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**BS EN 60728-1:2014**



**BSI Standards Publication**

# **Cable networks for television signals, sound signals and interactive services**

Part 1: System performance of forward paths

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This British Standard is the UK implementation of EN 60728-1:2014. It is identical to IEC 60728-1:2014. It supersedes BS EN 60728-1:2008 which is withdrawn.

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

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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**Compliance with a British Standard cannot confer immunity from legal obligations.**

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#### **Amendments/corrigenda issued since publication**

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## EUROPÄISCHE NORM

August 2014

ICS 33.060.40

Supersedes EN 60728-1:2008

English Version

Cable networks for television signals, sound signals and  
interactive services - Part 1: System performance of forward  
paths  
(IEC 60728-1:2014)

Réseaux de distribution par câbles pour signaux de  
télévision, signaux de radiodiffusion sonore et services  
interactifs - Partie 1: Caractéristiques des systèmes de voie  
directe  
(CEI 60728-1:2014)

Kabelnetze für Fernsehsignale, Tonsignale und interaktive  
Dienste - Teil 1: Systemanforderungen in Vorwärtsrichtung  
(IEC 60728-1:2014)

This European Standard was approved by CENELEC on 2014-06-27. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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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) 2015-03-27
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-06-27

This document supersedes EN 60728-1:2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

For this European Standard the informative Annex K of IEC 60728-1:2014 shall be disregarded and has been replaced by the informative Annex ZB "A-deviations".

Annexes ZA and ZB have been added by CENELEC.

### Endorsement notice

The text of the International Standard IEC 60728-1:2014 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 60728 Series	NOTE	Harmonized as EN 60728 Series (not modified).
IEC 61169-2	NOTE	Harmonized as EN 61169-2 (not modified).
IEC 61169-24	NOTE	Harmonized as EN 61169-24 (not modified).
CISPR 16-1 Series	NOTE	Harmonized as EN 55016-1 Series (not modified).
ISO/IEC 13818 Series	NOTE	Harmonized as EN ISO/IEC 13818 Series <sup>1)</sup> (not modified).
ISO/IEC 13818-3	NOTE	Harmonized as EN ISO/IEC 13818-3 <sup>1)</sup> (not modified).

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<sup>1)</sup> Withdrawn.

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(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](http://www.cenelec.eu)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
		Characteristics of DAB receivers	EN 50248	2001
IEC 60050-705	-	International Electrotechnical Vocabulary (IEV) - Chapter 705: Radio wave propagation	-	-
IEC 60050-712	1992	International Electrotechnical Vocabulary (IEV) - Chapter 712: Antennas	-	-
IEC 60050-725	-	International Electrotechnical Vocabulary (IEV) - Chapter 725: Space radiocommunications	-	-
IEC 60728-1-1	-	Cable networks for television signals, sound signals and interactive services - Part 1-1: RF cabling for two way home networks	EN 60728-1-1	-
IEC 60728-1-2	-	Cable networks for television signals, sound signals and interactive services - Part 1-2: Performance requirements or signals delivered at the system outlet in operation	EN 60728-1-2	-
IEC 60728-2	-	Cable networks for television signals, sound signals and interactive services - Part 2: Electromagnetic compatibility for equipment	EN 50083-2	-
IEC 60728-3	2010	Cable networks for television signals, sound signals and interactive services - Part 3: Active wideband equipment for cable networks	EN 60728-3	2011
IEC 60728-5	-	Cable networks for television signals, sound signals and interactive services - Part 5: Headend equipment	EN 60728-5	-
IEC 60728-10	-	Cable networks for television signals, sound signals and interactive services - Part 10: System performance of return paths	EN 60728-10	-

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		sound signals and interactive services - Part 11: Safety		
IEC 60728-12	-	Cabled distribution systems for television and sound signals - Part 12: Electromagnetic compatibility of systems	EN 50083-8	-
IEC 60966-2-4	-	Radio frequency and coaxial cable assemblies - Part 2-4: Detail specification for cable assemblies for radio and TV receivers - Frequency range 0 MHz to 3 000 MHz, IEC 61169-2 connectors	EN 60966-2-4	-
IEC 60966-2-5	-	Radio frequency and coaxial cable assemblies - Part 2-5: Detail specification for cable assemblies for radio and TV receivers - Frequency range 0 MHz to 1 000 MHz, IEC 61169-2 connectors	EN 60966-2-5	-
IEC 60966-2-6	-	Radio frequency and coaxial cable assemblies - Part 2-6: Detail specification for cable assemblies for radio and TV receivers - Frequency range 0 MHz to 3 000 MHz, IEC 61169-24 connectors	EN 60966-2-6	-
ISO/IEC 13818-1	2007	Information technology - Generic coding of moving pictures and associated audio information: Systems		-
ISO/IEC 13818-4		Information technology - Generic coding of moving pictures and associated audio information - Part 4: Conformance testing		-
ISO/IEC 14496-1	-	Information technology - Coding of audio-visual objects - Part 1: Systems		-
ITU-R Recommendation BS.412-9	-	Planning standards for terrestrial FM sound-broadcasting at VHF		-
ITU-R Recommendation BT.417-4		Minimum field strengths for which protection may be sought in planning an analogue terrestrial television service		-
ITU-R Recommendation BT.470-7	-	Conventional analogue television systems		-
ITU-R Recommendation BT.500-11	-	Methodology for the subjective assessment-of the quality of television pictures		-
ITU-T Recommendation J.61	-	Transmission performance of television circuits designed for use in international connections		-

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		structure, channel coding and modulation for 11/12 GHz satellite services		
ETSI EN 300 429	-	Digital Video Broadcasting (DVB): Framing - structure, channel coding and modulation for cable systems	-	
ETSI EN 300 468	-	Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems	-	
ETSI EN 300 473	-	Digital Video Broadcasting (DVB): Satellite - Master Antenna Television (SMATV) distribution systems	-	
ETSI EN 300 744	-	Digital Video Broadcasting (DVB): Framing - structure, channel coding and modulation for digital terrestrial television	-	
ETSI EN 302 307/V1.3.1	2013	Digital Video Broadcasting (DVB); Second - generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2)	-	
ETSI ETS 300 784	-	Satellite Earth Stations and Systems (SES); Television Receive-Only (TVRO) satellite earth stations operating in the 11/12 GHz frequency bands	-	
ETSI TS 101 211	-	Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)	-	
ETSI TS 102 831 V1.2.1	2012	Digital Video Broadcasting (DVB); Implementation guidelines for a second generation digital terrestrial television broadcasting system (DVB-T2)	-	

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(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 EC.

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

### Clause   Deviation

#### **3.1.58**   **Norway**

According to Regulations on Electronic Communications Networks and Services (Ecom Regulations) laid down by the Norwegian Ministry of Transport and Communications on 16 February 2004, the following applies:

When installing coaxial cable-based networks, the part of the network to which the end-user is connected shall be placed in a star structure. It is not permitted to insert receiver connections into the connection between the star points.

#### **5.4.1**   **Netherlands**

(Dutch Technical Regulations for CATV networks (Technische Voorschriften voor Centrale Antenne Inrichtingen, 3e uitgave), 21 December 1977, which are valid for CATV networks in accordance with Article 21 of the Dutch Telecommunications law (Stb. 1988, 520))

Replace by/add the following "minimum and maximum carrier levels" regulation as indicated in Table ZB.1.

**Table ZB.1 – Carrier signal levels at any system outlet**

FM sound mono:	80 dB( $\mu$ V) <sub>max</sub>
----------------	--------------------------------

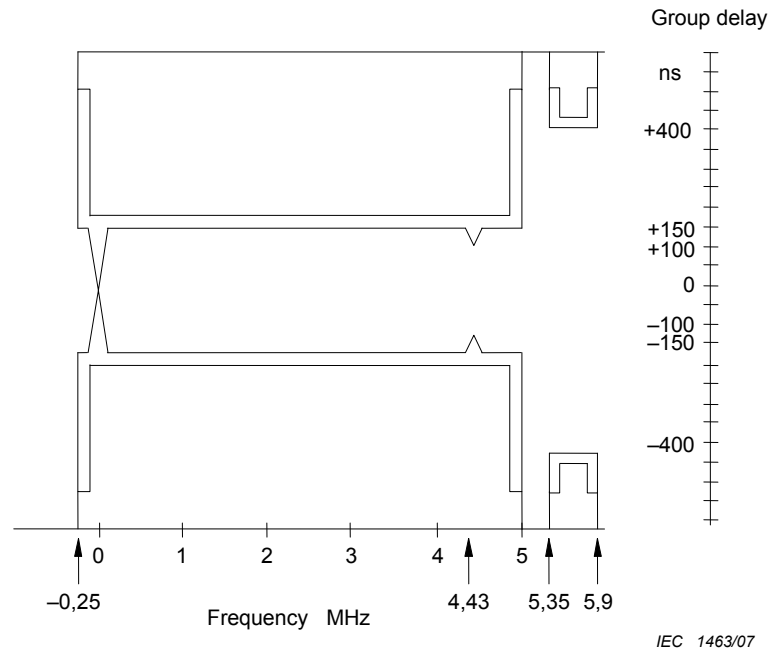
(measured in accordance with CISPR 16-1 [4] (quasi-peak measurement within 120 kHz bandwidth))



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(Dutch Technical Regulations for CATV networks (Technische Voorschriften voor Centrale Antenne Inrichtingen, 3e uitgave), 21 December 1977, which are valid for CATV networks in accordance with Article 21 of the Dutch Telecommunications law (Stb. 1988, 520))

Add the group delay response curve valid for PAL with FM-FM sound (Clause 5.4.1), as shown in Figure ZB.1.



**Figure ZB.1 – Mask group delay characteristic for PAL signals with FM-FM sound**

### 5.9.1 Netherlands

(Dutch Technical Regulations for CATV networks (Technische Voorschriften voor Centrale Antenne Inrichtingen, 3e uitgave), 21 December 1977, which are valid for CATV networks in accordance with Article 21 of the Dutch Telecommunications law (Stb. 1988, 520))

Replace by/add the following “single-frequency interference” regulation as indicated in Table ZB.2.

**Table ZB.2 – Single-frequency interference**

AM-VSB-PAL-signals:	$C/I \geq 60$ dB	(measured in a bandwidth of 300 kHz)
For signals outside used TV channels:	$C/I \geq 40$ dB	

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(Dutch Technical Regulations for CATV networks (Technische Voorschriften voor Centrale Antenne Inrichtingen, 3e uitgave), 21 December 1977, which are valid for CATV networks in accordance with Article 21 of the Dutch Telecommunications law (Stb. 1988, 520))

Replace the requirements for "echoes in television channels, PAL-SECAM standards" by the "requirement for echo loss in relation to the time delay of the reflected signal for AM-PAL-TV and FM-radio" (Figure ZB.2).

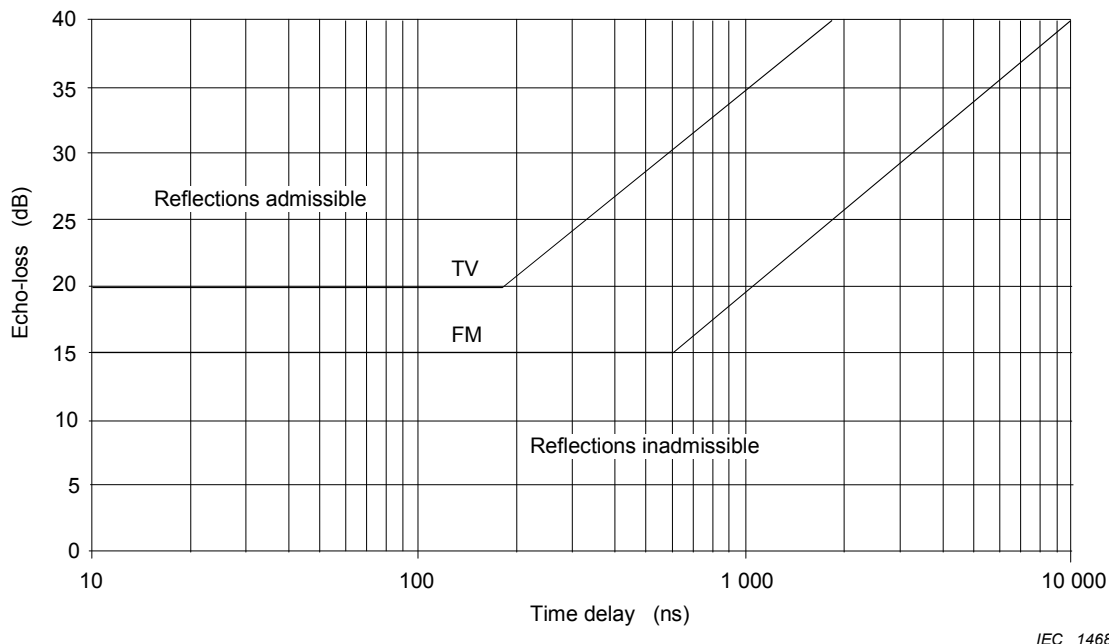


Figure ZB.2 – Requirement for echo loss in relation to the time delay of the reflected signal

#### 5.12.1 Denmark

(Danish technical regulations for CATV-networks, which are applicable to those networks in accordance with national legislation act. nr; 277 of June 1995, given by the Ministry of Research)

Add the requirement for "decoding margin" being "the decoding margin must be 40 %, when the margin is a minimum of 70 % at the receiving antenna".

#### 5.14.3 Netherlands

(Dutch Technical Regulations for CATV networks (Technische Voorschriften voor Centrale Antenne Inrichtingen, 3e uitgave), 21 December 1977, which are valid for CATV networks in accordance with Article 21 of the Dutch Telecommunications law (Stb. 1988, 520))

Add the requirement for "adjacent channel spacing" by  $\geq 400$  kHz.

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## INTRODUCTION

Standards and 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 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.

IEC 60728-1 includes the following clauses:

Clause 5 defines the system performance limits which will, with an unimpaired input, (headend input signal), produce picture and sound signals (at system outlets) where the impairment to any single parameter will not be worse, in normal operating conditions for any analogue channel, than grade four on the five-grade impairment scale contained in ITU- R Recommendation BT.500-10. For digitally modulated signals, the quality requirement is a quasi-error-free (QEF) reception.

Appropriate performance requirements for the signals at the receiving antennas site are given in Clause 6 in order to provide at the input of the headend of the cable network both analogue and digital television signals with suitable quality.

Clause 7 is applicable to home networks (including those of individual receiving systems) using coaxial cables, balanced cables or optical cables and primarily intended for television signals, sound signals and interactive services, operating between about 30 MHz and 3 000 MHz.

This clause (Clause 7), considering the basic operational characteristics of a home network, specifies the requirements with respect to the home network interface (HNI) taking into account the performance requirements given at the system outlet or at the terminal input.

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

## Part 1: System performance of forward paths

### 1 Scope

This part of IEC 60728 is applicable to any cable network (including individual receiving systems) having in the forward path a coaxial cable output and primarily intended for television and sound signals operating between about 30 MHz and 3 000 MHz.

This part of IEC 60728 specifies the basic methods of measurement of the operational characteristics of cable network having coaxial cable outputs in order to assess the performance of these systems and their performance limits.

### 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 60050-705, *International Electrotechnical Vocabulary – Chapter 705: Radio wave propagation*

IEC 60050-712:1992, *International Electrotechnical Vocabulary – Chapter 712: Antennas*

IEC 60050-725, *International Electrotechnical Vocabulary (IEV) – Chapter 725: Space radiocommunications*

IEC 60728-1-1, *Cable networks for television signals, sound signals and interactive services – Part 1-1: RF cabling for two way home networks*

IEC 60728-1-2, *Cable networks for television signals sound signals and interactive services – Part 1-2: Performance requirements for signals delivered at the system outlet in operation*

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

IEC 60728-3:2010, *Cable networks for television signals, sound signals and interactive services – Part 3: Active wideband equipment for cable networks*

IEC 60728-5, *Cable networks for television signals, sound signals and interactive services – Part 5: Headend equipment*

IEC 60728-10, *Cable networks for television signals, sound signals and interactive services – Part 10: System performance of return paths*

IEC 60728-11, *Cable networks for television signals, sound signals and interactive services – Part 11: Safety*