

Electromagnetic compatibility (EMC) —

**Part 3-8: Limits — Guide to signalling
on low-voltage electrical installations —
Emission levels, frequency bands and
electromagnetic disturbance levels**

ICS 33.100

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National foreword

This British Standard reproduces verbatim IEC 61000-3-8:1997 and implements it as the UK national standard, to provide guidance for those wishing to supply or operate mains signalling equipment.

The relevant standard for equipment intended for operation within Europe, including the UK, is EN 50065-1 which has been notified in the Official Journal of the European Union as an EMC standard. The British Standard implementation of the European Standard is BS EN 50065-1, which has the status of the UK national standard. Other parts of BS EN 50065 are in preparation.

The UK participation in the preparation of both standards was entrusted to Technical Committee PEL/205, Mains signalling, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

This document, BS IEC 61000-3-8, is one of a family of EMC standards being developed. For the latest information please refer to the BSI Standards Electronic Catalogue which you may have or which can be found at: <http://www.bsi.org.uk>

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the IEC title page, page ii, pages 1 to 12, an inside back cover and a back cover.

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Amendments issued since publication

Amd. No.	Date	Comments
10238	February 2000	Changes to national foreword only

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 March 1998

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ISBN 0 580 29333 5

**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC**

61000-3-8

Première édition
First edition
1997-08

Compatibilité électromagnétique (CEM) –

**Partie 3:
Limites –**

**Section 8: Transmission de signaux dans
les installations électriques à basse tension –
Niveaux d'émission, bandes de fréquences
et niveaux de perturbations électromagnétiques**

Electromagnetic compatibility (EMC) –

**Part 3:
Limits –**

**Section 8: Signalling on low-voltage electrical
installations – Emission levels, frequency bands
and electromagnetic disturbance levels**



Numéro de référence
Reference number
CEI/IEC 61000-3-8: 1997

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Introduction

This standard is part of the IEC 61000 series, according to the following structure:

- Part 1: General — General consideration (introduction, fundamental principles) — Definitions, terminology;
- Part 2: Environment — Description of the environment — Classification of the environment — Compatibility levels;
- Part 3: Limits — Emission limits — Immunity limits (in so far as they do not fall under the responsibility of the product committees);
- Part 4: Testing and measurement techniques — Measurement techniques — Testing techniques;
- Part 5: Installation and mitigation guidelines — Installation guidelines — Mitigation methods and devices;
- Part 6: Generic standards;
- Part 9: Miscellaneous.

Each part is further subdivided into sections which are to be published either as international standards or as technical reports.

This section is an international standard which gives requirements related to emission levels, frequency bands and electromagnetic disturbance levels for signalling on low-voltage electrical installations.

1 Scope

This section of IEC 61000-3 applies to electrical equipment using signals in the frequency range from 3 kHz up to 525 kHz to transmit information on low-voltage electrical installations, either on the public supply system or within customers' premises.

It specifies frequency bands allocated to different applications (where appropriate), limits for the terminal output voltage in the operating band and limits for conducted and radiated disturbance. It also gives the methods of measurement.

It specifies disturbance limits in the frequency range from 3 kHz up to 400 GHz.

It does not specify the signal modulation methods nor the coding methods, nor functional features.

Environmental requirements and tests are not included.

NOTE Compliance with this standard does not imply permission to establish communications with locations outside the customer's installation or with other customers through the public supply system where this would otherwise not be allowed.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 61000-3. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 61000-3 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards. IEC 60050(60):1970, *International Electrotechnical Vocabulary (IEV) — Chapter 60: Radio communications*.

IEC 60050(161):1990, *International Electrotechnical Vocabulary (IEV) — Chapter 161: Electro-magnetic compatibility*.

CISPR 14:1993, *Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and electric apparatus*.

CISPR 16-1:1993, *Specification for radio disturbance and immunity measuring apparatus and methods — Part 1: Radio disturbance and immunity measuring apparatus*.

CISPR 16-2:1996, *Specification for radio disturbance and immunity measuring apparatus and methods — Part 2: Methods of measurement of disturbances and immunity*.

CISPR 22:1993, *Limits and methods of measurement of radio disturbance characteristics of information technology equipment*.

3 General

The objects of this section are twofold:

- to prevent interference by mains signalling equipment to radiocommunications services and other equipment connected to the network;
- to limit mutual interference between differing mains signalling equipments connected to the same electrical network.

With regard to the former object and above 150 kHz, limits for maximum output terminal voltage for household equipment are given in CISPR 14, and for information technology equipment are given in CISPR 22. Neither of these specifically apply to mains signalling equipment, but they have been used as guidance for the maximum output levels specified in this section. However, it should be pointed out that the CISPR is concerned with involuntary emissions whereas mains signalling is deliberate emission and, with some methods of signalling, the signal level needs to be above the possible noise level in order to achieve signalling success.

Below 150 kHz, there is no guidance and the values specified are considered appropriate and consistent with the CISPR principles. Another factor at any frequency band is that there may be, in some countries, regulatory guidelines for maximum emission levels for signalling which must be observed.

With regard to the latter object, three classes of technique may be used to limit mutual interference between different signalling systems:

- a) physical separation, separation by means of filters to limit interchange of emissions, or differential signal injection systems;
- b) separation by frequency bands allocated to different types of application;
- c) agreement to a common protocol, with identified and separate addressing mechanisms for different applications to avoid contention.

The general rules for the assignment and use of frequencies in the range from 9 kHz to 400 GHz by radiocommunication services and definitions of these services are specified in the ITU radio regulations which contain a table of frequency allocations. This standard takes these allocations into account where it defines frequency bands for different applications, in order to avoid disturbances to radiotelecommunications services. However, in the event of actual disturbance being caused, then additional precautions will need to be applied. The ITU regulations specify three regions, and frequency allocations vary between these regions.

Where requirements in specific regions having equipment within the scope of this section are known to differ from values stated, this is recorded by means of a note (as in clause 7). However, omission of such a note does not imply that frequency bands, output voltages, or conducted or radiated disturbance values stated are necessarily acceptable in these regions.

In ITU region 1, AM broadcasting bands begin above 148,5 kHz, and to optimise the use of the range in which mains signalling is allowed, and taking into account that there is no protocol common to electricity supplier and customer applications, the CENELEC countries have adopted the approach of b) and have agreed separate frequency bands for supplier/customer use. All clauses of this section therefore apply, and care is required with out of band emissions within the band(s) available for other equipment in order to limit the possibility of mutual interference.

In ITU regions 2 and 3, AM broadcasting begins at 525 kHz and 526,5 kHz respectively. Frequency band allocation for mains signalling is not employed and the methods used to limit mutual interference may fall outside the scope of this section, particularly where protocols need to be defined. In these regions, clause 5 will not apply and, as regards clause 7, out of band emissions within the band available for mains signalling may not be relevant in that they cannot interfere with radiocommunications services. However, consideration shall be given to possible interference with other equipment connected to the mains, and the relevant values given in clause 6 should be observed.

NOTE In the United States, the Federal Communications Commission is to allow mains signalling at frequencies above which AM broadcasting begins (in the band 535 kHz to 1 705 kHz), albeit with restrictions on maximum output levels. This is a special case and is not covered by this section.

Common-mode injection shall not be used unless otherwise explicitly allowed in local regulations (see also clause 9).

4 Definitions

For the purpose of this section, the definitions of IEC 60050(60) and IEC 60050(161) apply.

5 Frequency bands (ITU region 1 only)

Under consideration in ITU region 3.

5.1 Band 3 kHz up to 9 kHz

The use of frequencies in this band shall be restricted to electricity suppliers.

However, frequencies in this band may be used for signalling in customers' installations in cases and under conditions authorized by the electricity supplier.

5.2 Band 9 kHz up to 95 kHz

The use of frequencies in this band shall be restricted to electricity suppliers and their licensees.