

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Electrical equipment for measurement, control and laboratory use –
EMC requirements –
Part 1: General requirements**

**Matériel électrique de mesure, de commande et de laboratoire – Exigences
relatives à la CEM –
Partie 1: Exigences générales**

WATERMARK



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL EQUIPMENT FOR MEASUREMENT,
CONTROL AND LABORATORY USE –
EMC REQUIREMENTS –**

Part 1: General requirements

FOREWORD

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International Standard IEC 61326-1 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement and control.

The IEC 61326 series cancels and replaces IEC 61326:2002 and constitutes a technical revision.

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

FDIS	Report on voting
65A/456/FDIS	65A/464/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 2.

IEC 61326-1 consists of the following parts, under the general title *Electrical equipment for measurement, control and laboratory use – EMC requirements*:

- Part 1: General requirements – (Annexes A and B of IEC 61326: 2002 are integrated in the main body of IEC 61326-1)
- Part 2-1: Sensitive test and measurement equipment for EMC unprotected applications (Annex D of IEC 61326: 2002)
- Part 2-2: Portable test, measuring and monitoring equipment used in low-voltage distribution systems (Annex E of IEC 61326:2002)
- Part 2-3: Transducers with integrated or remote signal conditioning (includes Annex F of IEC 61326: 2002)
- Part 2-4: Insulation monitoring devices according to IEC 61557-8 and for equipment for insulation fault location according to IEC 61557-9 (new)
- Part 2-5: Test configurations, operational conditions and performance criteria for field devices with interfaces according to communication profile Family 3 Profile 3/2 (new)
- Part 2-6: *In vitro* diagnostic (IVD) medical equipment (new)
- Part 3-1: Immunity requirements for equipment performing or intended to perform safety related functions (functional safety) – Part 3.1: General industrial applications (The matter of functional safety in Table 2 of IEC 61326:2002 is incorporated into IEC 61326-3-1).

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

The contents of the corrigenda of February 2008 and February 2010 have been included in this copy.

INTRODUCTION

Instruments and equipment within the scope of this standard may often be geographically widespread and may have to operate under a wide range of environmental conditions.

The limitation of undesired electromagnetic emissions ensures that no other equipment, installed nearby, is unduly influenced by the equipment under consideration. The limits are more or less specified by, and therefore taken from, IEC and International Special Committee on Radio Interference (CISPR) publications.

However, the equipment has to function without undue degradation in a typical electromagnetic environment. The limit values for immunity specified in this standard have been chosen under this assumption. Special risks, involving for example nearby or direct lightning strikes, circuit-breaking, or exceptionally high electromagnetic radiation in close proximity, are not covered.

Complex electric and/or electronic systems require EMC planning in all phases of their design and installation, taking into consideration the electromagnetic environment, any special requirements, and the severity of failures.

This part of IEC 61326 specifies the EMC requirements that are generally applicable to all equipment within its scope. For certain types of equipment, these requirements will be supplemented or modified by the special requirements of one, or more than one, particular part within IEC 61326-2. These should be read in conjunction with the IEC 61326-1 requirements.

ITEH Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 61326-1:2005](https://standards.iteh.ai/standards/iec/61326-1-2005)

<https://standards.iteh.ai/standards/iec/61326-1-2005>

ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE – EMC REQUIREMENTS –

Part 1: General requirements

1 Scope

This part of IEC 61326 specifies requirements for immunity and emissions regarding electromagnetic compatibility (EMC) for electrical equipment, operating from a supply or battery of less than 1 000 V a.c. or 1 500 V d.c. or from the circuit being measured, intended for professional, industrial-process, industrial-manufacturing and educational use, including equipment and computing devices for

- measurement and test;
- control;
- laboratory use;
- accessories intended for use with the above (such as sample handling equipment),

intended to be used in industrial and non-industrial locations.

Computing devices and assemblies and similar equipment within the scope of Information Technology Equipment (ITE) and complying with applicable ITE EMC standards can be used in systems within the scope of this part of IEC 61326 without additional testing, if it is suitable for the intended electromagnetic environment.

This product family standard takes precedence over generic standards.

The following equipment is covered in this standard.

a) Electrical measurement and test equipment

This is equipment, which by electrical means measures, indicates or records one or more electrical or non-electrical quantities, also non-measuring equipment such as signal generators, measurement standards, power supplies and transducers.

b) Electrical control equipment

This is equipment, which controls one or more output quantities to specific values, with each value determined by manual settings, by local or remote programming, or by one or more input variables. This includes Industrial Process Measurement and Control (IPMC) equipment, which consists of devices such as:

- process controllers and regulators;
- programmable controllers;
- power supply units for equipment and systems (centralized or dedicated);
- analogue/digital indicators and recorders;
- process instrumentation;
- transducers, positioners, intelligent actuators, etc.

c) Electrical laboratory equipment

This is equipment which measures, indicates monitors or analyses substances, or is used to prepare materials, and includes In Vitro Diagnostic (IVD) equipment. This equipment may also be used in areas other than laboratories, for example self-test IVD equipment may be used in the home.

This standard is applicable to

- equipment for use in residential, commercial and light-industrial environments, according to IEC 61000-6-1;
- equipment for use in industrial locations;
- equipment for use in laboratories or test and measurement areas with a controlled electromagnetic environment;
- portable test and measurement equipment.

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

IEC 61000-3-2:2000, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16A per phase)*

IEC 61000-3-3:2002, *Electromagnetic compatibility (EMC) – 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*

IEC 61000-3-11:2000, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75A and subject to conditional connection*

IEC 61000-3-12:2004, *Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low voltage systems with input current > 16A and ≤ 75A per phase*

IEC 61000-4-2:2001, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2002, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:2004, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2001, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2003, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:1993, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*
Amendment 1 (2000)

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-6-1:2005, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments*

CISPR 11:2003, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161 as well as the following apply.

Other definitions, not included in IEC 60050-161 and this standard, but nevertheless necessary for the application of the different tests, are given in the EMC basic publications of the IEC 61000 series.

3.1

type test

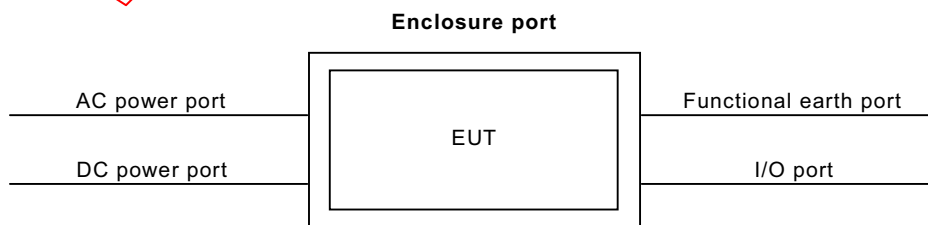
conformity test made on one or more items representative of the production
[IEV 151-16-16]

3.2

port

any particular interface of the specific device or system with the external electromagnetic environment within the scope of this part of IEC 61326 (see Figure 1 for an example of Equipment Under Test (EUT))

NOTE I/O ports are input, output or bi-directional, measurement, control, or data ports.



IEC 1119/98

Figure 1 – Examples of ports

3.3**enclosure port**

physical boundary of equipment through which electromagnetic fields may radiate or impinge

3.4**class A equipment**

equipment suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes

[CISPR 11, 4.2]

3.5**class B equipment**

equipment suitable for use in domestic establishments and in establishments directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes

[CISPR 11, 4.2]

3.6**long-distance lines**

lines within a building which are longer than 30 m, or which leave the building (including lines of outdoor installations)

3.7**industrial locations**

locations characterized by a separate power network, in most cases supplied from a high- or medium-voltage transformer, dedicated for the supply of installations feeding manufacturing or similar plants with one or more of the following conditions:

- frequent switching of heavy inductive or capacitive loads;
- high currents and associated magnetic fields;
- presence of Industrial, Scientific and Medical (ISM) apparatus (for example, welding machines)

3.8**laboratory or test and measurement area**

area that is specifically used for analysis, testing and servicing and where equipment is operated by trained personnel

3.9**controlled electromagnetic environment**

environment usually characterized by recognition and control of EMC threats by users of the equipment or design of the installation

3.10**functional earthing**

earthing a point or points in a system or in an installation or in equipment, for purposes other than electrical safety

[IEV 195-01-13, modified]

NOTE The EUT port used for functional earthing is called functional earth port.

4 General

Equipment and systems within the scope of this standard can be subjected to various kinds of electromagnetic disturbances, conducted by power, measurement or control lines, or radiated from the environment. The types and levels of disturbances depend on the particular conditions in which the systems, subsystems or equipment are installed and operate.

Equipment such as generators, analysers or frequency meters shall fulfil the requirements under the conditions defined by the manufacturer (that is without a test object connected, or connecting a 50 Ω termination to the output of a signal generator).

The manufacturer shall give information that emissions, which exceed the levels required by this standard, may occur when equipment is connected to a test object.

Equipment and individual devices of a system within the scope of this standard may also be a source of electromagnetic disturbances over a wide frequency range. These disturbances may be conducted through power and signal lines, or be directly radiated, and may affect the performance of other equipment, or influence the external electromagnetic environment.

For emissions, the objective of these requirements is to ensure that the disturbances generated by the equipment and systems, when operated normally, do not exceed a level which could prevent other systems from operating as intended. The emission limits are considered in 7.2

To comply with this standard, no additional EMC tests are required beyond those stated here.

NOTE 1 Higher immunity levels than those specified may be necessary for particular applications (for example, when reliable operation of the equipment is essential for safety) or when the equipment is intended for use in harsher electromagnetic environments.

NOTE 2 This standard does not specify basic safety requirements such as protection against electric shock, unsafe operation, insulation co-ordination and related dielectric tests for equipment. See IEC 61010 for safety requirements.

NOTE 3 The emission limits of this standard may not, however, provide full protection against interference to radio and television reception when the measurement, control or laboratory equipment is used closer than 30 m to the receiving antenna for industrial or professional applications, and closer than 10 m for domestic and commercial applications.

NOTE 4 In special cases, for example when highly susceptible equipment is being used in close proximity, additional mitigation measures may have to be employed to reduce the influencing electromagnetic emission further below the specified limits.

NOTE 5 The manufacturer may elect to perform all tests either on a single EUT or more than one. The testing sequence is optional.

5 EMC test plan

5.1 General

An EMC test plan shall be established prior to testing. It shall contain, as a minimum, the elements given in 5.2 to 5.5.

It may be determined from consideration of the electrical characteristics and usage of a particular apparatus that some tests are inappropriate and therefore unnecessary. In such cases, the decision not to test shall be recorded in the EMC test plan.