

# INTERNATIONAL STANDARD



**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 2-73: Particular requirements for fixed immersion heaters

#### FOREWORD

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**This commented version (CMV) of the official standard IEC 60335-2-73:2024 edition 3.0 allows the user to identify the changes made to the previous IEC 60335-2-73:2002+AMD1:2006+AMD2:2009 CSV edition 2.2. Furthermore, comments from IEC TC 61 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.**

**A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.**

**This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.**

IEC 60335-2-73 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, 19.2);
- c) addition of external accessible surface temperatures (Clause 11).

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

Draft	Report on voting
61/6954/CDV	61/7055A/RVC

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

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/publications](http://www.iec.ch/publications).

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 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 fixed 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 will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](https://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 can 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 the amendment 2 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~~ can 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~~ 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. ~~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 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. **1**



## HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

### Part 2-73: Particular requirements for fixed immersion heaters

#### 1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of **fixed electric immersion heaters** for household and similar purposes that are intended for installation in a water tank open to the atmosphere for heating water to a temperature below its boiling point. ~~The~~ with a **rated voltage** ~~is~~ of not more than 250 V for single-phase appliances and 480 V for other appliances including direct current (DC) supplied appliances. **2**

NOTE 101 The water tank ~~may~~ can have alternative means for heating water, such as the circulation of hot water supplied from a separate boiler.

~~NOTE 102~~—Immersion heaters having a **rated power input** up to 25 kW for incorporation as an alternative heating source in central heating boilers are also within the scope of this standard.

Appliances not intended for normal household use but which nevertheless ~~may~~ can be a source of danger to the public, such as appliances intended to be used by ~~laymen~~ laypersons 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 knowledge
 prevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

~~NOTE 103~~—Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements ~~may~~ can be necessary;
- in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

~~NOTE 104~~—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 appliances such as
  - appliances for heating liquids (IEC 60335-2-15);
  - storage water heaters (IEC 60335-2-21);
  - instantaneous water heaters (IEC 60335-2-35);

- aquarium heaters (IEC 60335-2-55);
- portable immersion heaters (IEC 60335-2-74);
- engine preheaters such as those for cars and buses.

## 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: 3 normal operation

Replace the first paragraph with the following:

operation of the appliance after installation in the smallest tank specified, the tank being thermally insulated and filled with water

NOTE 101 to entry **Accessible parts** of the appliance are not thermally insulated.

## 4 General requirement

This clause of Part 1 is applicable. [IEC 60335-2-73:2024](https://standards.iteh.ai/catalog/standards/iec/828f9ac2-e379-4c4c-8a83-21b82a8b1b3d/iec-60335-2-73-2024)

## 5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

### 5.2 Addition:

NOTE 101 Additional appliances ~~may~~ can be required for the tests of Clause 19.

## 6 Classification

This clause of Part 1 is applicable except as follows.

### 6.1 Addition:

Immersion heaters shall be **class I**, **class II** or **class III**.

## 7 Marking and instructions

This clause of Part 1 is applicable except as follows.

### 7.1 ~~Modification~~ Addition:

Appliances for multiple supply shall be marked with their **rated power input** for each supply circuit.

#### ~~Addition:~~

Appliances shall be marked with the substance of "Do not cover".

#### 7.12.1 Addition:

The installation instructions shall include ~~the substance of~~ the following:

- the type and dimensions of the tank in which the immersion heater can be installed;
- the positioning of the immersion heater within the tank;
- a statement that the installer must check that there is water in the tank before the immersion heater is first switched on;
- a statement that the immersion heater is to be installed only in a system where the heating element is always below water level, such as in a cistern-fed tank, if applicable.

## 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.* 4

**11.7** ~~Addition~~-Modification: **5**

Replace the first paragraph with the following:

*Appliances are operated until steady conditions are established. However, the test is terminated after 24 h provided that a thermal control has operated.*

**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.* **6**

**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** ~~Void~~ Charging of metal-ion batteries

This clause of Part 1 is applicable. **7**

**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.

### 19.2 Addition:

*Appliances are operated with the tank empty, any thermal control that operates during the test of Clause 11 being short-circuited.*

~~NOTE 101~~ *If more than one thermal control operates during the test of Clause 11, they are short-circuited in turn.*

*The test is not carried out on immersion heaters intended to be installed in a system where the heating element is always below water level, such as in a cistern-fed tank.*

### 19.4 ~~Modification~~ Addition:

*Appliances are operated with the tank filled with water to at least 10 mm above the highest point of the heating element, or the highest level allowed by the construction.*

*The water temperature shall not exceed 98 °C.*

## 20 Stability and mechanical hazards

This clause of Part 1 is applicable.

## 21 Mechanical strength

This clause of Part 1 is applicable.

## 22 Construction

This clause of Part 1 is applicable except as follows.

**22.101** Appliances shall be supplied with a seal or ~~similar~~ other means to ensure that there is no leakage from the tank after installation.

*Compliance is checked by inspection during the test of Clause 11.*

**22.102** The compartment containing the supply terminals shall be prevented from rotating by more than 180° with respect to the fixed part of the immersion heater.

*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.

**24.101 Thermal cut-outs** incorporated for compliance with Clause 19 shall not be self-resetting. They shall operate independently of the **thermostat**.

*Compliance is checked by inspection.*

### **25 Supply connection and external flexible cords**

This clause of Part 1 is applicable.

### **26 Terminals for external conductors**

This clause of Part 1 is applicable.

### **27 Provision for earthing**

This clause of Part 1 is applicable except as follows.

#### **27.1 Addition:**

Metal parts of **class I immersion heaters** that are in contact with water shall be permanently connected to the earthing terminal.

### **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.

**30.2.2** Not applicable.