

# INTERNATIONAL STANDARD

# IEC 60335-2-21

Edition 5.1  
2004-11

Edition 5:2002 consolidated with amendment 1:2004

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## Household and similar electrical appliances – Safety –

### Part 2-21: Particular requirements for storage water heaters

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International Electrotechnical Commission, 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland  
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: [inmail@iec.ch](mailto:inmail@iec.ch) Web: [www.iec.ch](http://www.iec.ch)



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

#### Part 2-21: Particular requirements for storage water 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 part of International Standard IEC 60335 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This consolidated version of IEC 60335-2-21 consists of the fifth edition (2002) [documents 61/2135/FDIS and 61/2160/RVD] and its amendment 1 (2004) [documents 61/2683/FDIS and 61/2719/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 5.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

The French version of this standard has not been voted upon.

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 storage water 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 the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. 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.

- 6.1: Class 0I appliances are allowed (Japan).
- 6.2: IPX0 water heaters are allowed (France, Portugal, United Kingdom and USA).
- 7.1: Additional markings are required (Australia, New Zealand and South Africa).
- 7.1: The rated pressure is to be marked in pounds per square inch (USA).
- 7.1: Open outlet water heaters are not required to be marked with rated pressure (USA).
- 7.12.1: Additional instructions are required (South Africa).
- 11.7: The test is different (USA).
- 19.1: Water heaters that have all four features and are not liable to be emptied in normal use are not subjected to the test of 19.101 (South Africa).
- 19.1: Appliances incorporating sheathed heating elements are not required to have an outer enclosure of metal but their rated power input is limited to 12 kW (USA).
- 19.101: The test is different (USA).

- 22.101: Pressure reducing valves have to be designed for an inlet pressure of 2 MPa (South Africa).
- 22.101: The minimum rated pressure is 1,0 MPa (Denmark, Finland, Norway and Sweden).
- 22.102: The minimum pressure is 2,1 MPa. The test is not carried out on water heaters having a capacity less than 2 l or on appliances having containers open to the atmosphere (USA).
- 22.103: Closed water heaters have to incorporate a pressure-relief device (Norway).
- 22.103: Closed water heaters have to incorporate a pressure-relief device sensitive to both pressure and temperature that operates before the water temperature reaches 99 °C (Australia and New Zealand).
- 22.103: Closed water heaters having a capacity exceeding 50 l or a rated power input exceeding 2 kW have to incorporate a pressure-relief device sensitive to both pressure and temperature that operates before the water temperature reaches 99 °C (South Africa).
- 22.103: Closed water heaters have to incorporate a temperature relief valve or a combined temperature and pressure-relief valve that operates before the water temperature reaches 100 °C (United Kingdom).
- 22.106: All water heaters have to incorporate a thermal cut-out (India).
- 22.106: The thermal cut-out of single-phase closed water heaters need only provide single-pole disconnection (Japan).
- 22.106: For all closed water heaters, the thermal cut-out is to provide all-pole disconnection (France, Netherlands, Norway and Switzerland).
- 22.109: A tool is not required for draining the appliance (Canada and USA).
- 22.110: Additional requirements apply to plastic or resin-based containers (South Africa).
- 22.112: The temperature limit is 95 °C (South Africa).
- 22.112: The temperature limit is 85 °C (USA).
- 24.101: Thermal cut-outs are required to have a trip-free switching mechanism (USA).
- 24.102: The maximum water temperature is 90 °C (Australia and New Zealand).
- 24.102: The maximum water temperature is 99 °C (Japan, Norway, Portugal, United Kingdom and USA).
- 24.102: The temperature limit of 130 °C is only allowed for closed water heaters having a rated pressure of at least 0,4 MPa (South Africa).

## INTRODUCTION

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

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

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 2-21: Particular requirements for storage water heaters

#### 1 Scope

This clause of Part 1 is replaced by the following.

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

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 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

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

NOTE 101 Attention is drawn to the fact that

- for appliances intended to be used at high altitudes, additional requirements may be necessary;
- 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;
- in many countries regulations exist for the installation of equipment connected to the water mains.

NOTE 102 This standard does not apply to

- appliances for boiling water (IEC 60335-2-15);
- instantaneous water heaters (IEC 60335-2-35);
- commercial dispensing appliances and vending machines (IEC 60335-2-75);
- 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).

#### 2 Normative references

This clause of Part 1 is applicable.

### 3 Definitions

This clause of Part 1 is applicable except as follows.

#### 3.1.9 Replacement:

##### normal operation

operation of the appliance after installation in accordance with the instructions and filled with cold water

#### 3.101

##### storage water heater

**stationary appliance** for heating and storing water in a container and incorporating devices to control the water temperature

#### 3.102

##### closed water heater

unvented **storage water heater** intended to operate at the pressure of the water system, the flow of water being controlled by one or more valves in the outlet system

NOTE 1 A **closed water heater** is shown in Figure 101a.

NOTE 2 The operating pressure may be the output pressure of a reducing or boosting device.

#### 3.103

##### cistern-fed water heater

**storage water heater** that is vented to atmosphere and intended to be supplied by water under gravity from a separate cistern, the flow of water being controlled by one or more valves in the outlet system

NOTE 1 A **cistern-fed water heater** is shown in Figure 101b.

NOTE 2 The water heater may be installed so that the expanded water returns to the cistern.

NOTE 3 In a **cistern-fed water heater**, the pressure in the container results from the column of water in the cistern.

#### 3.104

##### cistern-type water heater

**storage water heater** having a container supplied by water under gravity from a cistern incorporated in the appliance. The expanded water can return to the cistern, the flow of water being controlled by one or more valves in the outlet system

NOTE 1 A **cistern-type water heater** is shown in Figure 101c.

NOTE 2 In a **cistern-type water heater**, the surface of the water is always at atmospheric pressure.

#### 3.105

##### open-outlet water heater

**storage water heater** in which the flow of water is only controlled by a valve in the inlet pipe and in which the expanded or displaced water flows through the outlet

NOTE 1 An **open-outlet water heater** is shown in Figure 101d.

NOTE 2 In an **open-outlet water heater**, the static pressure at the outlet is always at atmospheric pressure.