

INTERNATIONAL STANDARD



**Cable networks for television signals, sound signals and interactive services –
Part 11: Safety**

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IEC 60728-11:2010

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INTERNATIONAL STANDARD



**Cable networks for television signals, sound signals and interactive services –
Part 11: Safety**

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COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CABLE NETWORKS FOR TELEVISION SIGNALS,
SOUND SIGNALS AND INTERACTIVE SERVICES –****Part 11: Safety**

FOREWORD

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International Standard IEC 60728-11 has been prepared by technical area 5: Cable networks for television signals, sound signals and interactive services, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This third edition cancels and replaces the second edition published in 2005. This edition constitutes a technical revision.

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

- The list of "differences in some countries" was transferred from the "Foreword" to informative Annex D.
- Some new terms and definitions were added.
- All Figures were reworked among other things concerning equipotential bonding and earthing details and were incorporated in the text at the appropriate places.

- Clause 11 "Protection against atmospheric overvoltages and elimination of potential differences" was completely reworked and re-structured taking into account among other things the provisions and requirements of the IEC 62305 series on "Lightning protection".
- New informative Annex A on "Earth loop impedance" was added.
- New informative Annex C on "Examples of calculation of risk due to lightning" was added.
- Former Annex B on "Special conditions using IT power line networks" was re-worded and incorporated in Annex D as "Difference in Norway".

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

FDIS	Report on voting
100/1679/FDIS	100/1708/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all the parts of the IEC 60728 series, under the general title *Cable networks for television signals, sound signals and interactive services*, can be found on the IEC website.

The committee has decided that the contents of this publication 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

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

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Standards of the IEC 60728 series deal with cable networks including equipment and associated methods of measurement for headend reception, processing and distribution of television signals, sound signals and their associated data signals and for processing, interfacing and transmitting all kinds of signals for interactive services using all applicable transmission media.

This includes

- CATV networks,
- MATV networks and SMATV networks,
- individual receiving networks

and all kinds of equipment, systems and installations installed in such networks.

NOTE CATV encompasses the Hybrid Fibre Coaxial (HFC) networks used nowadays to provide telecommunications services, voice, data, audio and video both broadcast and narrowcast.

The extent of this standardization work is from the antennas, special signal source inputs to the headend or other interface points to the network up to the terminal input.

The standardization of any user terminals (i.e. tuners, receivers, decoders, terminals, etc.) as well as of any coaxial and optical cables and accessories thereof is excluded.

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CABLE NETWORKS FOR TELEVISION SIGNALS, SOUND SIGNALS AND INTERACTIVE SERVICES –

Part 11: Safety

1 Scope

This part of IEC 60728 deals with the safety requirements applicable to fixed-sited systems and equipment. As far as applicable, it is also valid for mobile and temporarily installed systems, for example, caravans.

Additional requirements may be applied, for example, referring to

- electrical installations of buildings and overhead lines,
- other telecommunication services distribution systems,
- water distribution systems,
- gas distribution systems,
- lightning systems.

This standard is intended to provide specifically for the safety of the system, personnel working on it, subscribers and subscriber equipment. It deals only with safety aspects and is not intended to define a standard for the protection of the equipment used in the system.

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 60065:2001, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-1, *Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC 60364-5-52, *Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

IEC 60364-5-54, *Electrical installations of buildings – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and protective bonding conductors*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60617, *Graphical symbols for diagrams*

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

IEC 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCS)*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

IEC 60990, *Methods of measurement of touch current and protective conductor current*

IEC 61140:2001, *Protection against electric shock – Common aspects for installation and equipment*

IEC 62305 (all parts), *Protection against lightning*

IEC 62305-2:2006 *Protection against lightning – Part 2: Risk management*

IEC 62305-3:2006, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

IEC 62305-4, *Protection against lightning – Part 4: Electrical and electronic systems within structures*

ISO 3864-1:2002, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs in workplaces and public areas*

EN 50117 (all parts), *Coaxial cables*

EN 50164-1, *Lightning Protection Components (LPC) – Part 1: Requirements for connection components*

EN 50164-2, *Lightning Protection Components (LPC) – Part 2: Requirements for conductors and earth electrodes*

EN 50174-2, *Information technology – Cabling installation – Part 2: Installation planning and practices inside buildings*

EN 50310, *Application of equipotential bonding and earthing in buildings with information technology equipment*

CENELEC R 064-004, *Electrical installations of buildings – Protection against electromagnetic interference (EMI) in installations of buildings*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Some terms have been taken from IEC 60050-195, IEC 60050-826 and IEC 60050-851, with the IEC numbering in square brackets, and from other IEC standards, also referenced to in square brackets.

3.1.1

air termination system

part of an external LPS using metallic elements such as rods, mesh conductors or catenary wires intended to intercept lightning flashes

[IEC 62305-3:2006, 3.6]

3.1.2

amplifier

device to compensate for attenuation

3.1.3

attenuation

decibel ratio of the input power to the output power

3.1.4

cable networks (for television signals, sound signals and interactive services)

general overall term used to define CATV-networks, MATV-networks, SMATV-networks and individual receiving networks; these networks can be used in downstream and upstream directions

3.1.5

CATV network or community antenna television network

network designed to provide sound and television signals as well as signals for interactive services to communities

3.1.6

class I equipment

equipment with basic insulation as provision for basic protection and protective bonding as provision for fault protection, in accordance with IEC 61140:2001, 7.1

[IEC 60050-851:2008, 851-15-10]

3.1.7

class II equipment

equipment with basic insulation as provision for basic protection, and supplementary insulation as provision for fault protection, or in which basic and fault protection are provided by reinforced insulation, in accordance with IEC 61140:2001, 7.3

[IEC 60050-851:2008, 851-15-11]

3.1.8

earthing arrangement

all the electric connections and devices involved in the earthing of a system, an installation and equipment

[IEC 60050-195:1998, 195-02-20]

3.1.9

earthing conductor

conductor which provides a conductive path, or part of the conductive path, between a given point in a system or in an installation or in equipment and an earth electrode or an earth-electrode network

NOTE In the electrical installation of a building, the given point is usually the main earthing bar, and the earthing conductor connects this point to the earth electrode or the earth-electrode network.

[IEC 60050-826:2004, 826-13-12]

3.1.10

earth electrode

conductive part, which may be embedded in the soil or in a specific conductive medium, e.g. concrete or coke, in electric contact with the Earth

[IEC 60050-826:2004, 826-13-05]

3.1.11**earthing terminal**

terminal provided on equipment or on a device and intended for the electric connection with the earthing arrangement

[IEC 60050-195:1998, 195-02-31]

3.1.12**electric shock**

physiological effect resulting from an electric current through a human or animal body

[IEC 60050-826:2004, 826-12-01]

3.1.13**equipotential bonding**

provision of electric connections between conductive parts, intended to achieve equipotentiality

[IEC 60050-826:2004, 826-13-19]

3.1.14**equipotential bonding bar**

bar which is part of an equipotential bonding system and enables the electric connection of a number of conductors for equipotential bonding purposes

[IEC 60050-826:2004, 826-13-35, modified]

3.1.15**protective bonding conductor**

protective conductor provided for protective-equipotential-bonding

[IEC 60050-826:2004, 826-13-24]

3.1.16**exposed conductive part**

conductive part of equipment which can be touched and which is not normally live, but which can become live when basic insulation fails

[IEC 60050-195:1998, 195-06-10]

3.1.17**extraneous conductive part**

conductive part not forming part of the electrical installation and liable to introduce an electric potential, generally the electric potential of a local earth

[IEC 60050-195:1998, 195-06-11]

3.1.18**feeder**

transmission path forming part of a cable network; such a path may consist of a metallic cable, optical fibre, waveguide or any combination of them

NOTE By extension, the term is also applied to paths containing one or more radio links.

3.1.19**galvanic isolator**

device providing electrical isolation below a certain frequency range

3.1.20

hazardous voltage

electrical condition of an object from which a hazardous touch current (electric shock) could be drawn

[IEC 60065:2001, 2.6.10, modified]

3.1.21

headend

equipment, which is connected between receiving antennas or other signal sources and the remainder of the cable network, to process the signals to be distributed

3.1.22

home distributor

HD

physical distribution point within a home where cables terminate

3.1.23

individual receiving network

network designed to provide sound and television signals as well as signals for interactive services to an individual household

3.1.24

let-go threshold current

maximum value of electric current through the body of a person at which that person can release himself or herself

[IEC 60050-195:1998, 195-03-09]

3.1.25

lightning protection system

LPS

complete system used to protect a space against the effects of lightning consisting of both external and internal lightning protection systems

NOTE In particular cases, an LPS may consist of an external LPS or an internal LPS only.

3.1.26

main earthing terminal

main earthing bar

terminal or bar which is part of the earthing arrangement of an installation and enabling the electric connection of a number of conductors for earthing purposes

[IEC 60050-826:2004, 826-13-15, modified]

3.1.27

MATV network or master antenna television network

network designed to provide sound and television signals as well as signals for interactive services to households in one or more buildings

3.1.28

metal installation

extended metal items in the structure to be protected which may form a path for lightning current, such as pipe-work, staircases, elevator guide rails, ventilation, heating and air conditioning ducts, and interconnected reinforcing steel

[IEC 62305-3:2006, 3.18]

3.1.29**natural component of LPS**

conductive component installed not specifically for lightning protection which can be used in addition to the LPS or in some cases could provide the function of one or more parts of the LPS

NOTE Examples of the use of this term include:

- natural air-termination;
- natural down-conductor;
- natural earthing electrode.

[IEC 62305-3:2006, 3.15]

3.1.30**network interface unit****NIU**

interface between the cable network and the network inside an apartment

NOTE The network interface unit can contain an overvoltage protective element and/or a galvanic isolation.

3.1.31**neutral conductor**

identification: **N**

conductor electrically connected to the neutral point and capable of contributing to the distribution of electric energy

[IEC 60050-826:2004, 826-14-07]

3.1.32**PEN conductor**

conductor combining the functions of both a protective earthing conductor and a neutral conductor

[IEC 60050-826:2004, 826-13-25]

NOTE The acronym PEN results from the combination of both symbols PE for the protective conductor and N for neutral conductor.

3.1.33**protective conductor**

identification: **PE**

conductor provided for purposes of safety, for example protection against electric shock

NOTE In an electrical installation, the conductor identified PE is normally also considered as protective earthing conductor.

[IEC 60050-826:2004, 826-13-22]

3.1.34**receiver lead**

lead, which connects the system outlet to the subscriber equipment

3.1.35**receiving antenna**

device with proper electrical characteristics that intercepts desired signals in the atmosphere and transfers these to the remainder of the cable network