

INTERNATIONAL STANDARD

IEC 60335-1

2001

AMENDMENT 1
2004-03

Amendment 1

**Household and similar electrical appliances –
Safety –**

**Part 1:
General requirements**

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*

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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 Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
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FOREWORD

This amendment has been prepared by technical committee 61: Safety of household and similar electrical appliances.

The text of this amendment is based on the following documents:

FDIS	Report on voting
61/2569/FDIS	61/2639/RVD

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

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2006. At this date, the publication will be

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- withdrawn;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

CONTENTS

Replace the title of Annex D by the following new title:

Thermal motor protectors

Add the following new titles to the list of annexes:

Annex P (informative) Guidance for the application of this standard to appliances used in damp warm equable climates

Annex Q (informative) Sequence of tests for the evaluation of electronic circuits

Annex R (normative) Software evaluation

Replace the title of Figure 5 by the word "Void".

Replace the title of Table 10 by the following title:

Dimensions of cables and conduits

FOREWORD

Replace the third and fourth paragraphs below the table by the following:

Annexes B, C, D, E, F, G, H, I, J, K, M, N and R form an integral part of this standard.

Annexes A, L, O, P and Q are for information only.

In Note 1, *replace* "Proof tracking tests" *by* "Proof tracking test".

Add to Note 1 the following item:

- Annex R Software evaluation IEC 60730-1

In the list of differences existing in some countries add the following new items:

- 19.11: Different tests are carried out to evaluate solid state devices used in protective electronic circuits (USA).
- 22.46: The evaluation of software is different (USA).
- 29.3 The third dashed item of the test specification does not apply (Germany).

Renumber the existing item “Clause 21” as “21.1”.

INTRODUCTION

Replace the second sentence of the second paragraph by the following:

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.

1 Scope

Delete the second dashed item of Note 2.

2 Normative references

Delete from the existing list the following normative references:

IEC 60051-2

IEC 60065

IEC 60998-2-1

IEC 60998-2-2

IEC 61643

ISO 1463

ISO 2178

Replace the reference to IEC 60112:1979, by the following new reference:

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

Replace the undated references to IEC 60249-2-4 and IEC 60249-5 by the following dated reference:

IEC 60249-2-4:1987, *Base materials for printed circuits – Part 2: Specifications – Specification No. 4: Epoxide woven glass fabric copper-clad laminated sheet, general purpose grade*

Amendment 1 (1989)

Amendment 2 (1992)

Amendment 3 (1993)

Amendment 4 (1994)

Amendment 5 (2000)

IEC 60249-2-5:1987, *Base materials for printed circuits – Part 2: Specifications – Specification No. 5: Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test)*

Amendment 1 (1989)

Amendment 2 (1992)

Amendment 3 (1993)

Amendment 4 (1994)

Amendment 5 (2000)

Replace “IEC 60320-1:1994, ...” by “IEC 60320-1, ...”

Replace the publication date of IEC 60598-1 by 2003

Replace the reference to IEC 60664-1:1992 by the following:

IEC 60664-1:1992, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

Amendment 1 (2000)

Amendment 2 (2002)¹

Replace « IEC 60695-11-10:1999, ... » by « IEC 60695-11-10, ... »

Replace the non-dated reference to IEC 60999-1 by the following dated reference:

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm² up to 35 mm² (included)*

Replace the reference to IEC 61058-1 by the following reference:

IEC 61058-1:2000, *Switches for appliances – Part 1: General requirements*

Amendment 1 (2001)²

Add the following new references:

IEC 60068-2-2, *Environmental testing – Part 2 Tests. Tests B: Dry heat*

IEC 60320-2-2, *Appliance couplers for household and similar general purposes – Part 2-2: Interconnection couplers for household and similar equipment*

¹ There exists a consolidated edition 1.2 (2002) that includes edition 1 and its amendments 1 and 2.

² There exists a consolidated edition 3.1 (2001) that includes edition 3 and its amendment 1.

IEC 60730-2-8:2000, *Automatic electrical controls for household and similar use – Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-11:1994, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 11: Voltage dips, short interruptions and voltage variations immunity tests*
Amendment 1 (2000)³

IEC 61000-4-13, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests*

IEC 61770, *Electric appliances connected to the water mains – Avoidance of backsiphonage and failure of hose-sets*

Replace the reference to IEC 60417 as follows:

IEC 60417-DB:2002⁴, *Graphical symbols for use on equipment*

Replace the publication date of ISO 9772 by “2001”.

3 Definitions

Add the following new paragraph before the definitions:

An Index of the defined terms is provided at the end of this publication.

3.5.4 fixed appliance

Delete the note.

³ There exists a consolidated edition 1.1 (2001) including Edition 1 and its Amendment 1.

⁴ DB refers to the IEC on-line database.

3.8.2 off position

Add the following at the end of the definition:

or, for electronic disconnection, the circuit is de-energized

Add the following new definitions:

3.1.11

dangerous malfunction

unintended operation of the appliance that may impair safety

3.9.3

protective electronic circuit

electronic circuit that prevents a hazardous situation under abnormal operating conditions

NOTE Parts of the circuit may also be used for functional purposes.

3.9.4

software class B

software that includes code intended to prevent hazards if a fault, other than a software fault, occurs in the appliance

3.9.5

software class C

software that includes code intended to prevent hazards without the use of other **protective devices**

5 General conditions for the tests

5.2 *Add the following new paragraph after the fourth paragraph of Note 1:*

If the test of Annex D has to be carried out, an additional appliance may be used.

5.3 *Replace the last sentence of the first paragraph by the following:*

The tests of Clause 14 and 21.2 and 22.24 are carried out after the tests of Clause 29.

5.14 *Add the following note:*

NOTE Guidance is given in Annex P for enhanced requirements that may be used to ensure an acceptable level of protection against electrical and thermal hazards for particular types of appliances used in an installation without a protective earthing conductor in countries that have warm damp equable climates.

7 Marking and instructions

7.1 *Add the following:*

The enclosure of electrically-operated water valves incorporated in external hose-sets for connection of an appliance to the water mains shall be marked with symbol IEC 60417-5036 (DB:2002-10) if their **working voltage** exceeds **extra-low voltage**.

7.6 Add the following:

[symbol IEC 60417-5021 (DB:2002-10)]

equipotentiality



[symbol IEC 60417-5036 (DB:2002-10)]

dangerous voltage

7.12.4 Replace the last dashed item by the following:

- necessity to allow disconnection of the appliance from the supply after installation, unless the appliance incorporates a switch complying with 24.3. The disconnection may be achieved by having the plug accessible or by incorporating a switch in the fixed wiring in accordance with the wiring rules.

Add the following new subclauses:

7.12.6 The instructions for **heating appliances** incorporating a **non-self-resetting thermal cut-out** that is reset by disconnection of the supply mains shall contain the substance of the following:

CAUTION: In order to avoid a hazard due to inadvertent resetting of the thermal cutout, this appliance must not be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly switched on and off by the utility.

Compliance is checked by inspection.

7.12.7 The instructions for **fixed appliances** shall state how the appliance is to be fixed to its support.

NOTE The method of fixing is not to depend on the use of adhesives since they are not considered to be a reliable fixing means.

Compliance is checked by inspection.

7.12.8 The instructions for appliances connected to the water mains shall state

- the maximum inlet water pressure, in pascals;
- the minimum inlet water pressure, in pascals, if this is necessary for the correct operation of the appliance.

The instructions for appliances connected to the water mains by **detachable hose-sets** shall state that the new hose-sets supplied with the appliance are to be used and that old hose-sets should not be reused.

Compliance is checked by inspection.

8 Protection against access to live parts

8.1.4 Add the following to the last paragraph of the test specification:

The quantity of electricity in the discharge is measured using a resistor having a nominal non-inductive resistance of 2 000 Ω .

Number the existing note as Note 1 and add the following note:

NOTE 2 The quantity of electricity is calculated from the sum of all areas recorded on the voltage/time graph without taking voltage polarity into account.

11 Heating

11.8 Add to the second paragraph:

However, components in **protective electronic circuits** are allowed to operate provided they are tested for the number of cycles of operation specified in 24.1.4.

Table 3 – Maximum normal temperature rises

Replace the third paragraph of table footnote b by the following:

The temperature rise limit does not apply to switches or controls tested in accordance with the conditions occurring in the appliance.

13 Leakage current and electric strength at operating temperature

13.3 Replace the first paragraph by the following:

The appliance is disconnected from the supply and the insulation is immediately subjected to a voltage having a frequency of 50 Hz or 60 Hz for 1 min, in accordance with IEC 61180-1.

The high-voltage source used for the test is to be capable of supplying a short circuit current I_s between the output terminals after the output voltage has been adjusted to the appropriate test voltage. The overload release of the circuit is not to be operated by any current below the tripping current I_r . The values of I_s and I_r are given in Table 5 for various high-voltage sources.

Table 4

Replace the existing Table 4 by the following new table:

Table 4 – Voltage for electric strength test

Insulation	Test voltage V			
	Rated voltage ^a			Working voltage (U)
	SELV	≤150 V	>150 V and ≤250 V ^b	>250 V
Basic insulation	500	1 000	1 000	1,2 U + 700
Supplementary insulation		1 250	1 750	1,2 U + 1 450
Reinforced insulation		2 500	3 000	2,4 U + 2 400

^a For multi-phase appliances, the line to neutral or line to earth voltage is used for **rated voltage**. The test voltage for 480 V multi-phase appliances is that specified for a **rated voltage** in the range > 150 V and ≤ 250 V.

^b For appliances having a **rated voltage** ≤ 150 V, these test voltages apply to parts having a **working voltage** > 150 V ≤ 250 V.

Delete the fourth paragraph, commencing with "Initially, not more...".

Delete Note 3.

Table 5

Replace the existing Table 5 by the following new table:

Table 5 – Characteristics of high-voltage sources

Test voltage V	Minimum current mA	
	I_s	I_r
≤4 000	200	100
>4 000 and ≤10 000	80	40
>10 000 and ≤20 000	40	20

NOTE The currents are calculated on the basis of the short circuit and release energies of 800 VA and 400 VA respectively at the upper end of the voltage ranges

14 Transient overvoltages

Table 6

Replace the existing Table 6 by the following new table:

Table 6 – Impulse test voltage

<i>Rated impulse voltage</i>	<i>Impulse test voltage</i>
V	V
330	350
500	550
800	910
1 500	1 750
2 500	2 950
4 000	4 800
6 000	7 300
8 000	9 800
10 000	12 300

Replace the existing Note 2 by the following new note:

NOTE 2 The impulse test voltages have been calculated using correction factors for testing at locations situated at sea level. It is considered that they are appropriate for any location between sea level and 500 m. If tests are carried out at other locations, other correction factors should be used as noted in subclause 4.1.1.2.1.2 of IEC 60664-1.

15 Moisture resistance

15.1.1 Add the following:

Water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains are subjected to the test specified for IPX7 appliances.

15.1.2 Add the following after the seventh paragraph:

Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support that is constructed to prevent water spraying onto its top surface. The pivot axis of the oscillating tube is located at the same level as the underside of the support and aligned centrally with the appliance. The spray is directed upwards.

For IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min.

16 Leakage current and electric strength

Table 7

Replace the existing Table 7 by the following new table:

Table 7 – Test voltages

Insulation	Test voltage V			
	Rated voltage ^a			Working voltage (U)
	SELV	≤150 V	>150 V and ≤250 V ^b	>250 V
Basic insulation	500	1 250	1 250	1,2 U + 950
Supplementary insulation	–	1 250	1 750	1,2 U + 1 450
Reinforced insulation	–	2 500	3 000	2,4 U + 2 400

^a For multi-phase appliances, the line to neutral or line to earth voltage is used for **rated voltage**. The test voltage for 480 V multi-phase appliances is that specified for a **rated voltage** in the range > 150 V and ≤ 250 V.

^b For appliances having a **rated voltage** ≤ 150 V, these test voltages apply to parts having a **working voltage** > 150 V and ≤ 250 V.

19 Abnormal operation

19.1 In the second paragraph, replace “dangerous malfunction” by “**dangerous malfunction**”.

19.2 Add the following note:

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

19.3 Add the following note:

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

19.7 Replace the text of Note 2 by “Void”.

19.9 Delete Note 2.

19.11 Replace the second paragraph of the test specification by the following:

Appliances incorporating a **protective electronic circuit** are subjected to the tests of 19.11.3 and 19.11.4.

Appliances having a switch with an **off position** obtained by electronic disconnection, or a switch that can place the appliance in a stand-by mode, are subjected to the tests of 19.11.4.

NOTE 1a The sequence of tests for the evaluation of **electronic circuits** is given in Annex Q.

19.11.1 In the second dashed item, replace “dangerous malfunction” by “**dangerous malfunction**”.

19.11.2 Delete the second sentence of item f), commencing with “In this case the possible hazardous”

Replace the last paragraph by the following:

In each case, the test is ended if a non-self-resetting interruption of the supply occurs within the appliance.