BS EN 60728-11:2017



BSI Standards Publication

Cable networks for television signals, sound signals and interactive services

Part 11: Safety

bsi.

National foreword

This British Standard is the UK implementation of EN 60728-11:2017. It is identical to IEC 60728-11:2016. It supersedes BS EN 60728-11:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/100/4, Cable distribution equipment and systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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NORME EUROPÉENNE

EUROPÄISCHE NORM

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May 2017

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English Version

Cable networks for television signals, sound signals and interactive services - Part 11: Safety (IEC 60728-11:2016 + COR1:2016)

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs - Partie 11: Sécurité (IEC 60728-11:2016 + COR1:2016)

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 11: Sicherheitsanforderungen (IEC 60728-11:2016 + COR1:2016)

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European foreword

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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)	2017-11-26
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-05-26

This document supersedes EN 60728-11:2010.

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For this European Standard the informative Annex C of IEC 60728-11:2016 shall be disregarded and has been replaced by the Annexes ZB, A deviations and ZC, Special National Conditions.

Endorsement notice

The text of the International Standard IEC 60728-11:2016 + COR1:2016 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 standards indicated:

IEC 60364 Series	NOTE	Harmonized as HD 60364 Series.
IEC 60728-1	NOTE	Harmonized as EN 60728-1.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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

NOTE 1 When 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.cenelec.eu

Publication	Year	Title	EN/HD	Year
-	-	Coaxial cables	EN 50117	Series
-	-	Lightning Protection Components (LPC) - Part 1: Requirements for connection components	EN 50164-1	-
-	-	Lightning Protection Components (LPC) - Part 2: Requirements for conductors and earth electrodes	EN 50164-2	-
-	-	Information technology - Cabling installation - Part 2: Installation planning and practices inside buildings	EN 50174-2	-
-	-	Telecommunications bonding networks for buildings and other structures	EN 50310	-
IEC 60065 (mod)	2014	Audio, video and similar electronic apparatus - Safety requirements	EN 60065	2014
IEC 60364-1	-	Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions	HD 60364-1	-
IEC 60364-4-44	-	Low-voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	HD 60364-4-442	-
IEC 60364-5-52	-	Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems	HD 60364-5-52	-
IEC 60364-5-54	-	Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements and protective conductors	HD 60364-5-54	-

Publication	Year	Title	EN/HD	Year
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529	-
IEC 60728-2	-	Cable networks for television signals, sound signals and interactive services - Part 2: Electromagnetic compatibility for equipment	EN 50083-2	-
IEC 60825-1	-	Safety of laser products - Part 1: Equipment classification and requirements	EN 60825-1	-
IEC 60825-2	-	Safety of laser products - Part 2: Safety of optical fibre communication systems (OFCS)	EN 60825-2	-
IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1	2006
			+A11	2009
			+A12	2011
			+AC	2011
IEC 60990	-	Methods of measurement of touch current and protective conductor current	EN 60990	-
IEC 61140	2001	Protection against electric shock - Common aspects for installation and equipment	EN 61140	2002 [1)]
+A1 (mod)	2004		+A1	2006 [1)]
IEC 62305	Series	Protection against lightning	EN 62305	Series
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 62305-4 (mod)	2010	Protection against lightning - Part 4: Electrical and electronic systems within structures	EN 62305-4	2011
ISO 3864-1	2011	Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs and safety markings	-	-

[1)] Superseded by EN 61140:2016 (IEC 61140:2016): DOW = 2019-05-27.

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 CENELEC national member.

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

In the relevant CEN-CENELEC countries, these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

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.

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.

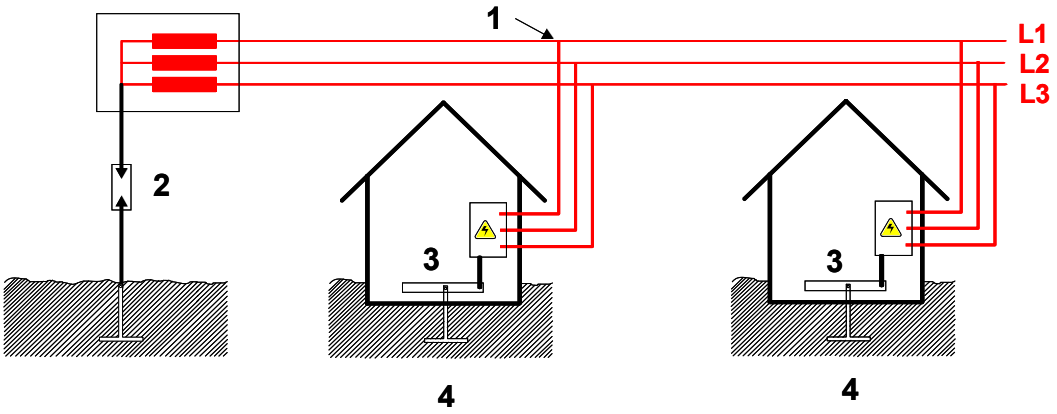
It shall not be possible to touch metallic parts of the galvanic isolator when connected.

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 60950-1:2005, Annex V).



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).

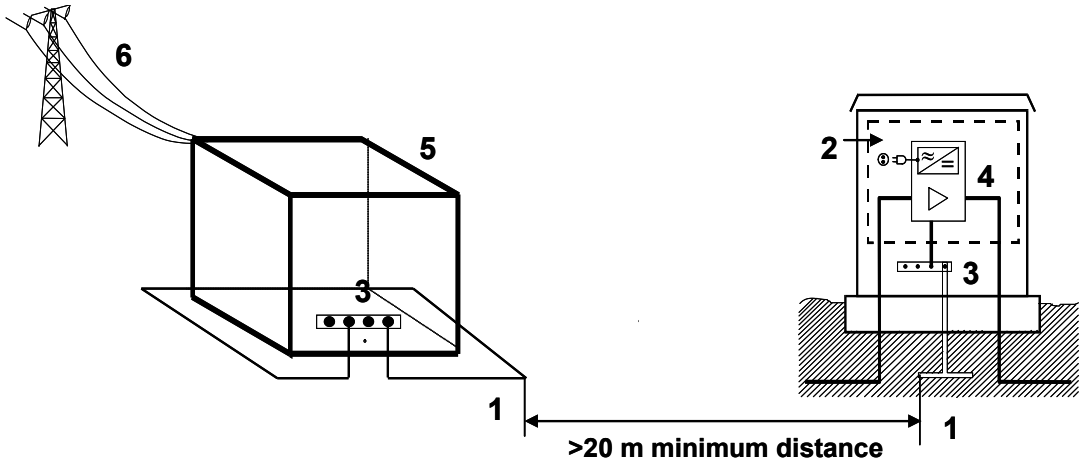
If the above-mentioned distance is less than 20 m, all equipment in the cable network shall be electrically isolated from local earth by mounting the equipment within a non-metallic enclosure, as shown in Figure ZC.3. Mains powered equipment with local power feeding should not be used in this case.

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"  according to sign 7.4 of ISO 3864-1:2002 shall be attached to the non-metallic enclosure.

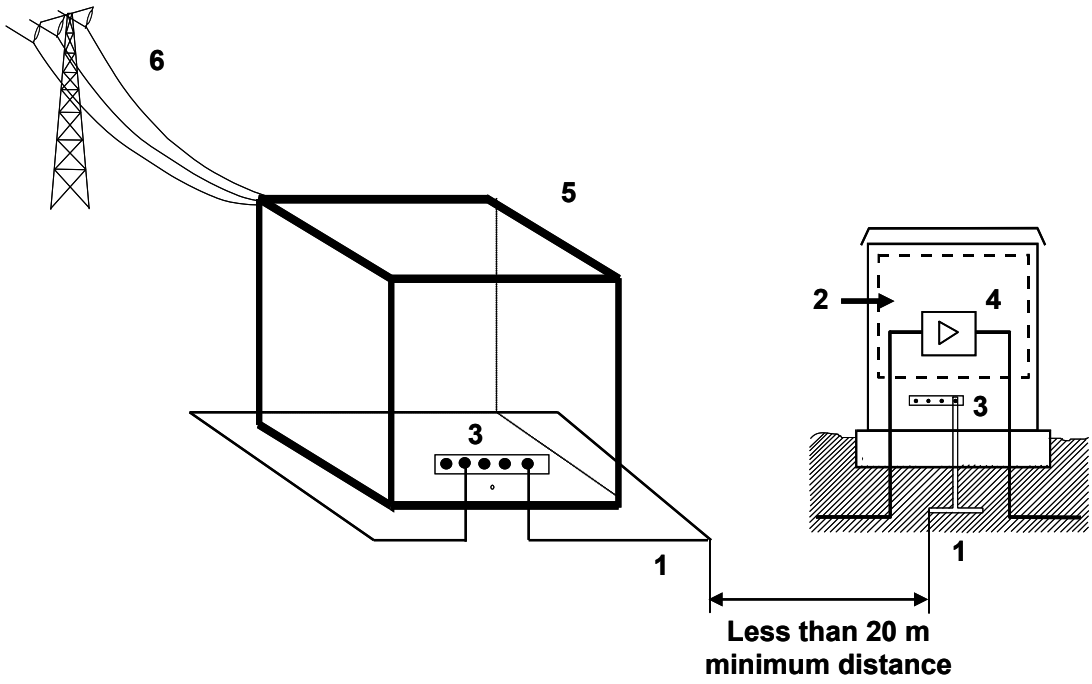
ZC.2.2.2 Cabinets for cable networks located near cabinets/ installations for mains

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.



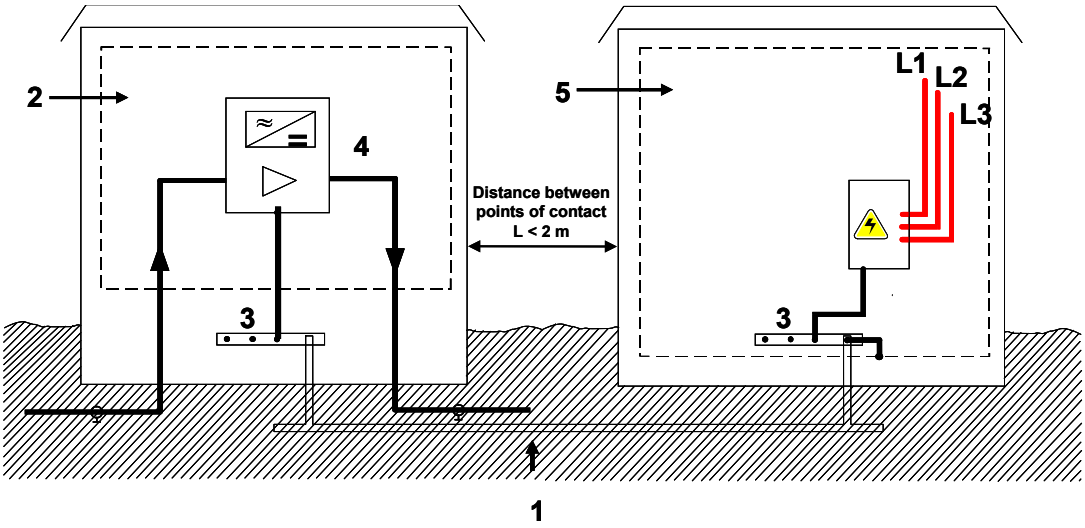
1 Earth electrode	2 Non-metallic enclosure
3 Equipotential bonding bar	4 Mains supplied equipment
5 Transforming station	6 High-voltage power transmission system

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



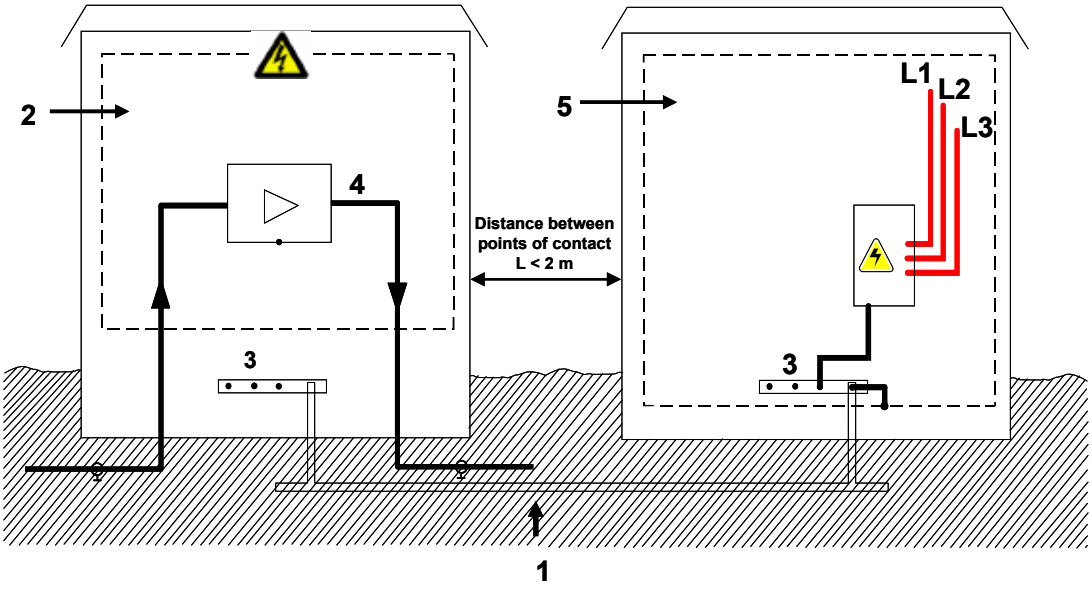
1 Earth electrode	2 Non-metallic enclosure
3 Equipotential bonding bar	4 Remotely supplied equipment
5 Transforming station	6 High-voltage power transmission system

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



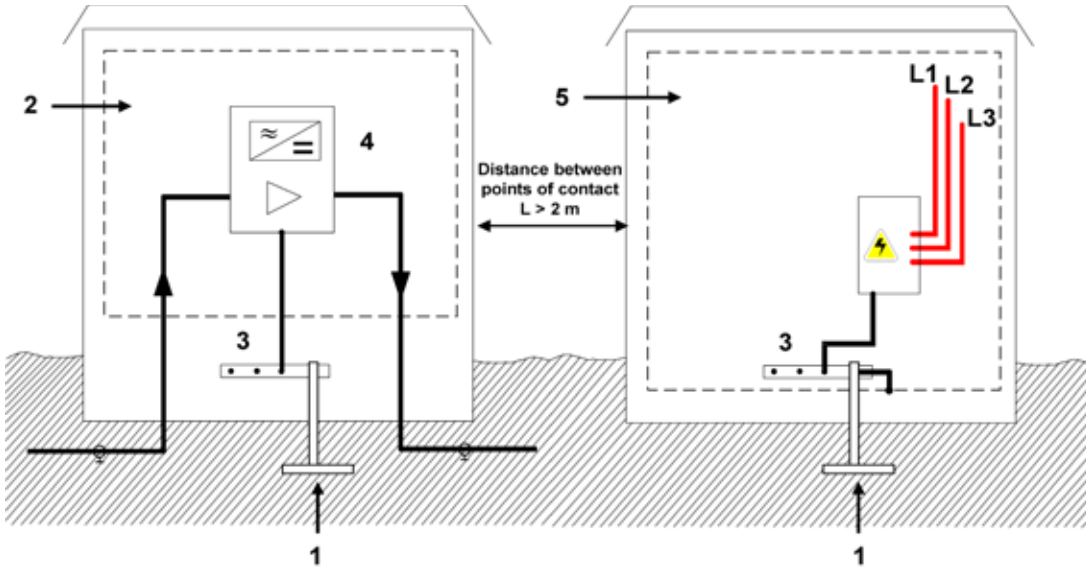
1 Common earth electrode	2 Non-metallic enclosure
3 Equipotential bonding bar	4 Mains supplied equipment
5 Metallic enclosure	

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



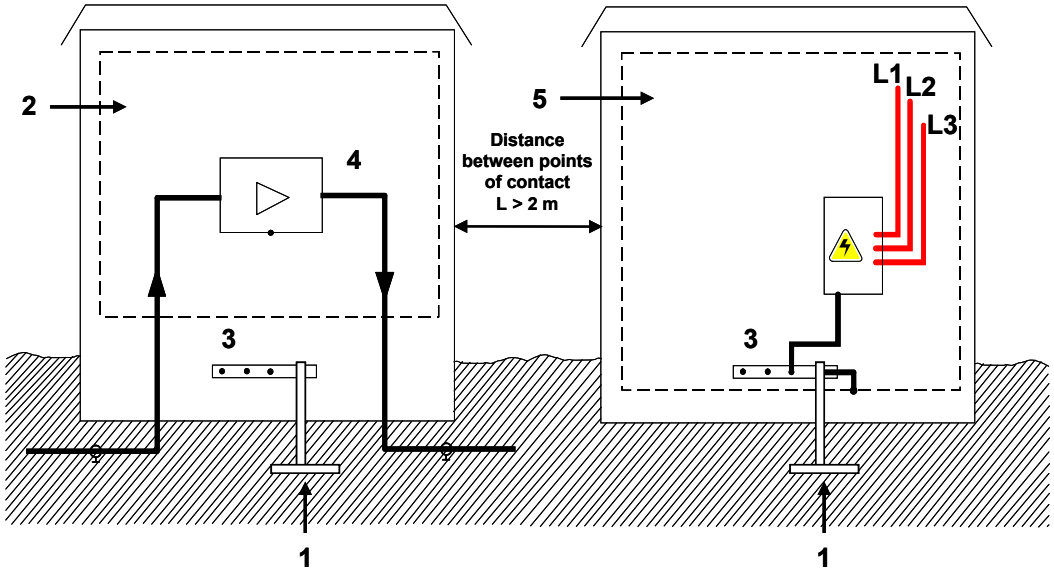
1 Common earth electrode	2 Non-metallic enclosure
3 Equipotential bonding bar	4 Remotely supplied equipment
5 Metallic enclosure	

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



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

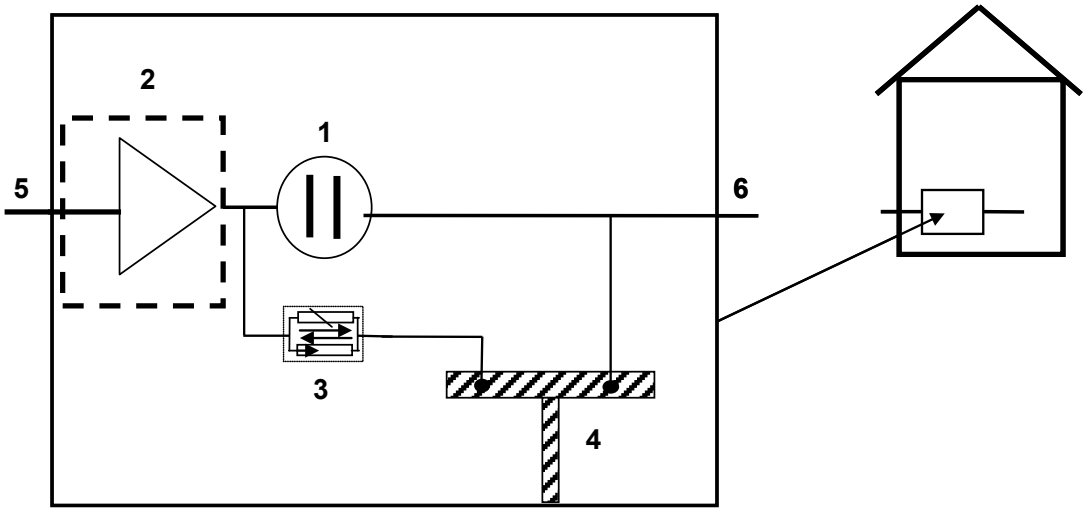


1 Earth electrode	2 Non-metallic enclosure
3 Equipotential bonding bar	4 Remotely supplied equipment
5 Metallic enclosure	

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.



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:

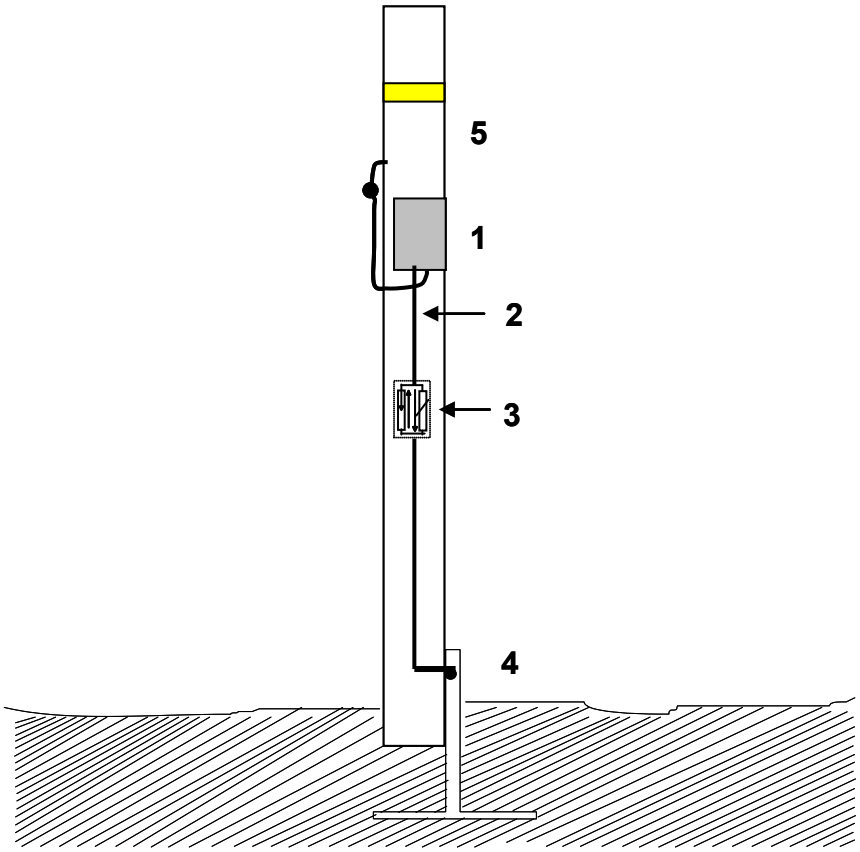
0 to 200 ms	1 030 V
201 to 350 ms	780 V
351 to 500 ms	650 V
501 to 1 000 ms	430 V
1 001 to 2 000 ms	300 V
2 001 to 3 000 ms	250 V

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 3 and Figure ZC.9.



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 ELECTROTECHNICAL COMMISSION

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

Part 11: Safety

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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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 fourth edition cancels and replaces the third edition published in 2010. This edition constitutes a technical revision.

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

- Correction of minimum cross-section of bonding conductor in Figure 6, Figure 14 and Figure 17.
- Verbal modification of 11.3.1.2.

- Creation of new symbols for “overvoltage protective device – (OPD)” and for “coaxial overvoltage protective device – (COPD)”.
- Introduction of new OPD symbol to 3.2, Figure 3 and Figure 6.
- Introduction of new COPD symbol to 3.2 and Figure 19.
- In 3.1 replacement of terms CATV, MATV and SMATV by new terms and definitions due to changes in technology and use of cable networks.
- New Figures 18a to 18d.
- Deletion of Figure 19.
- Extension for remote feeding voltage on subscriber feeder.
- Adaption to Edition 2.0 of the IEC 62305 series.
- Deletion of informative Annex C and normative reference to the simplified software for the calculation of risk due to lightning (Annex J of IEC 62305-2:2006[1].
- New subclause 10.2.6 Fully-isolated system outlet provided by means of a FTTH system.

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

FDIS	Report on voting
100/2592/FDIS	100/2636/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 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.

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

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.

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.

The contents of the corrigendum of July 2016 have been included in this copy.

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

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 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60065:2014, *Audio, video and similar electronic apparatus – Safety requirements*

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

IEC 60364-4-44, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

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

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

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

IEC 60728-2, *Cable networks for television signals, sound signals and interactive services – Part 2: Electromagnetic compatibility for equipment*

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