
Signalizacija po nizkonapetostnih električnih napeljavah v frekvenčnem območju od 3 kHz do 148,5 kHz – 2-2. del: Zahteve za odpornost omrežne komunikacijske opreme in sistemov, ki obratujejo v frekvenčnem območju od 95 kHz do 148,5 kHz in so namenjeni za uporabo v industrijskih okoljih

Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz - Part 2-2: Immunity requirements for mains communications equipment and systems operating in the range of frequencies 95 kHz to 148,5 kHz and intended for use in industrial environments

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**Signalling on low-voltage electrical installations
in the frequency range 3 kHz to 148,5 kHz
Part 2-2: Immunity requirements for mains communications equipment
and systems operating in the range of frequencies 95 kHz to 148,5 kHz
and intended for use in industrial environments**

Transmission de signaux sur les réseaux électriques basse tension dans la bande de fréquences de 3 kHz à 148,5 kHz
Partie 2-1: Exigences d'immunité pour les appareils et les systèmes de communication sur le réseau électrique dans la bande de fréquences de 95 kHz à 148,5 kHz et destinés à être utilisés dans un environnement industriel

Signalübertragung auf elektrischen Niederspannungsnetzen im Frequenzbereich 3 kHz bis 148,5 kHz
Teil 2-2: Störfestigkeitsanforderungen an Netz-Datenübertragungsgeräte und -systeme die im Frequenzbereich 95 kHz bis 148,5 kHz betrieben werden und für den Gebrauch im Industriebereich bestimmt sind

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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 European Standard was prepared by SC 205A, Mains communicating systems, of Technical Committee CENELEC TC 205, Home and Building Electronic Systems (HBES).

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50065-2-2 on 2001-12-04.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2003-08-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-08-01

This part of this standard defines limits and test methods for the immunity of mains communication equipment and systems (MCES) operating in the range of frequencies from 95 kHz to 148,5 kHz and intended for use in industrial environments. Immunity requirements for similar equipment intended for operation in residential, commercial and light industrial environments are given in Part 2-1 of this standard. Immunity requirements and tests applicable to Electricity Suppliers' equipment and systems operating in the band 3 kHz to 95 kHz are given in Part 2-3 of this standard.

These tests and limits represent essential electromagnetic compatibility and immunity requirements for the environment according to the scope. They may accordingly be applied to MCES according to the Scope of Part 2-3 if lower immunity requirements are sufficient for the considered MCES. Not all known disturbances have been included for testing purposes which have been limited to those disturbances known to be critical for the operation of such equipment including specific MCES disturbances such as conducted narrow band.

The immunity requirements have been selected to ensure an adequate level of immunity for MCES in industrial environments. The levels do not however cover extreme cases which may occur in any location but with an extremely low probability of occurrence.

NOTE This standard closely follows EN 50082-2, the generic immunity standard for the industrial environment, from which much of the material is taken. However the nature of MCES is such that the performance criteria given in clause 5 of this standard differ from those given in EN 50082-2, particularly regarding the recovery of equipment following a disturbance. For clarity and completeness all the affected sections of EN 50082-2 are therefore repeated in this part.

Annexes designated "normative" are part of the body of the standard.
In this standard, annex A is normative.

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1 Scope

This standard applies to electrical equipment using signals in the frequency range 95 kHz to 148,5 kHz to transmit or receive information on low voltage electrical systems, in industrial environments. In the case of equipment which includes functions other than the transmission or reception of information on low voltage electrical supplies, this standard applies only to that part of the equipment intended for such transmission or reception of information. Other parts of the equipment shall comply with the immunity standard or standards relevant to the functions of those other parts. In the event of tests being specified in those other standards of a different severity and where the construction of the equipment is such that the functions cannot be tested separately, the higher severity shall apply to all affected functions.

The object of this standard is to limit mutual influence between mains communication equipment and systems (MCES) operating in different frequency bands as defined in EN 50065-1 and to contribute to ensuring electromagnetic compatibility in general. It specifies essential immunity requirements and test methods, including those tests which are to be performed during type-testing of MCES on low-voltage installations, for electromagnetic interference in general and more specific interference coming from other MCES. It therefore defines the immunity test requirements for apparatus in relation to continuous and transient disturbances, both conducted and radiated, and electrostatic discharges. Test requirements are specified for each port considered.

This standard gives limits which are applicable to products operating in industrial environments. The levels do not however cover extreme cases which may occur in any location but with a low probability of occurrence. In special cases situations will arise where the level of disturbances may exceed the levels specified in this standard e.g. where a hand-held transmitter is used in proximity to an apparatus. In these instances special mitigation measures may have to be employed.

It does not specify immunity between mains communication systems operating in the same band (as defined in EN 50065-1) or immunity to signals originating from power line carrier systems operating on high or medium voltage networks.

Safety considerations are not included in this standard.

2 Normative references

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).

EN 50065-1		Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz – Part 1: General requirements, frequency bands and electromagnetic disturbances
EN 50082-2		Electromagnetic compatibility – Generic immunity standard – Part 2: Industrial environment
EN 55022	1998	Information technology equipment – Radio disturbance characteristics - Limits and methods of measurement (CISPR 22:1997, mod)

EN 61000-3-2	Electromagnetic compatibility (EMC) – Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase) (IEC 61000-3-2)
EN 61000-4-2	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test (IEC 61000-4-2)
EN 61000-4-3	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3, mod)
EN 61000-4-4	Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test (IEC 61000-4-4)
EN 61000-4-5	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test (IEC 61000-4-5)
EN 61000-4-6	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)
EN 61000-4-8	Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test (IEC 61000-4-8)
EN 61000-4-11	Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests (IEC 61000-4-11)
CISPR 16-1	1999 Specification for radio disturbance and immunity measuring apparatus methods – Part 1: Radio disturbance and measuring apparatus
IEC 60050-161	International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility

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3 Definitions

For the purpose of this standard, the following definitions together with those in IEC 60050-161 apply.

**3.1
electromagnetic interference**
see definition given in IEC 60050-161

**3.2
immunity**
ability of MCES to perform within specified limits in the presence of an electromagnetic disturbance

NOTE 1 Influences between MCES operating in the same frequency band (see EN 50065-1) are not taken into account.

NOTE 2 See IEC 60050-161 for a more general definition.

3.3**immunity level**

maximum level of a given electromagnetic disturbance incident on the equipment for which it remains capable of operating at a specified degree of performance
(Definition given in IEC 60050-161)

3.4**port**

particular interface of the specified accessory with the external electromagnetic environment (see Figure 1)

3.5**cable port**

point at which a conductor or a cable is connected to the accessory. Examples are signal, control and power ports

3.6**enclosure port**

physical boundary of the accessory through which electromagnetic fields may radiate or impinge

3.7**public mains network**

electricity lines to which all categories of consumers have access and which are operated by a supply or distribution undertaking for the purpose of supplying electrical energy

3.8**severity level**

value of an influencing electromagnetic quantity specified for an immunity test



Figure 1 – Examples of ports

4 Description of locations

The environments encompassed by this standard are industrial locations, both indoor and outdoor. Apparatus covered by this standard is intended to be connected to a power network supplied from a high or medium-voltage transformer dedicated to the supply of an installation feeding manufacturing or similar plant. This standard applies to apparatus intended to operate in industrial locations or in proximity to industrial power installations.

Industrial locations are characterised by the existence of one or more of the following conditions:

- industrial, scientific and medical (ISM) apparatus;
- heavy inductive or capacitive loads, which are frequently switched;
- currents and associated magnetic fields are high.

These are major contributors to the industrial electromagnetic environment and as such distinguish the industrial environment.

5 Performance criteria

For the purposes of the tables the performance criteria are:

- A : the MCES continues to operate as intended (e.g. transmission, reception) within the performance limits specified by the manufacturer. No change of actual operating state or stored data is allowed;
- B : a temporary degradation or loss of function or performance is permitted during the disturbance provided the equipment automatically resumes normal operation following the removal of the disturbance. The time behaviour for this resumption of normal operation shall be as specified in the MCES manufacturer's specification. No change of actual operating state or stored data is allowed;
- C : a temporary degradation or loss of function or performance is permitted during the disturbance and which requires manual intervention or system reset before normal operation is resumed following removal of the disturbance. No change of stored data is allowed.

NOTE 1 The electrical mains are a hostile communications environment and many MCES operate using sophisticated protocol services which permit the recovery of data corrupted by interference or cause re-transmission of data in the event of corruption. Errors caused by the application of the tests in this standard and which are subsequently corrected by the protocol services are regarded as normal and the equipment is regarded as operating as intended in such circumstances.

NOTE 2 Changes in stored data referring only to the internal operation of the equipment under test, such as communication error logs, and which are not directly related to the intended function of the equipment should be ignored.

6 Conditions during testing

The tests shall be made in the most susceptible operating mode in the frequency band being investigated consistent with normal application. The configuration of the test sample shall be varied to achieve maximum susceptibility. If the apparatus is part of a system or can be connected to auxiliary apparatus, then the apparatus shall be tested while connected to the minimum configuration of auxiliary apparatus necessary to exercise the ports in accordance with EN 55022.

The configuration and mode of operation during the tests shall be precisely noted in the test report.

If the apparatus has a large number of terminals then a sufficient number shall be selected to simulate actual operating conditions and to ensure that all the different types of terminations are covered. The test shall be carried out within the specified operating environmental range for the apparatus and at its rated supply voltage, unless otherwise indicated in the basic standard.

Performance criteria A and B require that the functions of transmission and communication are verified during the application of the disturbance or immediately thereafter. The test circuit used to conduct immunity tests on such equipment shall be that in Annex A (normative).

7 Immunity specifications

7.1 Applicability of immunity test requirements

The immunity test requirements for products covered by this standard are given in Table 1 to Table 5, inclusive, on a port by port basis. Tests are applied to all relevant ports of the apparatus according to the tables where the relevant ports exist and are accessible during normal operation of the equipment.