be damaged.

22.106 **Portable appliances** shall not have openings on the underside that would allow small items to penetrate and touch **live parts**.

Compliance is checked by inspection and by measuring the distance between the supporting surface and **live parts** through openings. This distance shall be at least 6 mm. However, if the appliance is fitted with legs, this distance is increased to 10 mm if the appliance is intended to stand on a table and to 20 mm if it is intended to stand on the floor.

22.107 Visibly glowing radiant heaters intended to be fixed to a wall or ceiling shall be constructed so that the direction of radiation cannot be significantly changed without the use of a **tool** after the heater has been fixed.

Compliance is checked by inspection and by manual test.

NOTE A limited change in the direction of radiation is allowed if the limits are specified in the instructions.

22.108 Visibly glowing radiant heaters, other than **heaters for mounting at high level**, shall not incorporate **thermostats**, timers or similar means which switch on heating elements automatically, unless at least one heating element is already visibly glowing.

Compliance is checked by inspection.

22.109 The disconnection of the supply by a switch in the **off position** shall not rely on **electronic components**.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.3 Addition:

For switches operating during the test of 19.112, the number of cycles of operation is 300.

24.1.4 Modification:

*For **thermostats** of liquid-filled radiators that operate during the test of Clause 11 to limit the surface temperature rise to 85 K, the number of cycles of operation is increased to 100 000.*

*For **self-resetting thermal cut-outs**, the number of cycles of operation is increased to 10 000.*

*For non-self-resetting **thermal cut-outs** operating during the test of 19.112, the number of cycles of operation is increased to 300.*

*For other **non-self-resetting thermal cut-outs**, the number of cycles of operation is increased to 1 000.*

24.101 Devices incorporated in oil-filled radiators in order to comply with 19.114 shall not be self-resetting.

Compliance is checked by inspection.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.7 Addition:

Supply cords of portable heaters intended to be used in greenhouses shall be polychloroprene sheathed flexible cord.

Supply cords of heaters intended to be used on building sites shall not be lighter than heavy polychloroprene sheathed flexible cord (code designation 60245 IEC 66).

NOTE 101 For **portable oil-filled radiators**, metal parts likely to touch the **supply cord** in normal use include those parts that are inaccessible to the 75 mm diameter test rod but may come into contact with the cord when it is wrapped around the heater. This does not apply if storage means for the cord are provided.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 Addition:

For **fan heaters**, the microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.1 Addition:

For **portable fan heaters**, the temperature rises determined during the tests of Clause 19 are not taken into account.

30.2.1 Modification:

The glow-wire test is carried out on enclosures at a temperature of 650 °C.

30.2.2 Not applicable.

30.101 Fan heaters having an enclosure of substantially non-metallic material shall be resistant to fire.

Compliance is checked by inspection and by subjecting the enclosure of the appliance to the needle-flame test of Annex E.

The needle-flame test is not carried out on material classified as V-0 or V-1 according to IEC 60695-11-10, provided that the test sample was no thicker than the relevant part.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

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