BS EN 50083-8:2013

BSI Standards Publication

Cable networks for television signals, sound signals and interactive services -

Part 8: Electromagnetic compatibility for networks

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National foreword

This British Standard is the UK implementation of EN 50083-8:2013. It supersedes BS EN 50083-8:2002+A11:2008 which is withdrawn.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.

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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EUROPÄISCHE NORM

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December 2013

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English version

Cable networks for television signals, sound signals and interactive services - Part 8: Electromagnetic compatibility for networks

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs - Partie 8: Compatibilité électromagnétique des réseaux

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 8: Elektromagnetische Verträglichkeit von Kabelnetzen

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CENELEC

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

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Foreword

This document (EN 50083-8:2013) has been prepared by CLC/TC 209 "Cable networks for television signals, sound signals and interactive services".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-11-08
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2016-11-08

This document supersedes EN 50083-8:2002 + A11:2008.

EN 50083-8:2013 includes the following significant technical changes with respect to EN 50083-8:2002 and EN 50083-8/A11:2008.

— EN 50083-8 with its methods of measurement and EMC performance requirements is explicitly dedicated to “under operating conditions (in situ)” to ensure the ongoing EMC integrity of cable networks.

— The harmonized standard EN 50529-2 is dedicated for the provision of presumption of conformance to the EMC Directive.

— The first intermediate frequency range (1st IF range) for satellite signal transmission was extended to cover now frequencies from 950 MHz up to 3 500 MHz.

— The method of measurement and the requirements for in-band immunity were extended taking into account the new EMC environment due to the allocation of broadband wireless services in the frequency band 790 MHz to 862 MHz. As a consequence, the limits of in-band immunity were specified for analogue and additionally for digital signals in this frequency range.

— The substitution method of measurement (power method) was deleted.

— EMC measurements below 30 MHz were deleted

— New Annex D “Measurement in other distances than the standard distance of 3 m”

— New Annex E “GPS based leakage detection system for cable networks”

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1 Scope

1.1 General

Standards of the EN 50083 and EN 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.

1.2 Specific scope of EN 50083-8

This European Standard applies to the radiation characteristics and immunity to electromagnetic disturbance of cable networks for television signals, sound signals and interactive services and covers the frequency range 0,15 MHz to 3,5 GHz. It should be noted that measurements below 30 MHz are not generally considered useful in the context of cable networks and are difficult to perform in practice.

Application of the harmonized standard EN 50529-2 provides presumption of conformance to the EMC Directive. Therefore, to fulfil the requirements of EN 50529-2, it is necessary to use cable network equipment that satisfies the requirements of EN 50083-2 regarding limits of radiation and of immunity to external fields.

This European Standard specifies methods of measurement and EMC performance requirements under operating conditions (in situ) to ensure the ongoing EMC integrity of cable networks.

Cable networks beyond the system outlets (e.g. the receiver lead, in simplest terms) which begin at the system outlet and end at the input to the subscriber's terminal equipment are not covered by the standard EN 50083-8. Requirements for the electromagnetic compatibility of receiver leads are laid down in EN 60966-2-4, EN 60966-2-5 and EN 60966-2-6.

Cable networks and a wide range of radio services have to coexist. These include for example the emergency services, safety of life, broadcasting, aeronautical, radio navigation services and also land mobile, amateur and cellular radio services. Frequency ranges of typical safety of life services are listed in Annex B. Additional protection for certain services may be required by national regulations.

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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.

EN 50083 (all parts), *Cable networks for television signals, sound signals and interactive services*

EN 50083-2, *Cable networks for television signals, sound signals and interactive services – Part 2: Electromagnetic compatibility for equipment*

EN 50117 (all parts), *Coaxial cables*

EN 50529-2, *EMC Network Standard – Part 2: Wire-line telecommunications networks using coaxial cables*

EN 55016-1-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus (CISPR 16-1-1)*

EN 55016-1-4, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements (CISPR 16-1-4)*

EN 60728 (all parts), *Cable networks for television signals, sound signals and interactive services (IEC 60728, all parts)*

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

IEC 60050-161, *International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161 and the following apply.

NOTE The most important definitions of IEC 60050-161 are repeated hereafter with the IEV-numbering given in brackets. In addition, some more specific definitions, used in this European Standard, are listed.

3.1.1
building penetration loss
ability of buildings, in which networks for distribution of television and sound are located, to attenuate the influence of electromagnetic fields from outside the buildings or to suppress the radiation of electromagnetic fields from inside the buildings

3.1.2
carrier-to-interference ratio
minimum level difference measured at the output of an active equipment or at any other interface within the network between the wanted signal and

— intermodulation products of the wanted signal and/or unwanted signals generated due to non-linearities,

— harmonics generated by an unwanted signal,

— unwanted signals that have penetrated into the operating frequency range,

— unwanted signals that have been converted to the frequency range to be protected (operating frequency range)

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3.1.3
degradation (of performance)
undesired departure in the operational performance of any device, equipment or system from its intended performance

Note 1 to entry: The term "degradation" can apply to temporary or permanent failure.

[SOURCE: IEV 161-01-19]

3.1.4
disturbance level
level of an electromagnetic disturbance at a given location, which results from all contributing (interference) sources

3.1.5
electromagnetic disturbance
any electromagnetic phenomenon which may degrade the performance of a device, equipment or system, or adversely affect living or inert matter

Note 1 to entry: An electromagnetic disturbance may be an electromagnetic noise, an unwanted signal or a change in the propagation medium itself.

[SOURCE: IEV 161-01-05]

3.1.6
electromagnetic interference
EMI
degradation of the performance of an equipment, transmission channel or system caused by an electromagnetic disturbance

Note 1 to entry: In French, the terms "perturbation électromagnétique" and "brouillage électromagnétique" designate respectively the cause and the effect, and should not be used indiscriminately.

Note 2 to entry: In English, the terms "electromagnetic disturbance" and "electromagnetic interference" designate respectively the cause and the effect, but they are often used indiscriminately.

[SOURCE: IEV 161-01-06]

3.1.7
(electromagnetic) radiation
1. phenomenon by which energy in the form of electromagnetic waves emanates from a source into space

2. energy transferred through space in the form of electromagnetic waves

Note 1 to entry: By extension, the term "electromagnetic radiation" sometimes also covers induction phenomena.

[SOURCE: IEV 161-01-10]

3.1.8
external immunity
ability of a device, equipment or network to perform without degradation in the presence of electromagnetic disturbances entering other than via its normal input terminals or antenna

[SOURCE: IEV 161-03-07]

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3.1.9
headend
equipment that is connected between receiving antennas or other signal sources and the remainder of the cable network, to process the signals to be distributed

Note 1 to entry: The headend can, for example, comprise antenna amplifiers, frequency converters, combiners, separators and generators.

3.1.10
ignition noise
unwanted emission of electromagnetic energy, predominantly impulsive in content, arising from the ignition system within a vehicle or device

3.1.11
immunity (to a disturbance)
ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance

[SOURCE: IEV 161-01-20]

3.1.12
internal immunity
ability of a device, equipment or system to perform without degradation in the presence of electromagnetic disturbances appearing at its normal input terminals or antennas

[SOURCE: IEV 161-03-06]

3.1.13
operating frequency range
passband for the wanted signals for which the equipment has been designed

3.1.14
receiver lead
lead that connects the system outlet to the subscriber's equipment

3.1.15
screening effectiveness
ability of an equipment or system to attenuate the influence of electromagnetic fields from outside the equipment or system or to suppress the radiation of electromagnetic fields from inside the equipment or system

3.1.16
spur network
cable network normally laid out inside buildings to which splitters, subscriber's taps or looped system outlets are connected

3.1.17
subscriber's feeder
feeder connecting a subscriber's tap to a system outlet or, where the latter is not used, directly to the subscriber's equipment

Note 1 to entry: A subscriber's feeder can include filters and balun transformer.

3.1.18
system outlet
device for interconnecting a subscriber's feeder and a receiver lead

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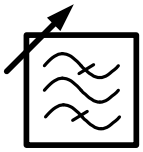
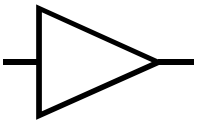
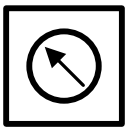
3.1.19
well-screened test set-up
test set-up whose radiation level, when terminated with a matched load, is at least 20 dB below the expected radiation level of the equipment under test, the test set-up and the equipment being supplied with the same input signal level

3.2 Symbols

For the purposes of this document, the following graphical symbols apply.

NOTE These graphical symbols are used in the figures of this European Standard. These symbols are either listed in IEC 60617 or based on symbols defined in IEC 60617.

Graphical symbol	Reference number and title	Graphical symbol	Reference number and title
	IEC 60617 (S01249) + IEC 60617 (S00081) Tuneable bandpass filter		IEC 60617 (S01239) Pre-amplifier
	Level meter		

3.3 Abbreviations

For the purposes of this document, the following abbreviations apply.

AM Amplitude Modulation

DSC Distress, Safety and Calling

DVB Digital Video Broadcasting

EMC Electromagnetic Compatibility

EMI Electromagnetic Interference

EPIRB Emergency Position Indicating Radiobeacons

FM Frequency Modulation

GPS Global Positioning System

HFC Hybrid Fibre Coax

IEV International Electrotechnical Vocabulary

ILS Instrument Landing System

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LAS	Leakage Analysis Software
MIL	Military (use)
NAV	(Aeronautical) Navigation (Radio)
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
SAT-IF	Satellite Intermediate Frequency
TV	Television
VOR	VHF Omnidirectional Range
VSB	Vestigial Side Band

NOTE Only the abbreviations used in the English version of this part of EN 50083 are mentioned in this subclause. The German and the French versions of this part can use other abbreviations. Refer to 3.3 of each language versions for details.

4 Methods of measurement

4.1 Basic principles

These methods of measurement describe the procedures for the testing of cable networks. The purpose of the measurements is to determine:

— the level of radiation generated by cable networks and

— the immunity of cable networks to external field strengths (e.g. those radiated by other radiocommunication services and RF applications).

The measurements cover the essential parameters and environmental conditions in order to assess cases of electromagnetic incompatibility between cable networks and other electrical or electronic equipment, networks, installations or other cabled networks with respect to the intended operation of such cable networks.

During the test the cable network shall operate within its normal operating conditions e.g. with regard to the signal level and signal quality at the system outlets.

NOTE Methods of measurement for radiated digitally modulated signals are under consideration. For digital egress measurements, where the level of emission is such that the signal is indeterminate from the general and other background noise, an analogue substitution method is employed, by using an analogue video carrier where possible.

4.2 Radiation from cable networks

4.2.1 General

The methods described hereafter are applicable to the measurement of radiation from cable networks (combination of cables and equipment). The termination point of the cable network to be measured is the system outlet.

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