BS EN 61000-2-2:2002+A2:2019

BSI Standards Publication

Electromagnetic compatibility (EMC)

Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems

bsi.

National foreword

This British Standard is the UK implementation of EN 61000-2-2:2002+A2:2019. It is identical to IEC 61000-2-2:2002, incorporating amendment 1:2017 and amendment 2:2018. It supersedes BS EN 61000-2-2:2002+A1:2017, which will be withdrawn on 17 May 2022.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee GEL/210, EMC - Policy committee.

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.

Published by BSI Standards Limited 2019

ISBN 978 0 580 98391 7

ICS 33.100.01

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 27 September 2002.

Amendments/corrigenda issued since publication

Date	Text affected
30 June 2018	Implementation of IEC amendment 1:2017 with CENELEC endorsement A1:2017
30 June 2019	Implementation of IEC amendment 2:2018 with CENELEC endorsement A2:2019

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61000-2-2:2002 +A2

May 2019

ICS 33.100.01

English Version

Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems

Compatibilité électromagnétique (CEM) – Partie 2-2: Environnement – Niveaux de compatibilité pour les perturbations conduites à basse fréquence et la transmission des signaux sur les réseaux publics d'alimentation basse tension

Elektromagnetische Verträglichkeit (EMV) – Teil 2-2: Umgebungsbedingungen – Verträglichkeitspegel für niederfrequente leitungsgeführte Störgrößen und Signalübertragung in öffentlichen Niederspannungsnetzen

This European Standard was approved by CENELEC on 2002-05-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Ref. No. EN 61000-2-2:2002+A2:2019: E

European foreword

The text of document 77A/367/FDIS, future edition 2 of IEC 61000-2-2, prepared by SC 77A, Low frequency phenomena, of IEC/TC 77 "Electromagnetic compatibility" was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC asEN 61000-2-2:2002 on 2002-05-01.

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)	(dop) 2003-02-01
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	(dow) 2005-05-01

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given for information only. In this standard, annex ZA is normative and annexes A and B are informative. Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61000-2-2:2002 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A1

The text of document 77A/958/FDIS, future IEC 61000-2-2:2002/A1, prepared by SC 77A "Low frequency phenomena" of IEC/TC 77 "Electromagnetic compatibility" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61000-2-2:2002/A1:2017.

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)	2018-05-01
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-08-01

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

Endorsement notice

The text of the International Standard IEC 61000-2-2:2002/A1:2017 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A2

The text of document 77A/980/CDV, future IEC 61000-2-2/A2, prepared by SC 77A "EMC - Low frequency phenomena" of IEC/TC 77 "Electromagnetic compatibility" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61000-2-2:2002/A2:2019.

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) 2019-11-17
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-05-17

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

Endorsement notice

The text of the International Standard IEC 61000-2-2:2002/A2:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated.

CISPR 15	NOTE	Harmonized as EN 55015

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE 1 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60050-101	— [1)]	International Electrotechnical Vocabulary (IEV) Part 101: Mathematics	—	—
IEC 60050-161	— [1)]	Chapter 161: Electromagnetic compatibility	—	—
IEC 60664-1 (mod)	— [1)]	Insulation coordination for equipment within low-voltage systems Part 1: Principles, requirements and tests	HD 625.1 S1 + corr. November	1996 [2)] 1996
IEC/TR3 61000-2-1	— [1)]	Electromagnetic compatibility (EMC) Part 2: Environment - Section 1: Description of the environment - Electromagnetic environment for low-frequency conducted disturbances and signalling in public power supply systems	—	—
IEC 61000-3-3	— [1)]	Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection	EN 61000-3-3 + corr. July	1995 [2)] 1997
IEC 61000-4-7	— [1)]	Part 4-7: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto	EN 61000-4-7	1993 [2)]
IEC 61000-4-15	— [1)]	Part 4-15: Testing and measurement techniques - Flickermeter - Functional and design specifications	EN 61000-4-15	1998 [2)]
IEC 61000-3-8	—	Electromagnetic compatibility (EMC) — Part 3-8: Limits — Signalling on low-voltage electrical installations — Emission levels, frequency bands and electromagnetic disturbance levels	—	—
CISPR 16-1-1	—	Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-1: Radio disturbance and immunity measuring apparatus — Measuring apparatus	EN 55016-1-1	—

Publication	Year	Title	EN/HD	Year
CISPR 16-2-1	—	Specification for radio disturbance and immunity measuring apparatus and methods — Part 2-1: Methods of measurement of disturbances and immunity — Conducted disturbance measurements	EN 55016-2-1	—

1) Undated reference.

2) Valid edition at date of issue.

Contents

Page

Foreword to amendment A1 ii

FOREWORD vii

INTRODUCTION ix

A1 INTRODUCTION to Amendment 1 x

1 Scope and object 1

2 Normative references 2

3 Definitions 2

3.1 General definitions 2

3.2 Phenomena related definitions 4

4 Compatibility levels 5

4.1 General comment 5

4.2 Voltage fluctuations and flicker 6

4.3 Harmonics 7

4.4 Interharmonics 8

A1 4.11 Voltage distortion in differential mode above the 40th harmonic up to 9 kHz 9

4.12 Voltage distortion in differential mode from 9 kHz to 150 kHz 10

4.12.1 General 10

4.12.2 Frequency range from 9 kHz to 30 kHz 11

4.12.3 Frequency range from 30 kHz to 150 kHz 11

4.5 Voltage dips and short supply interruptions 12

4.6 Voltage unbalance 12

4.7 Transient overvoltages 12

4.8 Temporary power frequency variation 12

4.9 DC component 12

4.10 A1 Signals from mains communicating systems up to 150 kHz 12

4.10.1 General 12

4.10.2 Ripple control systems (110 Hz to 3 000 Hz) 13

4.10.3 Mains communicating systems (band 3 kHz up to 9 kHz) 13

4.10.4 Mains communicating systems (band 9 kHz up to 95 kHz) 14

4.10.5 Mains communicating systems (band 95 kHz up to 150 kHz) 14

Annex A (informative) **The function of compatibility levels and planning levels in EMC** 15

Annex B (informative) **Discussion of some disturbance phenomena** 19

A1 Annex C (informative) **Rationale for the compatibility levels for voltage distortion in differential mode above the 40th harmonic up to 30 kHz** 26

A2 Annex D (informative) **Basis for the definition for the compatibility levels for voltage distortion in differential mode from the 30 kHz to 150 kHz** 28

A2 Annex E (informative) **Numerical values corresponding to Figure 1** 19

Bibliography 30

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.

2) The formal decisions or agreements of 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 IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61000-2-2 has been prepared by subcommittee 77A: Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility. It has the status of a basic EMC publication in accordance with IEC guide 107.

This second edition constitutes a technical revision.

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 the base publication and its amendment 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.

INTRODUCTION

IEC 61000 is published in separate parts according to the following structure:

Part 1: General

General considerations (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

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 several parts, published either as International Standards or as technical specifications or technical reports, some of which have already been published as sections. Others will be published with the part number followed by a dash and completed by a second number identifying the subdivision (example: 61000-6-1).

Detailed information on the various types of disturbances that can be expected on public power supply systems can be found in IEC 61000-2-1.

A1 INTRODUCTION to Amendment 1

This amendment is related to compatibility levels in the frequency range from 2 kHz to 150 kHz. It contains:

— compatibility levels for signals from mains communicating systems up to 150 kHz;

— compatibility levels for non-intentional emissions between 2 kHz and 30 kHz.

A second amendment is expected soon, containing:

— compatibility levels for non-intentional emissions between 30 kHz and 150 kHz. A1

Electromagnetic compatibility (EMC) —

Part 2-2:
Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems

1 Scope and object

A1 This part of IEC 61000 is concerned with conducted electromagnetic phenomena (disturbances and signals from mains communicating systems) in the frequency range from 0 kHz to 150 kHz. It gives compatibility levels for public low voltage a.c. distribution systems having a nominal voltage up to 420 V, single-phase, or 690 V, three-phase, and a nominal frequency of 50 Hz or 60 Hz.

The compatibility levels specified in this document apply at the point of common coupling. At the power input terminals of equipment receiving its supply from the above systems the levels of the conducted electromagnetic disturbances can, for the most part, be taken to be the same as the levels at the point of common coupling. In some situations this is not so, particularly in the case of a long line dedicated to the supply of a particular installation, or in the case of an electromagnetic phenomenon generated or amplified within the installation of which the equipment forms a part.

Compatibility levels are specified for conducted electromagnetic phenomena of the types which can be expected in public low voltage power supply systems, for guidance in the definition of:

— the limits to be set for conducted emissions into public power supply systems (including the planning levels defined in 3.1.5).

— the immunity limits to be set by product committees and others for the equipment exposed to the conducted electromagnetic phenomena present in public power supply systems.

NOTE 1 More information on compatibility levels and other main basic EMC concepts is given in IEC TR 61000-1-1.

A2 NOTE 2 The measurement methods of disturbance levels are outside the scope of this document. A2

The electromagnetic phenomena considered are:

— voltage fluctuations and flicker;

— harmonics up to and including order 40;

— interharmonics up to the 40th harmonic;

— voltage distortion in differential mode at higher frequencies (above the 40th harmonic up to 150 kHz);

— voltage dips and short supply interruptions;

— voltage unbalance;

— transient overvoltages;

— power frequency variation;

— d.c. components;

— signals from mains communicating systems (MCS).

Most of these phenomena are described in IEC TR 61000-2-1. In cases where it is not yet possible to establish compatibility levels, some information is provided in Annex B. A1