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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 50081-2

August 1993

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Descriptors: Radiodisturbances, electromagnetic compatibility, tests, equipment protection

English version

**Electromagnetic compatibility - Generic emission standard
Part 2: Industrial environment**

Compatibilité électromagnétique
Norme générique émission
Partie 2: Environnement industriel

Elektromagnetische Verträglichkeit
Fachgrundnorm Störaussendung
Teil 2: Industriebereich

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This European Standard was approved by CENELEC on 6 July 1993. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The present European Standard was prepared by the CENELEC Technical Committee TC 110, EMC. It was submitted to the CENELEC members for Unique Acceptance in August 1992 and was approved by CENELEC as EN 50081-2 on 6 July 1993.

NOTE: Austria and Switzerland have no obligation to implement this European Standard.

The following dates were fixed:

- | | | |
|---|-------|------------|
| - latest date of publication
of an identical national standard | (dop) | 1994-03-01 |
| - latest date of withdrawal
of conflicting national standards | (dow) | 1994-03-01 |

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Generic emission standard Part 2: Industry

1 Scope

This standard for emission requirements applies to electrical and electronic apparatus intended for use in the industrial environment, as described in clause 5, for which no dedicated product or product-family emission standard exists. Apparatus designed to radiate electromagnetic energy for radio communications purposes is excluded from this standard.

Disturbances in the frequency range 0 Hz to 400 GHz are covered. Fault conditions of apparatus are not taken into account.

Where a relevant dedicated product or product-family EMC emission standard exists, it shall take precedence over all aspects of this generic standard.

The environments encompassed by this standard are industrial, both indoor and outdoor. Apparatus covered by this standard is not intended for connection to a public mains network but is intended to be connected to a power network supplied from a high or medium voltage transformer dedicated for 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.

NOTE: Guidance on the choice and applicability of Generic EMC Standards can be found in CENELEC Report R110-002:1993 — Guide to Generic Standards.

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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.

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

<u>IEC Publication</u>	<u>Title</u>	<u>EN/HD</u>
-	Electromagnetic compatibility - Generic emission standard Part 1: Residential, commercial and light industry	EN 50081-1
50(161)	International Electrotechnical Vocabulary Chapter 161: Electromagnetic compatibility	-
CISPR 11 (mod)	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment	EN 55011
CISPR 14	Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus	EN 55014

<u>Publication</u>	<u>Title</u>	<u>EN/HD</u>
CISPR 22:1985 (mod)	Limits and methods of measurement of radio interference characteristics of information technology equipment	EN 55022:1987

3 Objective

The objective of this standard is to define limits and test methods for apparatus defined in the scope, in relation to electromagnetic emissions which may cause interference in other apparatus.

These emission limits represent essential electromagnetic compatibility requirements and have been selected to ensure that the disturbances generated by the apparatus operated normally at industrial locations do not exceed a level which could prevent other apparatus from operating as intended.

Test requirements are specified for each port considered.

NOTE 1: The limits in this standard may not, however, provide full protection against interference to radio and television reception when the apparatus is used closer than 30 m to the receiving antenna (e).

NOTE 2: In special cases, for instance when highly susceptible apparatus is being used in proximity, additional mitigation measures may have to be employed to reduce the electromagnetic emission further below the specified levels.

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4 Definitions

Definitions related to EMC and to relevant phenomena may be found in the EEC Directive, in chapter 161 of the IEV (IEC 50) and in IEC and CISPR Publications. The definitions stated in the Directive (89/336/EEC) take precedence.

The following particular definitions are used in this standard:

port: Particular interface of the specified apparatus with the external electro-magnetic environment (see figure 1).

enclosure port: The physical boundary of the apparatus through which electromagnetic fields may radiate or impinge.

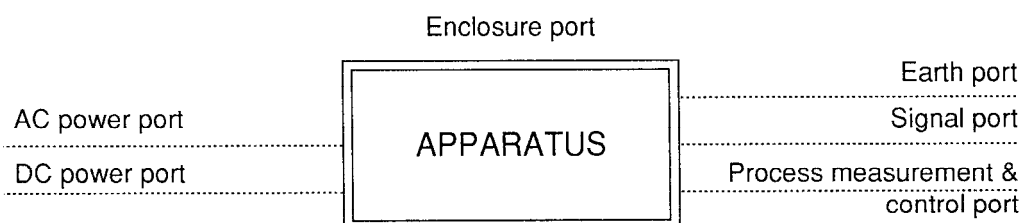


Figure 1: Examples of ports

5 Industrial locations

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

- industrial, scientific and medical (ISM)¹⁾ apparatus are present;
- heavy inductive or capacitive loads are frequently switched;
- currents and associated magnetic fields are high.

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

6 Conditions during measurement

The measurement shall be made in the operation mode producing the largest emission in the frequency band being investigated consistent with normal applications.

An attempt shall be made to maximize the emission by varying the configuration and the mode of operation of the test sample in accordance with the basic standard.

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 a similar manner to that described in clause 8 of EN 55022:1987.

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

If the apparatus has a large number of similar ports or ports with many similar connections, then a sufficient number shall be selected to simulate actual operating conditions and to ensure that all the different types of termination are covered.

The tests shall be carried out within the specified operating conditions for the apparatus and at its rated supply voltage, unless otherwise indicated in the basic standard.

7 Documentation for the purchaser/user

7.1 Documentation which shall be supplied to the purchaser/user:

The apparatus shall be supplied with a written warning indicating that the apparatus shall not be used in the residential, commercial and light-industrial environment unless the apparatus also conforms to the relevant standard [EN 50081-1].

The purchaser/user shall be informed if special measures have to be taken to achieve compliance, e.g. the use of shielded or special cables.

7.2 Documentation which shall be available to the purchaser/user upon request:

A list of auxiliary apparatus which together with the apparatus comply with the emission requirements.

1) As defined in EN 55011, ISM class A.

8 Applicability

The measurements in this standard are made on the relevant ports of the apparatus in accordance with table 1. Measurements shall only be carried out where the relevant ports exist.

It may be determined from consideration of the electrical characteristics and usage of a particular apparatus that some of the measurements are inappropriate and therefore unnecessary. In such a case it is required that the decision not to test be recorded in the test report.

9 Emission limits

The emission limits for apparatus covered by this standard are given on a port by port basis.

Measurements shall be performed in well-defined and reproducible conditions for each type of disturbance.

The description of the test, the test methods and the test set-up are given in basic standards which are referred to in table 1 and in table A.1.

The contents of these basic standards are not repeated here, however modifications or additional information needed for the practical application of the tests are given in this standard.

NOTE: The term 'basic standard' has been used for want of a more suitable term. The standards referenced (EN 55011, EN 55014, EN 55022 and EN 60555) are stand-alone product-family standards. The reference to 'basic standard' is intended to be limited to those parts of the standard that give the description of the test, the test methods and the test set-up.

Table 1: Emission

	Port	Frequency range	Limits	Basic standard	Applicability note	Remarks
1.1	Enclosure	30 - 230 MHz	30 dB(μ V/m) quasi peak, measured at 30 m distance	EN 55011	See Note 1	May be measured at 10 metres distance using the limits increased by 10 dB if the provisions of EN 55011 are met.
		230 - 1000 MHz	37 dB(μ V/m) quasi peak, measured at 30 m distance			
1.2	AC Mains	0,15 - 0,50 MHz	79 dB(μ V) quasi peak 66 dB(μ V) average	EN 55011	See Note 2 See Note 3	
		0,50 - 5 MHz	73 dB(μ V) quasi peak 60 dB(μ V) average			
		5 - 30 MHz	73 dB(μ V) quasi peak 60 dB(μ V) average			
<p>NOTE 1: In situ measurements are excluded from this standard.</p> <p>NOTE 2: Impulse noise (clicks) which occurs less than 5 times per minute is not considered. For clicks appearing more often than 30 times per minute the limits of item 1.2 apply. For clicks appearing between 5 and 30 times per minute, a relaxation of the limits of item 1.2 is allowed of $20 \log 30/N$ dB (where N is the number of clicks per minute). Criteria for separated clicks may be found in EN 55014.</p> <p>NOTE 3: Applies only to apparatus operating at less than 1000 V_{rms} AC.</p>						