

INTERNATIONAL STANDARD

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First edition
2001-02

Cabled distribution systems for television and sound signals –

Part 12: Electromagnetic compatibility of systems

*Systèmes de distribution par câbles destinés aux signaux
de radiodiffusion sonore et de télévision –*

*Partie 12:
Compatibilité électromagnétique des systèmes*

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International Electrotechnical Commission
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CABLED DISTRIBUTION SYSTEMS FOR TELEVISION
AND SOUND SIGNALS –**
Part 12: Electromagnetic compatibility of systems

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
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International Standard IEC 60728-12 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

FDIS	Report on voting
100/191/FDIS	100/217/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 3.

Annexes A and B are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2003. At this date, the publication will be:

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

The following differences exist in some countries:

- a) In Great Britain, based on the national Regulation MPT 1510: *Radiation Limits and Measurement Standard; Electromagnetic radiation from cabled distribution systems operating in the frequency range 30 MHz – 1 000 MHz*; May 1984 (revised 1989 and 1997) measurements of radiation from complete systems at the distribution frequencies in use and at other specified relevant frequencies are performed (Great Britain).
- b) In Great Britain, based on the national Regulation MPT 1520: *Radiation Limits and Measurement Standard; Electromagnetic radiation from cabled distribution systems operating in the frequency range 300 kHz – 30 MHz*; July 1984 (revised 1989 and 1997), measurements of radiation from complete systems at the distribution frequencies in use and at other specified relevant frequencies are performed (Great Britain).
- c) In Finland, based on the Radio Act and the Telecommunications Market Act, the Telecommunications Administration Centre can restrict or prohibit the use of certain channels in cable networks for the reason that radiation from the network causes excessive interference to co-frequency radiocommunications, even if the network fulfils the radiation limits as stated in this standard (Finland).
- d) In Finland, based on the Telecommunications Market Act, the Telecommunications Administration Centre can restrict or prohibit the use of certain channels in cable networks for the reason that the signal quality in the network will be degraded because of interference caused by leakage to the network of co-frequency radiocommunication signals (Finland).
- e) In Japan, based on the Regulation for Enforcement of the Cable Television Broadcast Law, radiated field strength (signal leakage) should not be more than 34 dB(μ V/m) ($\leq 50 \mu$ V/m) at a distance of 3 m in the frequency range of operating channels (Japan).

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INTRODUCTION

Standards of the IEC 60728 series deal with cable networks for television, sound signals and interactive services including equipment, systems and installations:

- for headend-reception, processing and distribution of sound and television signals and their associated data signals, and
- for processing, interfacing and transmitting all kinds of interactive services using all applicable transmission media.

They cover all kinds of networks, such as:

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

and all kinds of equipment installed in such networks.

The scope of these standards extends from antennas and special signal source inputs to headend or other interface points, to networks as a whole, up through network outlets, or terminal inputs, where no network outlet exists.

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

This part of IEC 60728 has been prepared to lay down the measuring methods and performance requirements and recommendations for electromagnetic compatibility of cabled distribution networks for television and sound signals.

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CABLED DISTRIBUTION NETWORKS FOR TELEVISION AND SOUND SIGNALS –

Part 12: Electromagnetic compatibility of systems

1 Scope

This part of IEC 60728 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 3,0 GHz.

This standard specifies EMC performance requirements and lays down the methods of measurement.

Cable networks beyond the network outlets (e.g. receiver leads, in simplest terms) which begin at the network outlet and at the subscriber's terminal equipment shall comply with these recommendations provided that no other specific provisions apply.

To minimise the risk of interference to other radio services caused by possible radiation from a cable network and to limit the possible penetration of external signals which may interfere with the operation of a network, it is necessary not only to use equipment which satisfies the requirement of IEC 60728-2 regarding limits of radiation and of immunity to external fields, but, also, to ensure the integrity of all cable connections on each item of active or passive cable network equipment.

Cable networks employing coaxial cables can be a source of interference to a wide range of services that utilise the radio frequency spectrum. These include not only emergency services, safety of life, broadcasting, aeronautical and radio navigation services but also land mobile, amateur and cellular radio services.

As existing and planned radio services need to be protected, radiation limits specified for cabled networks should be complied with.

Additional protection for certain services may be required by national regulations.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60728. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60728 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(161), *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

IEC 60096, (all parts) *Radio frequency cables*

IEC 60728, (all parts) *Cabled distribution systems for television and sound signals*

IEC 60728-1:1986, *Cabled distribution systems – Part 1: Systems primarily intended for sound and television signals operating between 30 MHz and 1 GHz*¹

IEC 60728-2:—, *Cabled distribution systems for television and sound signals – Part 2: Electromagnetic compatibility of equipment*²

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this standard, the definitions contained in IEC 60050(161) and the following definitions apply.

NOTE The most important definitions of IEC 60050(161) are repeated hereafter with the IEV numbering given in brackets.

3.1.1

(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 By extension, the term "electromagnetic radiation" sometimes also covers induction phenomena.

[IEV 161-01-10]

3.1.2

immunity (to a disturbance)

ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance [IEV 161-01-20]

3.1.3

electromagnetic disturbance

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

NOTE An electromagnetic disturbance may be an electromagnetic noise, an unwanted signal or a change in the propagation medium itself.

[IEV 161-01-05]

3.1.4

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

3.1.5

well-screened

a test set-up can be considered "well-screened" if its 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

¹ A new edition of this publication is under consideration.

² To be published

3.1.6**electromagnetic interference (EMI)**

degradation of the performance of an equipment, transmission channel or system caused by an electromagnetic disturbance [IEV 161-01-06]

3.1.7**operating frequency range**

passband for the wanted signals for which the equipment has been designed

3.1.8**carrier-to-interference ratio**

the minimum level difference measured at the output of an active equipment 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)

3.1.9**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

NOTE The headend may, for example, comprise antenna amplifiers, frequency converters, combiners, separators and generators.

3.1.10**system outlet**

a device for interconnecting a subscriber feeder and a receiver lead

3.1.11**inhouse network**

a cable network normally laid out inside buildings to which splitters, subscriber taps or looped system outlets are connected

3.1.12**ignition noise**

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

3.1.13**building penetration loss**

the 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

3.1.14**disturbance level**

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