



IEC 60335-2-74

Edition 3.1 2024-11  
CONSOLIDATED VERSION

# INTERNATIONAL STANDARD



Household and similar electrical appliances – Safety –  
Part 2-74: Particular requirements for portable immersion heaters

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –****Part 2-74: Particular requirements for portable immersion heaters**

## 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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**This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.**

**IEC 60335-2-74 edition 3.1 contains the third edition (2021-09) [documents 61/6172/CDV and 61/6293/RVC] and its amendment 1 (2024-11) [documents 61/7297/FDIS and 61/7345/RVD].**

**In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.**

IEC 60335-2-74 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This third edition cancels and replaces the second edition published in 2002, Amendment 1: 2006 and Amendment 2:2009. This edition constitutes a technical revision.

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

- a) the text has been aligned with IEC 60335-1:2020;
- b) some notes have been converted to normative text (Clause 1, 7.1);
- c) requirements for appliances that maintain a liquid at a set temperature are added (19.1, 30.2).

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

A list of all parts in the IEC 60335 series, published 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 unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) 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 portable immersion 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 document and its amendment will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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.

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.

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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.

Guidance documents concerning the application of the safety requirements for appliances can be accessed via TC 61 supporting documents on the IEC website

<https://www.iec.ch/tc61/supportingdocuments>

This information is given for the convenience of users of this International Standard and does not constitute a replacement for the normative text in this standard.

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 publications, basic safety publications and group safety publications 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.

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.

NOTE 3 Standards dealing with non-safety aspects of household appliances are:

- IEC standards published by TC 59 concerning methods of measuring performance;
- CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
- CISPR 14-2 concerning electromagnetic immunity;
- IEC standards published by TC 111 concerning environmental matters.

## HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

### Part 2-74: Particular requirements for portable immersion heaters

#### 1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of **portable electric immersion heaters** for household and similar purposes, their **rated voltage** being not more than 250 V including direct current (DC) supplied appliances and **battery-operated appliances**.

Appliances not intended for normal household use but which nevertheless can be a source of danger to the public, such as appliances intended to be used by laymen in 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 that are encountered by all persons in and around the home. However, in general, it does not take into account

- persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledgeprevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

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.

This standard does not apply to

- appliances intended exclusively for industrial purposes;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- heating elements incorporated in **portable appliances**, such as appliances for heating liquids (IEC 60335-2-15);
- aquarium heaters (IEC 60335-2-55);
- fixed immersion heaters (IEC 60335-2-73).
- ~~battery-operated appliances.~~

#### 2 Normative references

This clause of Part 1 is applicable except as follows:

*Addition:*

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

### 3 Terms and definitions

This clause of Part 1 is applicable except as follows.

#### 3.1 Definitions relating to physical characteristics

##### 3.1.9 ~~Replacement~~ Modification:

*Replace the first paragraph with the following:*

operation of the appliance in a vessel filled with water to the minimum depth of immersion

### 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.

#### 5.3 Addition:

*The additional test of 21.1 is carried out before the tests of Clause 8.*

### 6 Classification

This clause of Part 1 is applicable except as follows.

#### 6.2 Addition:

Immersion heaters shall be at least IPX7.

### 7 Marking and instructions

This clause of Part 1 is applicable except as follows.

#### 7.1 Addition:

Appliances, other than those intended to float, shall be marked with the maximum and minimum depths of immersion. This marking may be indicated by lines only.

#### 7.12 Addition:

The instructions shall include the substance of the following:

- details of suitable vessels to be used;
- unplug the immersion heater before removing it from the liquid;
- after unplugging, the heating element will remain hot and should not be touched or placed on combustible surfaces.

The instructions shall state that the appliance is not intended to be operated by means of an external timer or a separate remote-control system.

If the depths of immersion are indicated by lines only, their meaning shall be explained in the instructions.

## 8 Protection against access to live parts

This clause of Part 1 is 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.

### 11.3 Addition:

Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101. The probe is applied with a force of  $4\text{ N} \pm 1\text{ N}$  to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.

The probe may be held in place using a laboratory stand clamp or similar device. Any measuring instrument giving the same results as the probe may be used.

### 11.7 Replacement:

~~Appliances are operated for 15 min after the water temperature has reached 95 °C. However, if this temperature cannot be attained, the immersion heater is operated for 15 min after the water temperature has stabilized, or for 15 min after a thermal control has operated.~~

~~Appliance outlets accessible to the user and socket outlets accessible to the user are loaded with a resistive load that gives the marked outlet load.~~

### Modification:

Replace the first paragraph with the following:

Appliances are operated for 15 min after the water temperature has reached 95 °C. However, if this temperature cannot be attained, the immersion heater is operated for 15 min after the water temperature has stabilized, or for 15 min after a thermal control has operated.

Replace the first dashed item of the third paragraph with the following:

- the **battery** that has been **fully discharged** is charged, while the appliance is operated for 1 h or the time specified, whichever is less, performing its intended function, if allowed by the construction of the appliance;

**11.8 Modification:**

Replace the first paragraph with the following:

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101.

**Table 101 – Maximum temperature rises  
 for specified external accessible surfaces under normal operating conditions**

Surface	Temperature rise of external accessible surfaces <sup>a</sup>
	K
	<i>Other surfaces and surfaces of appliances situated not more than 850 mm above the floor after</i>
Bare metal	42
Coated metal <sup>b</sup>	49
Glass and ceramic	56
Plastic and plastic coating > 0,4 mm <sup>c, d</sup>	62

NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.

<sup>a</sup> Temperature rises are not measured on surfaces that are immersed during normal use or inaccessible to a 75 mm diameter probe having a hemispherical end.

<sup>b</sup> Metal is considered coated when a coating having a minimum thickness of 90 µm made of enamel, powder or non-substantially plastic coating is used.

<sup>c</sup> The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm.

<sup>d</sup> When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.

**12 Charging of metal-ion batteries**

This clause of Part 1 is ~~not~~ applicable.

**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 Addition:

*Only appliances intended to prevent water from freezing in animal troughs and appliances that maintain a liquid at a set temperature are subjected to the tests of 19.4 and 19.5.*

### 19.2 Addition:

*Appliances are placed on the floor of the test corner in the most unfavourable position.*

### 19.13 Addition:

*A temperature rise of 200 K is allowed during the first minute of operation for the walls and floor of the test corner.*

## 20 Stability and mechanical hazards

This clause of Part 1 is applicable.

## 21 Mechanical strength

This clause of Part 1 is applicable except as follows.

### 21.1 Addition:

*The appliance is dropped from a height of 1 m onto a hardwood board having a thickness of 50 mm. It is dropped four times, once on the handle, once on the end of the heating element and twice from a horizontal position.*

## 22 Construction

This clause of Part 1 is applicable.

## 23 Internal wiring

This clause of Part 1 is applicable.

## 24 Components

This clause of Part 1 is applicable except as follows.

**24.101 Thermal cut-outs** incorporated in appliances in order to comply with Clause 19 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.

### **25.5 Modification:**

Appliances shall not be fitted with **type X attachments**.

**Type Z attachment** is allowed.

## **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.

## **30 Resistance to heat and fire**

This clause of Part 1 is applicable except as follows.

### **30.2 Addition:**

~~For appliances intended to prevent water from freezing in animal troughs and appliances that maintain a liquid at a set temperature, 30.2.3 is applicable. For other appliances, 30.2.2 is applicable except as indicated for appliances for remote operation and parts of appliances connected to the supply mains during the charging period.~~

*Modification:*

*Replace the two dashed items with the following:*

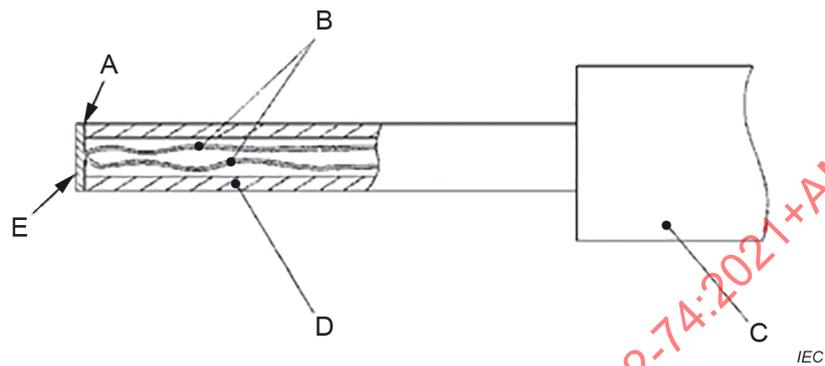
- for appliances intended to prevent water from freezing in animal troughs and appliances that maintain a liquid at a set temperature, 30.2.3 is applicable;*
- for other appliances, 30.2.2 is applicable.*

### 31 Resistance to rusting

This clause of Part 1 is applicable.

### 32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



#### Key

- A adhesive
- B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K
- C handle arrangement permitting a contact force of  $4\text{ N} \pm 1\text{ N}$
- D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm
- E tinned copper disc: 5 mm diameter, 0,5 mm thick with a flat contact face

**Figure 101 – Probe for measuring surface temperatures**

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## Annexes

The annexes of Part 1 are applicable [except as follows](#).

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## Annex B (normative)

### Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances

Annex B of Part 1 is applicable except as follows:

#### B.11.1 Replacement:

*Battery-operated appliances are tested under the conditions of normal operation.*

*For appliances operated with detachable batteries or separable batteries that are disconnected from the appliance for charging purposes, the appliance is operated as specified in 11.7 until it no longer operates due to depletion of the battery. If the battery is depleted before the appliance completes the duration of the test, the depleted battery is immediately replaced with another battery that is fully charged, the battery being the model or type reference of the battery provided or indicated in the instructions. The test is continued until the appliance completes the duration of the test as specified or it no longer operates due to depletion of the battery.*

*For appliances incorporating integral batteries or separable batteries not disconnected from the appliance for charging purposes, and that cannot perform their intended function while the batteries are being charged, the appliance is operated as specified in 11.7 until it cannot perform its intended function due to the depletion of the batteries.*

*For appliances operated with batteries that are replaceable, including integral batteries that are replaceable, or non-rechargeable batteries, the appliance is operated until the minimum capacity of the battery as specified in Table B.1 has been delivered or the appliance completes the duration of the test as specified in 11.7 whichever occurs first.*

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## Bibliography

The bibliography of Part 1 is applicable except as follows.

*Addition:*

IEC 60335-2-15, *Household and similar electrical appliances – Safety – Part 2-15: Particular requirements for appliances for heating liquids*

IEC 60335-2-55, *Household and similar electrical appliances – Safety – Part 2-55: Particular requirements for electrical appliances for use with aquariums and garden ponds*

IEC 60335-2-73, *Household and similar electrical appliances – Safety – Part 2-73: Particular requirements for fixed immersion heaters*

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –****Part 2-74: Particular requirements for portable immersion heaters**

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**This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.**

**IEC 60335-2-74 edition 3.1 contains the third edition (2021-09) [documents 61/6172/CDV and 61/6293/RVC] and its amendment 1 (2024-11) [documents 61/7297/FDIS and 61/7345/RVD].**

**This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.**

IEC 60335-2-74 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This third edition cancels and replaces the second edition published in 2002, Amendment 1: 2006 and Amendment 2:2009. This edition constitutes a technical revision.

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

- a) the text has been aligned with IEC 60335-1:2020;
- b) some notes have been converted to normative text (Clause 1, 7.1);
- c) requirements for appliances that maintain a liquid at a set temperature are added (19.1, 30.2).

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

A list of all parts in the IEC 60335 series, published 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 unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) 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 portable immersion 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 document and its amendment will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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.

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.

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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.

Guidance documents concerning the application of the safety requirements for appliances can be accessed via TC 61 supporting documents on the IEC website

<https://www.iec.ch/tc61/supportingdocuments>

This information is given for the convenience of users of this International Standard and does not constitute a replacement for the normative text in this standard.

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 publications, basic safety publications and group safety publications 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.

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.

NOTE 3 Standards dealing with non-safety aspects of household appliances are:

- IEC standards published by TC 59 concerning methods of measuring performance;
- CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
- CISPR 14-2 concerning electromagnetic immunity;
- IEC standards published by TC 111 concerning environmental matters.

## HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

### Part 2-74: Particular requirements for portable immersion heaters

#### 1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of **portable electric immersion heaters** for household and similar purposes, their **rated voltage** being not more than 250 V including direct current (DC) supplied appliances and **battery-operated appliances**.

Appliances not intended for normal household use but which nevertheless can be a source of danger to the public, such as appliances intended to be used by laymen in 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 that are encountered by all persons in and around the home. However, in general, it does not take into account

- persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledgeprevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

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.

This standard does not apply to

- appliances intended exclusively for industrial purposes;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- heating elements incorporated in **portable appliances**, such as appliances for heating liquids (IEC 60335-2-15);
- aquarium heaters (IEC 60335-2-55);
- fixed immersion heaters (IEC 60335-2-73).

#### 2 Normative references

This clause of Part 1 is applicable except as follows:

*Addition:*

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

### 3 Terms and definitions

This clause of Part 1 is applicable except as follows.

#### 3.1 Definitions relating to physical characteristics

##### 3.1.9 *Modification:*

*Replace the first paragraph with the following:*

operation of the appliance in a vessel filled with water to the minimum depth of immersion

### 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.

#### 5.3 *Addition:*

*The additional test of 21.1 is carried out before the tests of Clause 8.*

### 6 Classification

This clause of Part 1 is applicable except as follows.

#### 6.2 *Addition:*

Immersion heaters shall be at least IPX7.

### 7 Marking and instructions

This clause of Part 1 is applicable except as follows.

#### 7.1 *Addition:*

Appliances, other than those intended to float, shall be marked with the maximum and minimum depths of immersion. This marking may be indicated by lines only.

#### 7.12 *Addition:*

The instructions shall include the substance of the following:

- details of suitable vessels to be used;
- unplug the immersion heater before removing it from the liquid;
- after unplugging, the heating element will remain hot and should not be touched or placed on combustible surfaces.

The instructions shall state that the appliance is not intended to be operated by means of an external timer or a separate remote-control system.

If the depths of immersion are indicated by lines only, their meaning shall be explained in the instructions.

## 8 Protection against access to live parts

This clause of Part 1 is 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.

### 11.3 Addition:

Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101. The probe is applied with a force of  $4\text{ N} \pm 1\text{ N}$  to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.

The probe may be held in place using a laboratory stand clamp or similar device. Any measuring instrument giving the same results as the probe may be used.

### 11.7 Modification:

Replace the first paragraph with the following:

Appliances are operated for 15 min after the water temperature has reached 95 °C. However, if this temperature cannot be attained, the immersion heater is operated for 15 min after the water temperature has stabilized, or for 15 min after a thermal control has operated.

Replace the first dashed item of the third paragraph with the following:

- the **battery** that has been **fully discharged** is charged, while the appliance is operated for 1 h or the time specified, whichever is less, performing its intended function, if allowed by the construction of the appliance;

### 11.8 Modification:

Replace the first paragraph with the following:

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101.

**Table 101 – Maximum temperature rises  
 for specified external accessible surfaces under normal operating conditions**

Surface	Temperature rise of external accessible surfaces <sup>a</sup>
	K
Bare metal	42
Coated metal <sup>b</sup>	49
Glass and ceramic	56
Plastic and plastic coating > 0,4 mm <sup>c, d</sup>	62

*NOTE* The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.

<sup>a</sup> Temperature rises are not measured on surfaces that are immersed during normal use or inaccessible to a 75 mm diameter probe having a hemispherical end.

<sup>b</sup> Metal is considered coated when a coating having a minimum thickness of 90 µm made of enamel, powder or non-substantially plastic coating is used.

<sup>c</sup> The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm.

<sup>d</sup> When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.

## 12 Charging of metal-ion batteries

This clause of Part 1 is applicable.

## 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 Addition:

*Only appliances intended to prevent water from freezing in animal troughs and appliances that maintain a liquid at a set temperature are subjected to the tests of 19.4 and 19.5.*

### 19.2 Addition:

*Appliances are placed on the floor of the test corner in the most unfavourable position.*

### 19.13 Addition:

*A temperature rise of 200 K is allowed during the first minute of operation for the walls and floor of the test corner.*

## 20 Stability and mechanical hazards

This clause of Part 1 is applicable.

## 21 Mechanical strength

This clause of Part 1 is applicable except as follows.

### 21.1 Addition:

*The appliance is dropped from a height of 1 m onto a hardwood board having a thickness of 50 mm. It is dropped four times, once on the handle, once on the end of the heating element and twice from a horizontal position.*

## 22 Construction

This clause of Part 1 is applicable.

## 23 Internal wiring

This clause of Part 1 is applicable.

## 24 Components

This clause of Part 1 is applicable except as follows.

**24.101 Thermal cut-outs** incorporated in appliances in order to comply with Clause 19 shall not be self-resetting.