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INTERNATIONAL STANDARD

NORME INTERNATIONALE

GROUP SAFETY PUBLICATION PUBLICATION GROUPÉE DE SÉCURITÉ

Audio, video and similar electronic apparatus - Safety requirements

Appareils audio, vidéo et appareils électroniques analogues – Exigences de sécurité





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Audio, video and similar electronic apparatus – Safety requirements

Appareils audio, vidéo et appareils électroniques analogues - Exigences de sécurité

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

AUDIO, VIDEO AND SIMILAR ELECTRONIC APPARATUS – SAFETY REQUIREMENTS

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International Standard IEC 60065 has been prepared by IEC technical committee 92: Safety of audio, video and similar electronic equipment.

It has the status of a group safety publication in accordance with IEC Guide 104.

This consolidated version of IEC 60065 consists of the seventh edition (2001) [documents 92/85/FDIS and 92/89/RVD], its amendment 1 (2005) [documents 108/136/FDIS and 108/148A/RVD], its amendment 2 (2010) [documents 108/395/FDIS and 108/414/RVD] and its corrigendum of August 2002.

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

It bears the edition number 7.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

In this standard, the following print types are used:

- requirements proper: roman type
- test specifications: italic type
- NOTES: smaller roman type

For terms defined in clause 2, SMALL CAPITALS are used.

Annexes A, B, C, D, E, F, G, H, J, K and L form an integral part of this standard.

Annexes M and N are for information only.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability 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

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- reconfirmed, •
- withdrawn, •
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- amended. •

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INTRODUCTION

Principles of safety

General

This introduction is intended to provide an appreciation of the principles on which the requirements of this standard are based. Such an understanding is essential in order that safe apparatus can be designed and manufactured.

The requirements of this standard are intended to provide protection to persons as well as to the surroundings of the apparatus.

Attention is drawn to the principle that the requirements, which are standardized, are the minimum considered necessary to establish a satisfactory level of safety.

Further development in techniques and technologies may entail the need for future modification of this standard.

NOTE The expression "protection to the surroundings of the apparatus" implies that this protection should also include protection of the natural environment in which the apparatus is intended to be used, taking into account the life cycle of the apparatus, i.e. manufacturing, use, maintenance, disposal and possible end-of-life recycling of parts of the apparatus.

Hazards

The application of this standard is intended to prevent injury or damage due to the following hazards:

- electric shock;
- excessive temperatures;
- radiation;
- implosion;
- mechanical hazards;
- fire.

Electric shock

Electric shock is due to current passing through the human body. Currents of the order of a milliampere can cause a reaction in persons in good health and may cause secondary risks due to involuntary reaction. Higher currents can have more damaging effects. Voltages below certain limits are generally regarded as not dangerous under specified conditions. In order to provide protection against the possibility of higher voltages appearing on parts that may be touched or handled, such parts are either earthed or adequately insulated.

For parts which can be touched, two levels of protection are normally provided to prevent electric shock caused by a single fault. Thus a single fault and any consequential faults will not create a hazard. The provision of additional protective measures, such as SUPPLEMENTARY INSULATION or protective earthing, is not considered a substitute for, or a relief from, properly designed BASIC INSULATION.

Cause

Contacts with parts normally at hazardous voltage.

Breakdown of insulation between parts normally at hazardous voltage and accessible parts.

Breakdown of insulation between parts normally at hazardous voltage and circuits normally at non-hazardous voltages, thereby putting accessible parts and terminals at hazardous voltage.

Touch current from parts at hazardous voltage through the human body. (Touch current can include current due to RFI filter components connected between mains supply circuits and accessible parts or terminals.)

Prevention

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Prevent access to parts at hazardous voltage by fixed or locked covers, interlocks, etc. Discharge capacitors at hazardous voltages.

Either use double or reinforced insulation between parts normally at hazardous voltages and accessible parts so that breakdown is not likely to occur, or connect accessible conductive parts to protective earth so that the voltage which can develop is limited to a safe value. The insulations shall have adequate mechanical and electrical strength.

Segregate hazardous and non-hazardous voltage circuits either by double or reinforced insulation so that breakdown is not likely to occur, or by a protective earthed screen, or connect the circuit normally at non-hazardous voltage to protective earth, so that the voltage which can develop is limited to a safe value.

Limit touch current to a safe value or provide a protective earthing connection to the accessible parts.

Excessive temperatures

Requirements are included to prevent injury due to excessive temperatures of accessible parts, to prevent damaging of insulation due to excessive internal temperatures, and to prevent mechanical instability due to excessive temperatures developed inside the apparatus.

Radiation

Requirements are included to prevent injury due to excessive energy levels of ionizing and laser radiation, for example by limiting the radiation to non-hazardous values.

Implosion

Requirements are included to prevent injury due to implosion of picture tubes.

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Mechanical hazards

Requirements are included to ensure that the apparatus and its parts have adequate mechanical strength and stability, to avoid the presence of sharp edges and to provide guarding or interlocking of dangerous moving parts.

Fire

A fire can result from:

- heat;
- arcing;

caused by

- overloads;
- component failure;
- insulation breakdown;
- bad connections;
- conductor breakage.

Requirements are included that are intended to prevent fire originating within the apparatus from spreading beyond the immediate vicinity of the source of the fire or from causing damage to the surroundings of the apparatus.

The following preventive measures are recommended:

- the use of suitable components and subassemblies;
- the prevention of excessive temperature rise that might cause ignition under normal or fault conditions;
- the use of measures to eliminate POTENTIAL IGNITION SOURCES such as inadequate contacts, bad connections, interruptions;
- the limitation of the quantity of combustible material used;
- the control of the position of combustible materials in relation to POTENTIAL IGNITION SOURCES;
- the use of materials with high resistance to fire in the vicinity of POTENTIAL IGNITION SOURCES;

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- the use of encapsulation or barriers to limit the spread of fire within the apparatus;
- the use of suitable fire retardant materials for the enclosure.

AUDIO, VIDEO AND SIMILAR ELECTRONIC APPARATUS – SAFETY REQUIREMENTS

1 General

1.1 Scope

1.1.1 This International Safety Standard applies to electronic apparatus designed to be fed from the MAINS, from a SUPPLY APPARATUS, from batteries or from REMOTE POWER FEEDING and intended for reception, generation, recording or reproduction respectively of audio, video and associated signals. It also applies to apparatus designed to be used exclusively in combination with the above-mentioned apparatus.

This standard primarily concerns apparatus intended for household and similar general use but which may also be used in places of public assembly such as schools, theatres, places of worship and the workplace. PROFESSIONAL APPARATUS intended for use as described above is also covered unless falling specifically within the scope of other standards.

This standard concerns only safety aspects of the above apparatus; it does not concern other matters, such as style or performance.

This standard applies to the above-mentioned apparatus, if designed to be connected to the TELECOMMUNICATION NETWORK or similar network, for example by means of an integrated modem.

Some examples of apparatus within the scope of this standard are:

- receiving apparatus and amplifiers for sound and/or vision;
- independent LOAD TRANSDUCERS and SOURCE TRANSDUCERS;
- SUPPLY APPARATUS intended to supply other apparatus covered by the scope of this standard;
- ELECTRONIC MUSICAL INSTRUMENTS, and electronic accessories such as rhythm generators, tone generators, music tuners and the like for use with electronic or non-electronic musical instruments;
- audio and/or video educational apparatus;
- video projectors;

NOTE 1 Film projectors, slide projectors, overhead projectors are covered by IEC 60335-2-56 [5]¹

- video cameras and video monitors;
- video games and flipper games;
- juke boxes;
- electronic gaming and scoring machines;

NOTE 2 Video games, flipper games and gaming machines and other amusement games for commercial use are covered by IEC 60335-2-82 [6].

¹ Figures in square brackets refer to the bibliography.

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- teletext equipment;
- record and optical disc players;
- tape and optical disc recorders;
- antenna signal converters and amplifiers;
- antenna positioners;
- Citizen's Band apparatus;
- apparatus for IMAGERY;
- electronic light effect apparatus;
- apparatus for use in alarm systems;
- intercommunication apparatus, using low voltage MAINS as the transmission medium;
- cable head-end receivers;
- multimedia apparatus;

NOTE 3 The requirements of IEC 60950 may also be used to meet the requirements for safety of multi media apparatus (see also IEC Guide 112 [16])

- professional general use amplifiers, record or disc players, tape players, recorders, and public address systems;
- professional sound/video systems;
- electronic flash apparatus for photographic purposes (see Annex L).

1.1.2 This standard applies to apparatus with a RATED SUPPLY VOLTAGE not exceeding

- 250 V a.c. single phase or d.c. supply;
- 433 V a.c. in the case of apparatus for connection to a supply other than single-phase.

1.1.3 This standard applies to apparatus for use at altitudes not exceeding 2 000 m above sea level, primarily in dry locations and in regions with moderate or tropical climates.

For apparatus with protection against splashing water, additional requirements are given in annex A.

For apparatus to be connected to TELECOMMUNICATION NETWORKS, additional requirements are given in annex B.

For apparatus intended to be used in vehicles, ships or aircraft, or at altitudes exceeding 2 000 m above sea level, additional requirements may be necessary.

NOTE See Table A.2 of IEC 60664-1.

Requirements, additional to those specified in this standard, may be necessary for apparatus intended for special conditions of use.

1.1.4 For apparatus designed to be fed from the MAINS, this standard applies to apparatus intended to be connected to a MAINS supply with transient overvoltages not exceeding overvoltage category II according to IEC 60664-1.

For apparatus subject to transient overvoltages exceeding those for overvoltage category II, additional protection may be necessary in the MAINS supply of the apparatus.

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60027 (all parts), *Letter symbols to be used in electrical technology* IEC 60038:1983, *IEC standard voltages* Amendment 1 (1994) Amendment 2 (1997)

IEC 60068-2-6:1995, Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)

IEC 60068-2-32:1975, Environmental testing – Part 2: Tests – Test Ed: Free fall (Procedure 2)

IEC 60068-2-75:1997, Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests

IEC 60068-2-78:2001, Environmental testing – Part 2: Tests – Test Cab: Damp heat, steady state

IEC 60085:2004, Thermal evaluation and classification of electrical insulation

IEC 60086-4:2000, Primary batteries – Part 4: Safety of lithium batteries

IEC 60107-1:1997, Methods of measurement on receivers for television broadcast transmissions – Part 1: General considerations – Measurements at radio and video frequencies

IEC 60112:2003, Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions

IEC 60127 (all parts), Miniature fuses

IEC 60167:1964, Methods of test for the determination of the insulation resistance of solid insulating materials

IEC 60216 (all parts), Guide for the determination of thermal endurance properties of electrical insulating materials

IEC 60227 (all parts), Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V

IEC 60245 (all parts), Rubber insulated cables – Rated voltages up to and including 450/750 V

IEC 60249-2 (all specifications), Base materials for printed circuits – Part 2: Specifications

IEC 60268-1:1985, Sound system equipment – Part 1: General

IEC 60317 (all parts), Specifications for particular types of winding wires

IEC 60320 (all parts), Appliance couplers for household and similar general purposes

IEC 60335-1:2001, Household and similar electrical appliances – Safety – Part 1: General requirements Amendment 1 (2004)

IEC 60384-1:1999, Fixed capacitors for use in electronic equipment – Part 1: Generic specification

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IEC 60384-14:1993, Fixed capacitors for use in electronic equipment – Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains

Amendment 1 (1995)

IEC 60417 (all parts), Graphical symbols for use on equipment

IEC 60454 (all parts), Specifications for pressure-sensitive adhesive tapes for electrical purposes

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)* Amendment 1 (1999)

IEC 60664-1:1992, Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests Amendment 1 (2000) Amendment 2 (2002)

IEC 60664-3:2003, Insulation coordination for equipment within low-voltage systems – Part 3: Use of coatings to achieve insulation coordination of printed board assemblies

IEC 60691:2002, Thermal links – Requirements and application guide

IEC 60695-11-5:2004, Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance

IEC 60695-11-10:1999, Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods Amendment 1 (2003) ²

IEC 60730 (all parts), Automatic electrical controls for household and similar use

IEC 60747-5-5:2007, Semiconductor devices – Discrete devices – Part 5-5: Optoelectronic devices – Photocouplers

IEC 60825-1:2007, Safety of laser products – Part 1: Equipment classification and requirements

IEC 60851-3:1996, *Methods of test for winding wires – Part 3: Mechanical properties* Amendment 1 (1997)

IEC 60851-5:1996, *Methods of test for winding wires – Part 5: Electrical properties* Amendment 1 (1997) Amendment 2 (2004)

IEC 60851-6:1996, Methods of test for winding wires – Part 6: Thermal properties

IEC 60884 (all parts), Plugs and socket-outlets for household and similar purposes

IEC 60885-1:1987, Electrical test methods for electric cables – Part 1: Electrical tests for cables, cords and wires for voltages up to and including 450/750 V

IEC 60906 (all parts), *IEC system of plugs and socket-outlets for household and similar purposes*

IEC 60950:1999, Safety of information technology equipment

² A consolidated edition (1.1) exists, including IEC 60695-11-10:1999 and its Amendment 1.

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IEC 60990:1999, Methods of measurement of touch current and protective conductor current

IEC 60998-2-2:2002, Connecting devices for low-voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units

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)

IEC 61032:1997, Protection of persons and equipment by enclosures – Probes for verification

IEC 61051-2:1991, Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors

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

IEC/TR2 61149:1995, Guide for safe handling and operation of mobile radio equipment

IEC 61260:1995, Electroacoustics – Octave-band and fractional-octave-band filters

IEC 61293:1994, Marking of electrical equipment with ratings related to electrical supply – Safety requirements

IEC 61558-1:1997, Safety of power transformers, power supply units and similar – Part 1: General requirements and tests ³ Amendment 1 (1998)

IEC 61558-2-17:1997, Safety of power transformers, power supply units and similar – Part 2-17: Particular requirements for transformers for switch mode power supplies

IEC 61965:2003, Mechanical safety of cathode ray tubes

IEC 62151:2000, Safety of equipment electrically connected to a telecommunication network

IEC Guide 104:1997, The preparation of safety publications and the use of basic safety publications and group safety publications

ISO 261:1973, ISO general purpose metric screw threads – General plan

ISO 262:1973, ISO general-purpose metric screw threads – Selected sizes for screws, bolts and nuts

ISO 306:1994, Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST)

ISO 7000:1989, Graphical symbols for use on equipment – Index and synopsis

ITU-T Recommendation K17:1988, Tests on power-fed repeaters using solid-state devices in order to check the arrangements for protection from external interference

ITU-T Recommendation K21:1996, Resistibility of telecommunication equipment installed in customer's premises to overvoltages and overcurrents

³ There exists a consolidated edition 1.1 (1998) that includes edition 1.0 and its amendment 1.