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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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EUROPÄISCHE NORM

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June 2023

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English Version

Cable networks for television signals, sound signals and interactive services - Part 11: Safety (IEC 60728-11:2023)

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs - Partie 11: Sécurité (IEC 60728-11:2023)

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 11: Sicherheitsanforderungen (IEC 60728-11:2023)

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Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN IEC 60728-11:2023 E

EN IEC 60728-11:2023 (E)

European foreword

The text of document 100/3866/FDIS, future edition 5 of IEC 60728-11, prepared by IEC/TC 100 "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60728-11:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-02-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-05-23

This document supersedes EN 60728-11:2017 and all of its amendments and corrigenda (if any).

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The text of the International Standard IEC 60728-11:2023 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60364 (series)	NOTE	Approved as HD 60364 (series)
IEC 60728-1	NOTE	Approved as EN 60728-1

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
-	-	Power, control and communication cables - Cables for general applications in construction works subject to reaction to fire requirements	EN 50575 + A1	2014 2016
IEC 60364-1 (mod)	2005	Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions	HD 60364-1 + A11	2008 2017
IEC 60364-4-44 (mod) + A1 (mod) + A2	2007 2015 2018	Low-voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	HD 60364-4-442 HD 60364-4-443 HD 60364-4-444	2012 2016 2010
IEC 60364-5-52 (mod)	2009	Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems	HD 60364-5-52	2011
IEC 60364-5-54 + A1	2011 2021	Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements and protective conductors	HD 60364-5-54 + A11 + A1	2011 2017 2022
IEC 60529 + A1 + A2	1989 1999 2013	Degrees of protection provided by enclosures (IP Code)	EN 60529 + A1 + A2	1991 2000 2013
IEC 60990	2016	Methods of measurement of touch current and protective conductor current	EN 60990	2016
IEC 62305-2 (mod)	2010	Protection against lightning - Part 2: Risk management	EN 62305-2	2012
IEC 62305-3 (mod)	2010	Protection against lightning - Part 3: Physical damage to structures and life hazard	EN 62305-3	2011
IEC 62368-1	2018	Audio/video, information and communication technology equipment - Part 1: Safety requirements	EN IEC 62368-1	2020

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Publication	Year	Title	EN/HD	Year
IEC 62561-1	2017	Lightning Protection System Components (LPSC) - Part 1: Requirements for connection components	EN 62561-1	2017
IEC 62561-2	2018	Lightning protection system components (LPSC) - Part 2: Requirements for conductors and earth electrodes	EN IEC 62561-2	2018
ISO 7010	2011	Graphical symbols - Safety colours and safety signs - Registered safety signs	-	-
ISO/IEC 30129 + A1	2015 2019	Telecommunications bonding networks for buildings and other structures	EN 50310 + A1	2016 2020

Annex ZB
(informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN and/or CENELEC member.

This European Standard does not fall under any Directive/Regulation of the EU.

In the relevant CEN and/or CENELEC countries, these A-deviations are valid instead of the respective provisions of the European Standard until the national situation causing the A-deviation has changed.

Clause	Deviation
9	**ZB.1 France** (Arrêté interministériel, 2 April 1991) This regulation specifies, among many other parameters, the minimum distance between electric supply wires (isolated and not isolated, low-voltage and high-voltage) and any other installation (e.g. buildings, antennas, telecommunication lines, etc.). The main clauses of this regulation which concern the cable networks are Clauses 12, 25, 26, 33, 33bis, 38, 49, 51, 52 and 63. Clause 9 of this standard specifies distances of 10 mm (indoors) and 20 mm (outdoors) and this is not sufficient to cover overhead cables. As an example, the minimum distance between an overhead telecommunication line and an overhead low-voltage (up to 1 kV) electricity supply line shall be 1 m (Clause 33). This distance may be reduced under specified conditions (Clauses 51, 52 and 63). This regulation specifies also the minimum distance from high-voltage lines. This distance varies from 1 m to 4 m depending on the voltage, on the isolation of the cable and on the location (built-up area or not) (Clauses 33 and 63)
10.1	**ZB.2 United Kingdom** In the UK the use of fully isolated system outlets is obligatory except where back-powering to a network or to outdoor equipment such as preamplifiers, low-noise converters, polarizers, transmitters in antenna installations is necessary then requirements of 8.2 apply.
11	**ZB.3 France** (NF C 15100 - Décret n° 84-74 du 26 janvier 1984 modifié) The use of TT distribution systems with 300 mA differential switching is not compatible with the interconnection of the earthing of two different buildings.

Annex ZC
(normative)

Special national conditions

Special national condition: National characteristic or practice that cannot be changed even over a long period, e.g. climatic conditions, electrical earthing conditions.

NOTE If it affects harmonization, it forms part of the European Standard.

For the countries in which the relevant special national conditions apply these provisions are normative, for other countries they are informative.

Clause	Special national condition

6.2 ZC.1 Norway

The following parts of the standard are not applicable due to Special National Conditions:

For new and rebuilt coaxial electronic communication networks the outer conductor of the coaxial cable leading into a building shall be galvanic and isolated from the outer conductor of the coaxial cable inside the building;

Examples of installations inside buildings described in 6.2g, 6.2i, 6.2l and shown in Figure 2, Figure 4, Figure 5 and Figure 7 shall be equipped with a galvanic isolator separating local earth from the cable network distribution lines;

Galvanic isolators shall withstand the following requirements:

Applying a 50 Hz AC voltage of 300 V_{RMS} between the input and the output of the outer conductor of the galvanic isolator for a period of not less than 20 min, the leakage current shall not exceed 8 mA_{RMS}. Applying a continues DC voltage of 2 120 V between the input and the output of the outer conductor of the galvanic isolator for a period of not less than 1 min, the leakage current shall not exceed 0,7 mA.

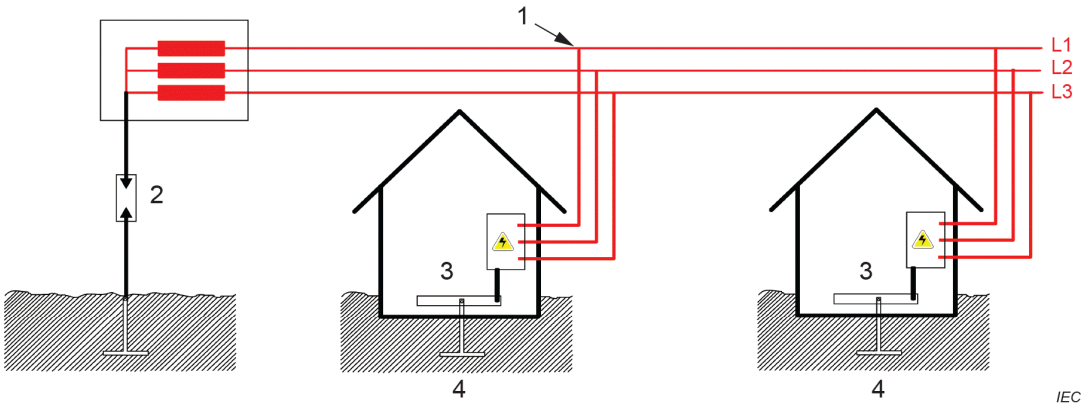
It shall not be possible to touch metallic parts of the galvanic isolator when connected.

6.3 ZC.2 Norway

ZC.2.1 Justification

In most parts of Norway, the AC mains power are built as an IT- or TT-network with a line-to-line voltage of 230 V (see Figure ZC.1).

These types of networks have no N-conductor, and the AC mains power is supplied to the equipment from two of the three line conductors (IEC 62386-1:2018, Annex V).



Key

1 AC power distribution, IT system, line-to-line voltage 230 V

2 Voltage limiter

3 Equipotential bonding bar

4 Earth electrode

Figure ZC.1 — IT power distribution system in Norway

For a cable network covering an area with this type of power supply networks, special initiative should be taken to ensure that safety in the cable network is maintained. The following equipotential bonding arrangements described will provide necessary safety in such a network.

ZC.2.2 Equipotential bonding mechanism for cable networks

ZC.2.2.1 Installations in the vicinity of transformer stations

Any earth electrode in a cable network shall preferably be located at a minimum distance of 20 m from the nearest earth electrode in a high-power transformer station (high to mains voltage) (see Figure ZC.2 and ITU-T K.8 or EN 50174-3).

If the above-mentioned distance is less than 20 m, all equipment in the cable network shall be electrically isolated from local earth by mounting the equipment within a non-metallic enclosure, as shown in Figure ZC.3. Mains powered equipment with local power feeding should not be used in this case.

Before any work on the installation is started, measurements shall be carried out to reveal if there are any hazardous voltages between local earth and the earth for the cable network.

The safety sign "Warning about hazardous electrical voltage"  ISO 7010-W012:2011-05 shall be attached to the non-metallic enclosure.

ZC.2.2.2 Cabinets for cable networks located near cabinets/ installations for mains

Cabinets for cable networks placed together with cabinets for mains power distributions should preferably be placed at a minimum of 2 m apart. If the distance is closer than 2 m, a common earth electrode between the cabinets shall be used. Examples of such installations are shown in Figure ZC.4, Figure ZC.5, Figure ZC.6 and Figure ZC.7.

Figure ZC.2 shows an example of installations located farther than 20 m away from a transforming station.

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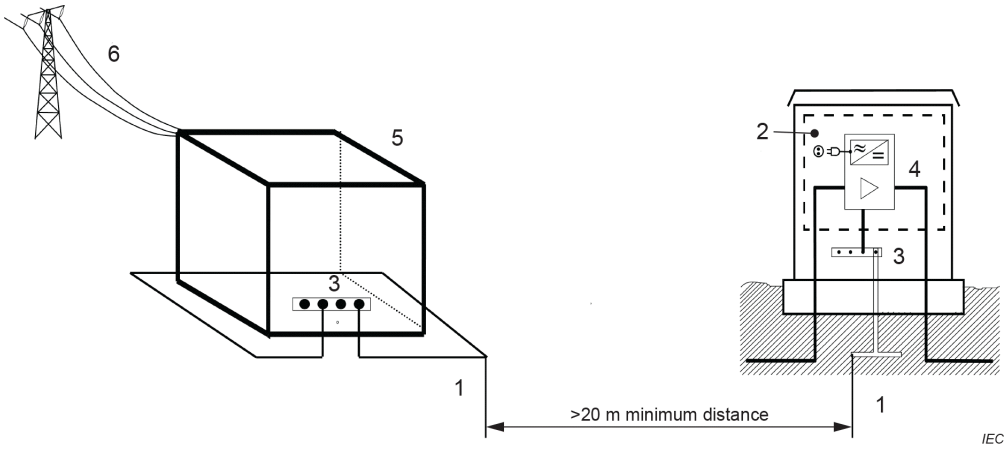
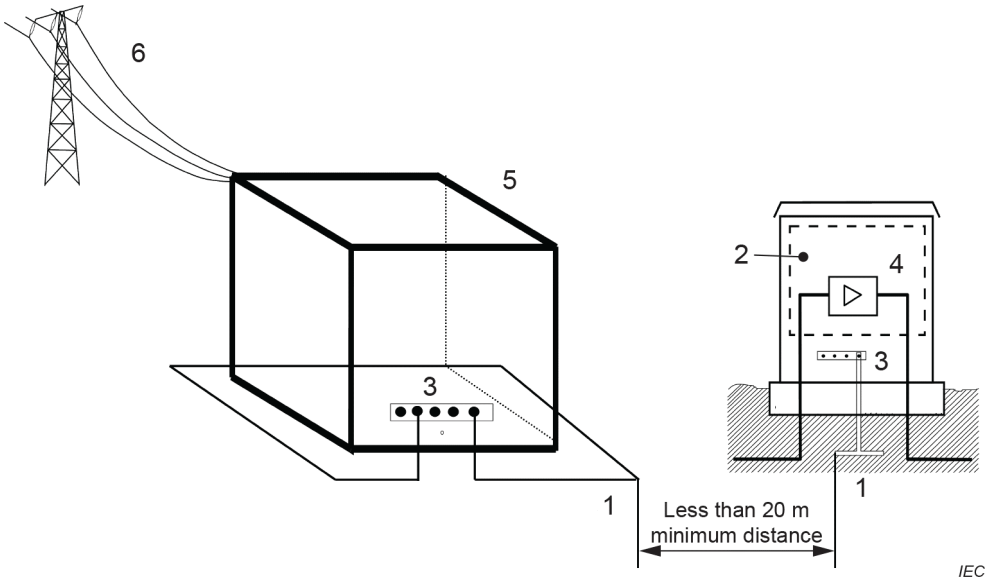


Key

1 Earth electrode
2 Non-metallic enclosure
3 Equipotential bonding bar
4 Mains supplied equipment
5 Transforming station
6 High-voltage power transmission system

Figure ZC.2 — Example of installations located farther than 20 m away from a transforming station

Figure ZC.3 shows an example of installations located closer than 20 m from a transforming station.

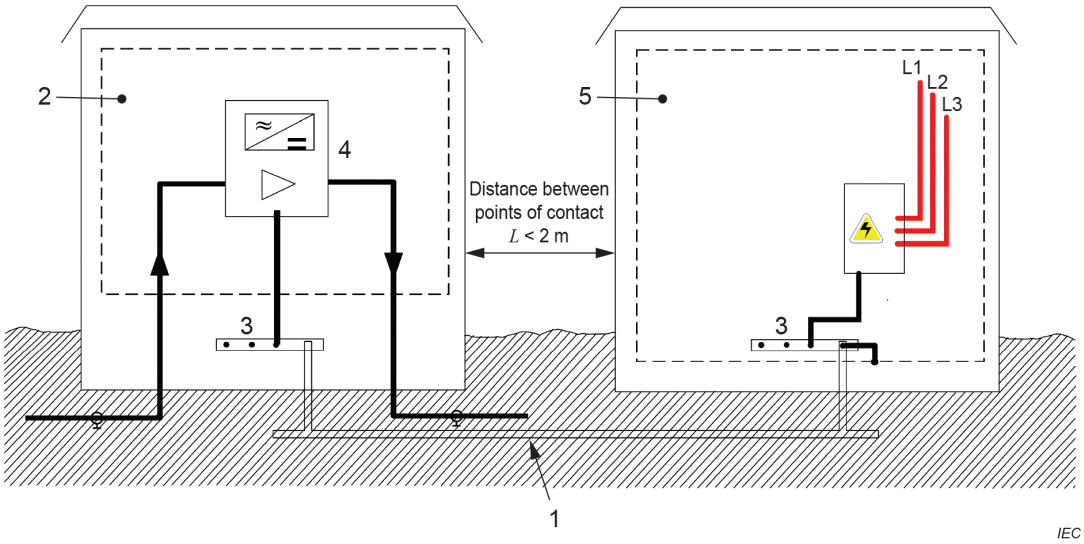


Key

1 Earth electrode
2 Non-metallic enclosure
3 Equipotential bonding bar
4 Remotely supplied equipment
5 Transforming station
6 High-voltage power transmission system

Figure ZC.3 — Example of installations located closer than 20 m from a transforming station

Figure ZC.4 shows an example of cabinets for cable network with locally fed equipment and mains placed less than 2 m apart.

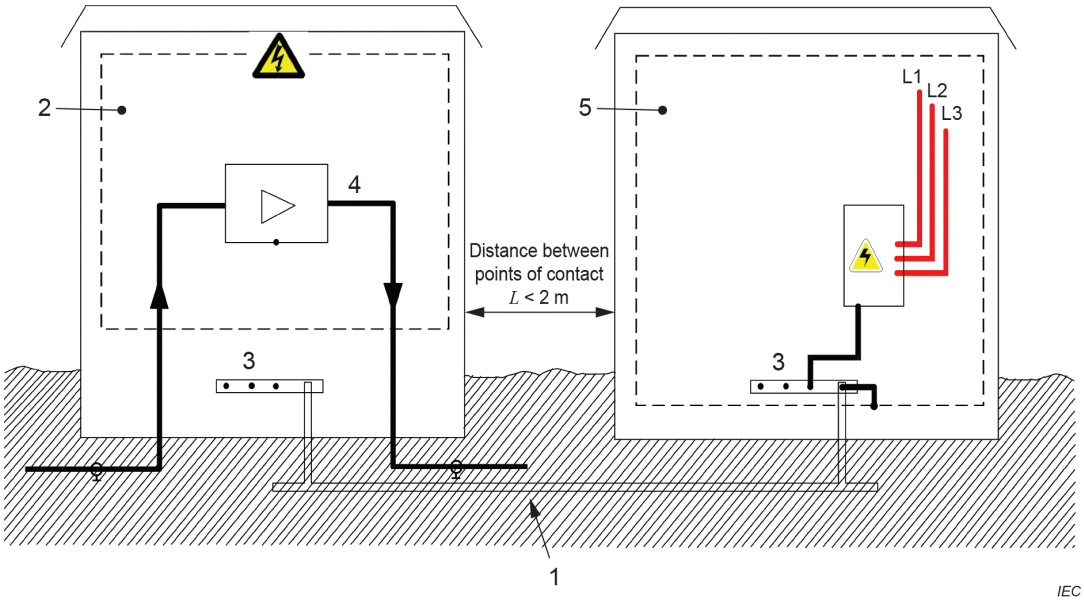


Key

1 Common earth electrode
2 Non-metallic enclosure
3 Equipotential bonding bar
4 Mains supplied equipment
5 Metallic enclosure

Figure ZC.4 — Example of cabinets for cable network with locally fed equipment and mains placed less than 2 m apart

Figure ZC.5 shows an example of cabinets for cable network with remotely fed equipment and mains placed less than 2 m apart.

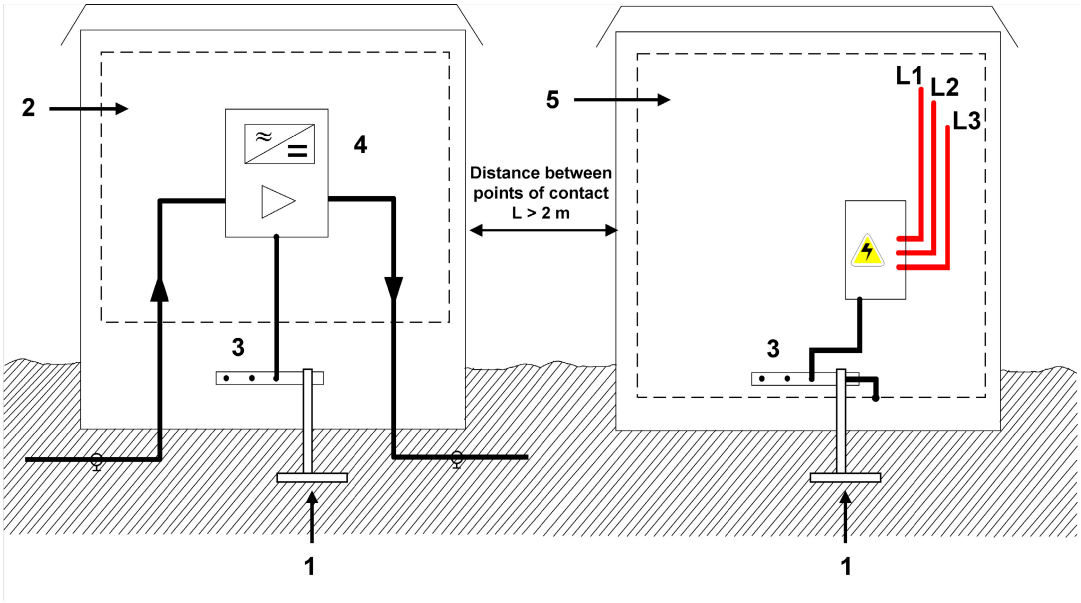


Key

1 Common earth electrode
2 Non-metallic enclosure
3 Equipotential bonding bar
4 Remotely supplied equipment
5 Metallic enclosure

Figure ZC.5 – Example of cabinets for cable network with remotely fed equipment and mains placed less than 2 m apart

Figure ZC.6 shows an example of cabinets for cable network with locally fed equipment and mains placed more than 2 m apart.

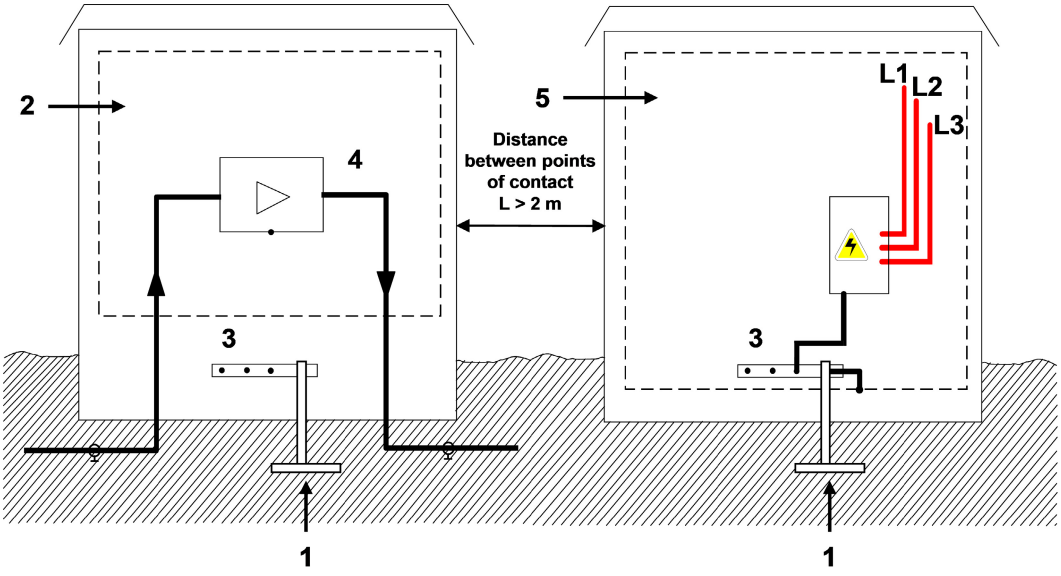


Key

1 Earth electrode
2 Non-metallic enclosure
3 Equipotential bonding bar
4 Mains supplied equipment
5 Metallic enclosure

Figure ZC.6 — Example of cabinets for cable network with locally fed equipment and mains placed more than 2 m apart

Figure ZC.7 shows an example of cabinets for cable network with remotely fed equipment and mains placed more than 2 m apart.



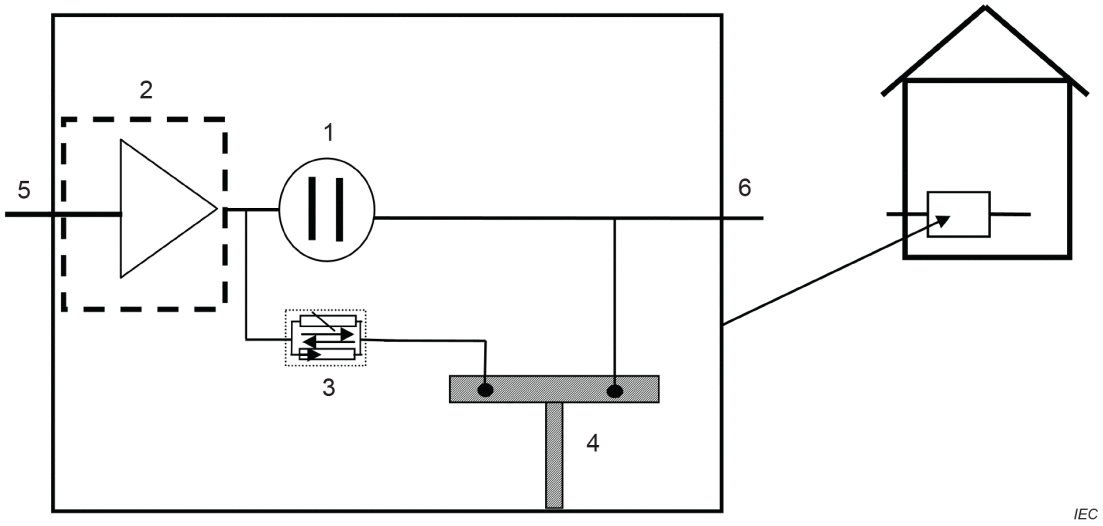
Key

1 Earth electrode
2 Non-metallic enclosure
3 Equipotential bonding bar
4 Remotely supplied equipment
5 Metallic enclosure

Figure ZC.7 — Example of cabinets for cable network with remotely fed equipment and mains placed more than 2 m apart

ZC.2.3 Use of galvanic isolation in a cable network with remote power-feeding

When using galvanic isolation in cable networks with remote power feeding, the amplifier shall be placed in front of the galvanic isolator as shown in Figure ZC.8.



Key

1 Galvanic isolator
2 Non-metallic enclosure
3 Voltage dependent protection device
4 Common earth electrode
5 CATV system
6 House internal cable-TV network

Figure ZC.8 – Example of an installation placing the amplifier in front of the galvanic isolator

A voltage dependent protective device is recommended in order to protect the galvanic isolator from transient voltages.

The amplifier shall be electrically isolated from the local electrical earth. In case the amplifier is mounted close to either local electrical earth or installations connected to local electrical earth, the amplifier shall be placed in such a way that it is not possible to physically touch both the amplifier and the installation without having to remove a cover or other safety arrangements. The covers and amplifiers shall be labelled with the safety sign given under ZC.2.2.1. The covers used shall be designed in such a way that they can only be removed using a key or a special tool.

ZC.2.4 Use of voltage dependent protective device in a cable network

Network, property and health shall be protected against failure in isolation between infrastructures with different levels of voltage and other unwanted high voltages caused by any kind of high voltage distribution networks or atmospheric discharges.

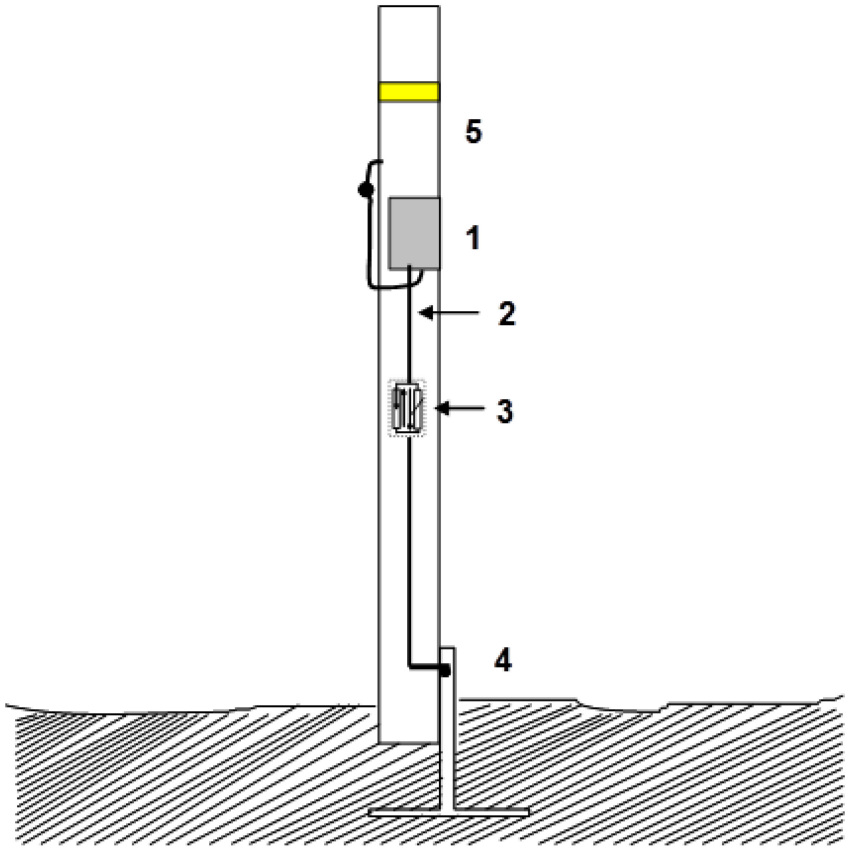
Depending on the voltages time span, all voltages with local earth as a reference shall be limited according to following values:

0 to 200 ms	1 030 V
201 to 350 ms	780 V
351 to 500 ms	650 V
501 to 1 000 ms	430 V
1 001 to 2 000 ms	300 V
2 001 to 3 000 ms	250 V
3 001 to 5 000 ms	200 V
5 001 to 10 000 ms	150 V
More than 10 000 ms	60 V

In Norway, network installations with no mains supplied equipment are usually installed isolated from local earth due to difficult ground conditions. When calculations show that the voltage level will rise above 650 V, measures must be taken to reduce the voltage level. This can be done by connecting a voltage dependent device between the network installation and local earth. The voltage dependent device must not connect the installations to local earth in case of a short circuit in mains power.

This implies a safe threshold voltage of 420 V.

Examples of protections using a voltage depending device are shown in Figure ZC.8 and Figure ZC.9.



Key

1 Amplifier / passive equipment
2 Equipotential bonding conductor
3 Voltage dependent protection device
4 Common earth electrode
5 Pylon

Figure ZC.9 – Example of protection using a voltage depending device on network installations on poles

12.3 ZC.3 Finland

The required wind pressure value is 700 N/m^2 for buildings up to 30 m.

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INTERNATIONAL STANDARD

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

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INTERNATIONAL STANDARD

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 11: Safety

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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. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2016. This edition constitutes a technical revision.

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

a) Replacement of references to IEC 60065 and IEC 60950-1 with references to IEC 62368-1.
b) Addition of subclauses 4.4 to 4.6.
c) Revised definition of class I equipment, class II equipment, main earthing terminal, see 3.1.6, 3.1.8 and 3.1.31.
d) Addition of definitions for harm, hazard, ordinary person, instructed person, skilled person, see 3.1.22, 3.1.23, 3.1.39, 3.1.40 and 3.1.41.

e) Additional requirement to provide details on the equipment installed, see 4.1.

f) Additional mechanical, design and construction requirements, see 4.2.2.

g) Changes to the accessible part requirements, see 4.2.3.

h) The current carrying capacity and dielectric strength of components is now obligatory, see 8.1.3.

i) The assessment of the risk of lightning strike is now obligatory, see Figure 10.

j) Extension of remote feeding voltage on subscriber feeder, see Table 1.

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

Draft	Report on voting
100/3866/FDIS	100/3882/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.

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. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

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 and other deliverables of the IEC 60728 series deal with cable networks including equipment and associated methods of measurement for headend reception, processing and distribution of television and sound signals and for processing, interfacing and transmitting all kinds of data signals for interactive services using all applicable transmission media. These signals are typically transmitted in networks by frequency-multiplexing techniques.

This includes for instance:

- regional and local broadband cable networks,
- extended satellite and terrestrial television distribution networks and systems,
- individual satellite and terrestrial television receiving systems,

and all kinds of equipment, systems and installations used in such cable networks, distribution and receiving systems.

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

The standardization work will consider coexistence with users of the RF spectrum in wired and wireless transmission systems.

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

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 document is intended to provide requirements 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60364-1:2005, *Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*
IEC 60364-4-44:2007/AMD1:2015
IEC 60364-4-44:2007/AMD2:2018

IEC 60364-5-52:2009, *Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

IEC 60364-5-54:2011, *Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors*
IEC 60364-5-54:2011/AMD1:2021

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60990:2016, *Methods of measurement of touch current and protective conductor current*

IEC 62305-2:2010, *Protection against lightning – Part 2: Risk management*

IEC 62305-3:2010, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

IEC 62368-1:2018, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

IEC 62561-1:2017, *Lightning protection system components (LPSC) – Part 1: Requirements for connection components*

IEC 62561-2, *Lightning protection system components (LPSC) – Part 2: Requirements for conductors and earth electrodes*

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

ISO/IEC 30129:2015, *Information technology – Telecommunications bonding networks for buildings and other structures*
ISO/IEC 30129:2015/AMD1:2019

EN 50575:2014, *Power, control and communication cables – Cables for general applications in construction works subject to reaction to fire requirements*