IEC 61326-1

Edition 3.0 2020-10

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

IEC 61326-1:2020-10(en-fr)

Documents
Document Sharing Hub
Full document details: IEC 61326-1-2020

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2020 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary
67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

IEC 61326-1

Edition 3.0 2020-10

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220.20; 25.040.40; 33.100.20

ISBN 978-2-8322-8947-1

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 8
3 Terms, definitions and abbreviations 9
3.1 Terms and definitions 9
3.2 Abbreviations 12
4 General 12
5 EMC test plan 12
5.1 General 12
5.2 Configuration of EUT during testing 13
5.2.1 General 13
5.2.2 Composition of EUT 13
5.2.3 Assembly of EUT 13
5.2.4 I/O PORTS 13
5.2.5 AUXILIARY EQUIPMENT 13
5.2.6 Cabling and earthing (grounding) 13
5.3 Operation conditions of EUT during testing 13
5.3.1 Operation modes 13
5.3.2 Environmental conditions 14
5.3.3 EUT software during test 14
5.4 Specification of FUNCTIONAL PERFORMANCE 14
5.5 Test description 14
6 Immunity requirements 14
6.1 Conditions during the tests 14
6.2 Immunity test requirements 14
6.3 Random aspects 17
6.4 Performance criteria 18
6.4.1 General 18
6.4.2 Performance criterion A 18
6.4.3 Performance criterion B 18
6.4.4 Performance criterion C 18
7 Emission requirements 19
7.1 Conditions during measurements 19
7.2 Emission limits 19
8 Test results and test report 19
9 Instructions for use 20
Annex A (normative) Immunity test requirements for PORTABLE TEST AND MEASUREMENT EQUIPMENT powered by battery or from the circuit being measured 21
Annex B (informative) Guide for analysis and assessment for electromagnetic compatibility 22
B.1 General 22
B.2 Risk analysis 22
B.3 Risk assessment 22
Bibliography 24

AVA Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

Figure 1 – Examples of ports 11

Table 1 – Immunity test requirements for equipment intended to be used in a BASIC ELECTROMAGNETIC ENVIRONMENT 15

Table 2 – Immunity test requirements for equipment intended to be used in an INDUSTRIAL ELECTROMAGNETIC ENVIRONMENT 16

Table 3 – Immunity test requirements for equipment intended to be used in a CONTROLLED ELECTROMAGNETIC ENVIRONMENT 17

Table A.1 – Immunity test requirements for PORTABLE TEST AND MEASUREMENT EQUIPMENT 21

Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1: General requirements

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

This third edition cancels and replaces the second edition, published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

– the immunity test levels and performance criteria have been reviewed;
– requirements for portable test and measurement equipment have been clarified and amended;

Documents
Document Sharing Hub
Full document details: IEC 61326-1-2020

– the description of the electromagnetic environments has been improved.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65A/975/FDIS	65A/985/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this document, the following print types are used:

- Terms used throughout this document which have been defined in Clause 3: SMALL CAPITALS

A list of all parts of the IEC 61326 series under the general title *Electrical equipment for measurement, control and laboratory use – EMC requirements*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

INTRODUCTION

Instruments and equipment within the scope of this document may often be geographically widespread and hence 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 should function without undue degradation in an electromagnetic environment typical for the locations where it is intended to be operated. In this respect, the document specifies three different types of electromagnetic environment and the levels for immunity. More detailed information about issues related to electromagnetic environments are given in IEC TR 61000-2-5. 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 should 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 IEC 61326-2 (all parts). These should be read in conjunction with the IEC 61326-1 requirements.

Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

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 AC or 1 500 V DC or from the circuit being measured. Equipment intended for professional, industrial-process, industrial-manufacturing and educational use is covered by this part. It includes 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 they are suitable for the intended electromagnetic environment.

It is generally considered that this product family standard takes precedence over the corresponding generic EMC standards.

The following equipment is covered by this document.

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, including In Vitro Diagnostic (IVD) medical equipment

This is equipment used to prepare or analyse materials, or measure, indicate or monitor physical quantities. This equipment might also be used in areas other than laboratories.

AVA Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

d) Equipment a), b) or c) as above when being equipped with components having radio functionality, for example for wireless communication.

Equipment within the scope of this document might be operated in different electromagnetic environments; depending on the electromagnetic environment different emission and immunity test requirements are applicable.

This document considers three types of electromagnetic environments:

- BASIC ELECTROMAGNETIC ENVIRONMENT;
- INDUSTRIAL ELECTROMAGNETIC ENVIRONMENT;
- CONTROLLED ELECTROMAGNETIC ENVIRONMENT.

Corresponding immunity test requirements are described in Clause 6.

In terms of emission requirements, equipment shall be classified in Class A or Class B equipment, as per the requirements and procedure of CISPR 11. The corresponding emission requirements are described in Clause 7.

The specified emission and immunity requirements aim at achieving electromagnetic compatibility between equipment covered in this document and other equipment that might operate at locations with electromagnetic environments considered in this document. Guidance for an assessment concerning the risk for achieving EMC is given in Annex B.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050-161:1990, *International Electrotechnical Vocabulary (IEV) – Part 161: Electromagnetic compatibility*
IEC 60050-161:1990/AMD1:1997
IEC 60050-161:1990/AMD2:1998
IEC 60050-161:1990/AMD3:2014
IEC 60050-161:1990/AMD4:2014
IEC 60050-161:1990/AMD5:2015
IEC 60050-161:1990/AMD6:2016
IEC 60050-161:1990/AMD7:2017
IEC 60050-161:1990/AMD8:2018
(available at <http://www.electropedia.org>)

IEC 61000-3-2:2018, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase)*

IEC 61000-3-3:2013, *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 61000-3-3:2013/AMD1:2017

IEC 61000-3-11:2017, *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 ≤75 A and subject to conditional connection*

Documents
Document Sharing Hub
Full document details: IEC 61326-1-2020

IEC 61000-3-12:2011, *Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤75 A per phase*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
IEC 61000-4-3:2006/AMD1:2007
IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*
IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11:2020, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
CISPR 11:2015/AMD1:2016
CISPR 11:2015/AMD2:2019

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
basic electromagnetic environment
environment existing at locations characterized by being supplied directly at low voltage from the public mains network

EXAMPLES

– residential properties, for example houses, apartments;

– retail outlets, for example shops, supermarkets;

– business premises, for example offices, banks;

Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

– areas of public entertainment, for example cinemas, public bars, dance halls;

– outdoor locations, for example petrol stations, car parks, amusement and sports centres;

– light-industrial locations, for example workshops, laboratories, service centres.

3.1.2
class A equipment
equipment suitable for use in all locations other than those allocated in residential environments and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes

[SOURCE: derived from CISPR 11:2015, 5.2]

3.1.3
class B equipment
equipment suitable for use in locations in residential environments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes

[SOURCE: derived from CISPR 11:2015, 5.2]

3.1.4
controlled electromagnetic environment
environment usually characterized by recognition and control of EMC threats by users of the equipment or by design of the installation

3.1.5
enclosure port
physical boundary of equipment through which electromagnetic fields may radiate or impinge

3.1.6
functional performance
operational performance characteristics defining the ability of equipment to achieve the intended functions

Note 1 to entry: Characteristics can be based on the related technical documentation.

3.1.7
industrial electromagnetic environment
environment existing at 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) equipment (for example, welding machines)

3.1.8
laboratory
test and measurement area that is specifically used for analysis, testing and servicing and where equipment is operated by trained personnel

3.1.9
long-distance lines
lines within a building which are longer than 30 m, or which leave the building (including lines of outdoor installations)

Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020

3.1.10
port
any particular interface of the specific equipment or system with the external electromagnetic environment

EXAMPLE See Figure 1 for an example of Equipment Under Test (EUT).

Note 1 to entry: I/O PORTS are input, output or bi-directional, measurement, control, or data PORTS.

Note 2 to entry: Within this document, PORTS intended to be connected with earth potential for functional reasons (functional earth PORTS) are considered as I/O PORTS.

Note 3 to entry: Within this document, the protective earth PORT (if any) is considered as part of the POWER PORT.

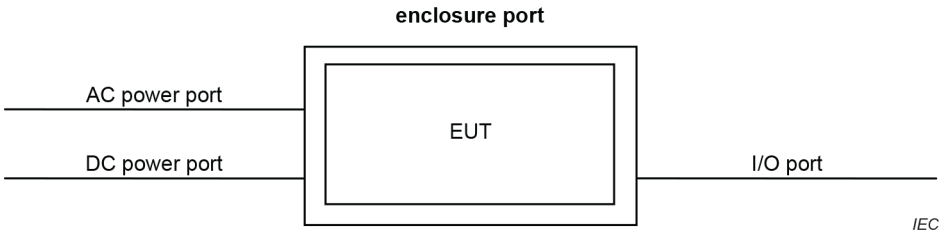

Figure 1 – Examples of ports

3.1.11
power port
port at which a conductor or cable, carrying the electrical input/output power needed for the operation (functioning), is connected to the equipment

3.1.12
portable test and measurement equipment
test and/or measuring equipment designed to be easily carried by hand and to be connected and disconnected by the user

3.1.13
type test
conformity test made on one or more items representative of the production

[SOURCE: IEC 60050-151:2001, 151-16-16]

3.1.14
auxiliary equipment
equipment necessary to provide the equipment under test (EUT) with the signals required for normal operation and equipment to verify the performance of the EUT

3.1.15
performance level
specified operation of equipment under conditions of intended use

3.1.16
degradation (in performance)
an undesired departure in the operational performance of any device, equipment or system from its intended performance

Note 1 to entry: The term "degradation" can apply to temporary or permanent failure.

[SOURCE: IEC 60050-161:1990, 161-01-19]

Documents
Document Sharing Hub
Full document details: IEC 61326-1-2020

3.1.17
loss of performance
operation of equipment outside a specified PERFORMANCE LEVEL

3.1.18
loss of function
operation of equipment with one (or more) of the equipment's function unusable

3.2 Abbreviations

AE	AUXILIARY EQUIPMENT
EMC	electromagnetic compatibility
ESD	electrostatic discharge
EUT	equipment under test
I/O	input/output
RF	radio frequency
UPS	uninterruptable power supply

4 General

Equipment and systems within the scope of this document can be subjected to various kinds of electromagnetic disturbances, sources of which include power, measurement or control lines or those 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 operated.

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

For emissions, the objective of the requirements given in this document 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.

NOTE 1 Higher immunity levels than those specified can 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. Also, additional tests and different performance criteria can be necessary for particular applications.

NOTE 2 In special cases, for example when highly susceptible equipment is being used near the EUT, additional mitigation measures could have to be employed to reduce the influencing electromagnetic emission further below the specified limits.

The manufacturer may select to perform all tests on either a single EUT or divide the tests among multiple EUTs. If the latter, each test result shall be traceable to the EUT tested. The testing sequence is optional.

5 EMC test plan

5.1 General

An EMC test plan shall be established prior to testing. At a minimum, it shall contain the elements defined in 5.2 to 5.5.

Documents
Document Sharing Hub
Full document details: IEC 61326-1-2020

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

5.2 Configuration of EUT during testing

5.2.1 General

Measurement, control and LABORATORY equipment often consists of systems with no fixed configuration. The kind, number and installation of different subassemblies within the equipment may vary from system to system. Thus, it is reasonable, and also recommended, not to test every possible arrangement.

To realistically simulate EMC conditions (related both to emission and immunity), the equipment assembly shall represent a typical installation as specified by the manufacturer. Such tests shall be carried out as TYPE TESTS under normal conditions as specified by the manufacturer.

5.2.2 Composition of EUT

All equipment, racks, modules, boards, etc. significant to EMC and belonging to the EUT shall be documented. If relevant, the software version shall be documented.

5.2.3 Assembly of EUT

If an EUT has a variety of internal and external configurations, the TYPE TESTS shall be made with one or more typical configurations that represent normal use in the intended environment. All types of modules shall be tested at least once. The rationale for this selection shall be documented in the EMC test plan.

5.2.4 I/O PORTS

Where there are multiple I/O PORTS, which are all of the same type, connecting a cable to just one of those PORTS is sufficient, provided that it can be shown that the additional cables would not affect the results significantly.

5.2.5 AUXILIARY EQUIPMENT

When a variety of equipment is provided for use with the EUT, at least one of each type of equipment shall be selected to simulate actual operating conditions. AUXILIARY EQUIPMENT may be simulated.

5.2.6 Cabling and earthing (grounding)

The cables and earth (ground) shall be connected to the EUT in accordance with the manufacturer's specifications. There shall be no additional earth connections.

5.3 Operation conditions of EUT during testing

5.3.1 Operation modes

A selection of representative operation modes shall be made, taking into account that not all functions, but only the most typical functions of the electronic equipment can be tested. The estimated worst-case operating modes for normal application shall be selected.

Documents
Document Sharing Hub
Full document details: IEC 61326-1-2020

5.3.2 Environmental conditions

The tests shall be carried out within the manufacturer's specified environmental operating range (for example, ambient temperature, humidity, atmospheric pressure), and within the rated ranges of supply voltage and frequency. The requirements of IEC 61000-4-2 for environmental conditions shall take precedence over those of the EUT specification (for example the humidity requirements for ESD).

5.3.3 EUT software during test

The software/firmware and its version used for the operation of the EUT shall be documented. This software shall represent the estimated worst-case operating mode for normal application.

5.4 Specification of FUNCTIONAL PERFORMANCE

For immunity tests, FUNCTIONAL PERFORMANCE for each operating mode and test shall be specified, where possible, as quantitative values, as well as for non-operational states such as 'standby' or 'battery charging', when an unintended change of state could occur through electromagnetic disturbances. If that is not possible, the FUNCTIONAL PERFORMANCE should be described in the test plan with supporting justification.

5.5 Test description

Each test to be applied shall be specified in the EMC test plan. The description of the tests, the test methods, the characteristics of the tests, and the test set-ups are given in the basic standards, which are referred to in 6.2 and 7.2. Additional information needed for the practical implementation of the tests is given in this document. The contents of the referenced standards need not be reproduced in the test plan. In some cases, the EMC test plan shall specify the application in detail.

NOTE Not all known disturbance phenomena have been specified for testing purposes in this document, but only those which are considered as most critical.

6 Immunity requirements

6.1 Conditions during the tests

The configuration of the EUT and the modes of operation used during the execution of each test shall be precisely noted in the test report.

Tests shall be applied to the relevant PORTS in accordance with Table 1, Table 2 or Table 3.

The tests shall be conducted in accordance with the basic standards listed in the relevant table for one phenomenon at a time. If additional test conditions or configurations not described in the basic standards are required, these conditions or configurations, and their rationale, shall be documented in the test report.

6.2 Immunity test requirements

Table 1 gives the immunity requirements for equipment intended to be used in a BASIC ELECTROMAGNETIC ENVIRONMENT.

Table 2 gives the immunity requirements for equipment intended to be used in an INDUSTRIAL ELECTROMAGNETIC ENVIRONMENT.

Table 3 gives the immunity requirements for equipment intended to be used in a CONTROLLED ELECTROMAGNETIC ENVIRONMENT.

Documents
Document Sharing Hub
Full document details: IEC 61326-1-2020

Annex A gives the immunity requirements for PORTABLE TEST AND MEASUREMENT EQUIPMENT that is powered by battery or from the circuit being measured.

The performance criteria A, B, and C that are mentioned in the following tables are described in 6.4.

Table 1 – Immunity test requirements for equipment intended to be used in a BASIC ELECTROMAGNETIC ENVIRONMENT

PORT	Phenomenon	Basic standard	Test value	Perform-ance criterion
ENCLOSURE	ESD	IEC 61000-4-2	±4 kV contact discharge ±8 kV air discharge	B B
	Electromagnetic field	IEC 61000-4-3	3 V/m (80 MHz to 1 GHz; 1,4 GHz to 6 GHz) [a]	A
	Power frequency magnetic field [b]	IEC 61000-4-8	3 A/m (50 Hz, 60 Hz)	A
AC power (including protective earth)	Burst	IEC 61000-4-4	±1 kV (5 kHz or 100 kHz)	B
	Surge	IEC 61000-4-5	±0,5 kV line-to-line ±1 kV line-to-ground	B B
	Conducted RF	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A
	Voltage dip	IEC 61000-4-11	0 % during half cycle 0 % during 1 cycle 70 % during 25/30 cycles [c]	B B C
	Short interruptions	IEC 61000-4-11	0 % during 250/300 cycles [c]	C
DC power [d, e] (including protective earth)	Burst	IEC 61000-4-4	±1 kV (5 kHz or 100 kHz)	B
	Surge	IEC 61000-4-5	±0,5 kV line-to-line ±1 kV line-to-ground	B B
	Conducted RF	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A
I/O signal/control [e] (including functional earth)	Burst [d]	IEC 61000-4-4	±0,5 kV (5 kHz or 100 kHz)	B
	Surge [f]	IEC 61000-4-5	±1 kV line-to-ground	B
	Conducted RF [d]	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A
I/O signal/control [e] connected directly to mains supply	Burst [d]	IEC 61000-4-4	±1 kV (5 kHz or 100 kHz)	B
	Surge [f]	IEC 61000-4-5	±0,5 kV line-to-line ±1 kV line-to-ground	B B
	Conducted RF [d]	IEC 61000-4-6	3 V (150 kHz to 80 MHz)	A

[a] In case testing is performed also in the frequency range from 1 GHz to 1,4 GHz, the same test level is recommended.

[b] Only to magnetically sensitive equipment.

[c] For example, "25/30 cycles" means "25 cycles for 50 Hz test" or "30 cycles for 60 Hz test".

[d] Only in the case of lines >3 m.

[e] DC POWER PORTS intended to be connected to a low voltage DC supply (≤ 60 V), where secondary circuits (isolated from the AC mains supply) are not subject to transient overvoltages (i.e. reliably-grounded, capacitively-filtered DC secondary circuits) shall be regarded as I/O signal/control PORTS.

[f] Only in the case of LONG-DISTANCE LINES.

AVA Documents
Document Sharing Hub

Full document details: IEC 61326-1-2020