SLOVENSKI STANDARD
oSIST prEN IEC 61000-2-4:2023

01-november-2023

Elektromagnetna združljivost (EMC) - 2-4. del: Okolje - Združljivi nivoji v sistemu za distribucijo električne energije pri prenapetostnih udarih za nizkofrekvenčne motnje v vodnikih v industrijskih objektih

Electromagnetic compatibility (EMC) - Part 2-4: Environment - Compatibility levels in power distribution systems in industrial locations for low-frequency conducted disturbances

Elektromagnetische Verträglichkeit (EMV) - Teil 2-4: Umgebungsbedingungen - Verträglichkeitspegel für niederfrequente leitungsgeführte Störgrößen in Industrieanlagen

Compatibilité électromagnétique (CEM) - Partie 2-4: Environnement - Niveaux de compatibilité dans les installations industrielles pour les perturbations conduites à basse fréquence

Ta slovenski standard je istoveten z: **prEN IEC 61000-2-4:2023**

ICS:

33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

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77A/1180/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 61000-2-4 ED3**	
DATE OF CIRCULATION: **2023-09-29**	CLOSING DATE FOR VOTING: **2023-12-22**
SUPERSEDES DOCUMENTS: **77A/1081/CD, 77A/1110A/CC**	

IEC SC 77A : EMC - LOW FREQUENCY PHENOMENA	
SECRETARIAT: France	SECRETARY: Mr Cédric LAVENU
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☒ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
☒ SUBMITTED FOR CENELEC PARALLEL VOTING **Attention IEC-CENELEC parallel voting** The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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Recipients of this document are invited to submit, with their comments, notification of any relevant "In Some Countries" clauses to be included should this proposal proceed. Recipients are reminded that the CDV stage is the final stage for submitting ISC clauses. (SEE AC/22/2007 OR NEW GUIDANCE DOC).

TITLE:

Electromagnetic compatibility (EMC) – Part 2-4: Environment – Compatibility levels in power distribution systems in industrial locations for low-frequency conducted disturbances

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

Please note the change in title. Original title: Electromagnetic compatibility (EMC) - Part 2-4: Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 2-4: Environment – Compatibility levels in power distribution systems in industrial locations for low-frequency conducted disturbances

FOREWORD

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International Standard IEC 61000-2-4 has been prepared by subcommittee 77A: Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

This standard forms part 2-4 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107.

This third edition cancels and replaces the second edition, published in 2002, and constitutes a technical revision.

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

FDIS	Report on voting
77A/378/FDIS	77A/383/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, B and C are for information only.

At this date, the publication will be

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

- amended.

The contents of the corrigendum of July 2014 have been included in this copy.

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

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 several parts, published either as International Standards, 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 a second number identifying the subdivision (example: 61000-3-11).

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 and IEC 61000-2-12.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 2-4: Environment – Compatibility levels in power distribution systems in industrial locations for low-frequency conducted disturbances

1 Scope

This part of IEC 61000 is related to conducted disturbances in the frequency range from 0 kHz to 150 kHz. It gives compatibility levels for industrial locations, with a nominal voltage up to 35 kV and a nominal frequency of 50 Hz or 60 Hz.

NOTE 1 Industrial locations are defined in 3.1.8.

Power distribution systems on ships, aircraft, offshore platforms and railways are not included.

NOTE 2 See also Annex E. The compatibility levels specified in this standard apply at the in-plant point of coupling (IPC). The level of the low-frequency disturbances at the terminals of equipment receiving its supply from the IPC is generally assumed to be similar to the disturbance level at the IPC itself. However, in some situations this is not the case, particularly when a long feeder is dedicated to the supply of a particular load, or when a disturbance is generated or amplified within the installation of which the equipment forms a part.

Compatibility levels are specified for the types of low-frequency electromagnetic disturbances expected at any in-plant point of coupling (IPC) within industrial locations, for guidance in the definition of:

a) limits for disturbance emissions in industrial power distribution systems (including the planning levels defined in 3.1.5);

NOTE 3 A very wide range of conditions is possible in the electromagnetic environments of industrial networks. These are approximated in this standard by the three classes described in Clause 4. However, it is the responsibility of the operator of such a network to take account of the particular electromagnetic and economic conditions, including equipment characteristics, in setting the above-mentioned limits.

b) immunity levels for the equipment within these systems.

The disturbance phenomena considered are:

– voltage deviations;
– voltage dips and short interruptions;
– voltage imbalance;
– power-frequency variations;
– harmonics up to order 40;
– interharmonics up to the 40th harmonic;
– voltage components above the 40th harmonic up to 150 kHz;
– d.c. component;
– transient overvoltages.

The compatibility levels are given for different classes of environment determined by the characteristics of the supply network and loads.

NOTE 4 Compatibility levels at the point of common coupling (PCC) on public networks are specified in IEC 61000-2-2 for low-voltage networks and IEC 61000-2-12 for medium-voltage networks. Technical reports IEC 61000-3-6 and IEC 61000-3-7 describe the approach of power distribution system operators to the limitation of emissions from installations and large loads.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-101, *International Electrotechnical Vocabulary (IEV) – Part 101: Mathematics*

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

IEC 60050-551, *International Electrotechnical Vocabulary (IEV) – Part 551: Power electronics*

IEC 61000-2-2, *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*

IEC 61000-2-12, *Electromagnetic compatibility (EMC) – Part 2-12: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public medium-voltage power supply systems*

ISO/IEC Guide 98-3,2008: *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM [1]:1995)*

IEC 61000-4-7: *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*

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*

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*

3 Definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 General definitions

3.1.1
(electromagnetic) disturbance
electromagnetic phenomenon that can degrade the performance of a device, equipment or system

[IEV 161-01-05, modified, delete Notes 1, 2, 3 and the last part of the definition]

3.1.2
disturbance level
amount or magnitude of an electromagnetic disturbance, measured and evaluated in a specified way

[IEV 161-03-01, modified]

3.1.3
electromagnetic compatibility
EMC
ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment

[1] GUM: Guides to the expression of uncertainty in measurement

[IEV 161-01-07]

NOTE 1 Electromagnetic compatibility is a condition of the electromagnetic environment such that, for every phenomenon, the disturbance emission level is sufficiently low and immunity levels are sufficiently high so that all devices, equipment and systems operate as intended.

NOTE 2 Electromagnetic compatibility is achieved only if emission and immunity levels are controlled such that the immunity level of devices, equipment and systems, at any location, are not exceeded by the disturbance level at that location, resulting from the cumulative emission of all sources and other factors such as circuit impedances. Conventionally, compatibility is said to exist if the probability of the departure from intended performance or of the adverse effect is sufficiently low. See Clause 4 of IEC 61000-2-1.

NOTE 3 Where the context requires it, compatibility is intended to refer to a single disturbance or class of disturbances.

NOTE 4 Electromagnetic compatibility is a term used also to describe the field of study of the adverse electromagnetic effect which devices, equipment and systems undergo from each other or from electromagnetic phenomena.

3.1.4
(electromagnetic) compatibility level
specified electromagnetic disturbance level used as a reference level in a specified environment for coordination in the setting of emission and immunity limits

[IEV 161-03-10, modified, the last sentence of Note 1 is deleted because it is less relevant in industrial locations compared to public locations]

NOTE By convention, the compatibility level is chosen so that there is only a small probability that it will be exceeded by the actual disturbance level.

3.1.5
planning level
level of a particular disturbance in a particular environment, adopted as a reference value for the limits to be set for the emission of large loads and installations, in order to coordinate those limits with all the limits adopted for equipment intended to be connected to the power supply system

NOTE The planning level is locally specific and is adopted by those responsible for planning and operating the power supply network in the relevant area. (For further explanation, see Annex A of IEC 61000-2-2 and IEC TS 61000-1-2.)

3.1.6
Industrial and private power distribution system
Distribution network which is separated by at least one separation transformer from the public power supply system at which other customer installations are connected

3.1.7
point of common coupling
PCC
point on a public power supply network, electrically nearest to a particular load, at which other loads are, or could be, connected

NOTE The PCC is usually the point for which electromagnetic compatibility in public networks is to be considered.

[IEV 161-07-15, modified. The two notes have been deleted. The content of Note 2 is integrated in the definition.]

3.1.8
industrial location
location characterized by an installation consisting of a separate power distribution network, supplied by a high- or medium-voltage transformer, dedicated for the supply of this installation

Note 1 to entry: Industrial locations can generally be described by the existence of an installation with one or more of the following characteristics:

- significant amount of electrical power generated, transmitted and/or consumed;
- frequent switching of heavy inductive or capacitive loads;
- high currents and associated magnetic fields;
- presence of industrial, high power scientific and medical (ISM) equipment (for example, welding machines).

The electromagnetic environment at an industrial location is predominantly produced by the equipment and installation present at the location. There are types of industrial locations where some of the electromagnetic phenomena appear in a more severe degree than in other installations.

Example locations include metalworking, pulp and paper, chemical plants, car production, farm building, high voltage areas of airports.
Note 2 to entry: The connection between location and electromagnetic environment is given in 3.1.8

[SOURCE: 61000-6-4, 3.1.12, modified – The clause reference in Note 2 to entry has been updated]

3.1.9
electromagnetic environment

totality of electromagnetic phenomena existing at a given location

Note 1 to entry: In general, the electromagnetic environment is time-dependent and its description can be better described with a statistical approach.

Note 2 to entry: It is very important not to confuse the concept of electromagnetic environment with the surrounding location.

[SOURCES: 61000-6-4, 3.1.13, IEC 60050-161:1990, IEV 161-01-01, modified – Note 2 to entry has been added.]

3.1.10
in-plant point of coupling
IPC
point inside a non-public power distribution system, electrically nearest to a given load, at which loads from other branches are, or could be, connected

NOTE The IPC is usually the point for which electromagnetic compatibility in industrial networks is to be considered.

3.2 Phenomena-related definitions

The definitions below that relate to harmonics are based on the analysis of system voltages or currents by the Discrete Fourier Transform method (DFT). This is the practical application of the Fourier Transform as defined in IEV 101-13-09. See Annex A.

NOTE The Fourier Transform of a function of time, whether periodic or non-periodic, is a function in the frequency domain and is referred to as the frequency spectrum of the time function, or simply spectrum. If the time function is periodic the spectrum is constituted of discrete lines (or components). If the time function is not periodic, the spectrum is a continuous function indicating components at all frequencies.

Other definitions related to harmonics or interharmonics are given in IEV and other standards. Some of those other definitions, although not used in this standard, are discussed in Annex A.

3.2.1
fundamental frequency
frequency, in the spectrum obtained from a Fourier transform of a time function, to which all the components of this spectrum are referred.

[IEV 101-14-50, modified]

Note 1 to entry: In the case of a periodic function, the fundamental frequency is generally equal to the frequency of the function itself (see A.1.). For the purposes of this standard, the fundamental frequency is also the same as the power supply frequency.

3.2.2
fundamental component (or fundamental)
spectral component of a periodic time function whose frequency is equal to the fundamental frequency

3.2.3
harmonic frequency
frequency which is an integer multiple of the fundamental frequency