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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1: General requirements

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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;
– the description of the electromagnetic environments has been improved.

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65A/975/FDIS	65A/985/RVD

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In this document, the following print types are used:

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

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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,
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- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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.

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 ~~may~~ 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~~

~~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.~~

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.

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*
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IEC 61000-4-11:~~2004~~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:~~2009~~2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
~~Amendment 1:2010~~
CISPR 11:2015/AMD1:2016
CISPR 11:2015/AMD2:2019

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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)

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IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*
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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*
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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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MATÉRIEL ÉLECTRIQUE DE MESURE, DE COMMANDE ET DE LABORATOIRE – EXIGENCES RELATIVES À LA CEM –

Partie 1: Exigences générales

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La Norme internationale IEC 61326-1 a été établie par le sous-comité 65A: Aspects systèmes, du comité d'études 65 de l'IEC: Mesure, commande et automation dans les processus industriels.

Cette troisième édition annule et remplace la deuxième édition parue en 2012. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

– les niveaux d'essai d'immunité et les critères de performance ont été revus;
– les exigences concernant le matériel d'essai et de mesure portable ont été clarifiées et modifiées;
– la description des environnements électromagnétiques a été améliorée.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
65A/975/FDIS	65A/985/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Dans le présent document, les caractères d'imprimerie suivants sont utilisés:

- Termes définis à l'Article 3 et utilisés dans tout ce document: PETITES MAJUSCULES

Une liste de toutes les parties de la série IEC 61326, publiées sous le titre général *Matériel électrique de mesure, de commande et de laboratoire – Exigences relatives à la CEM*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

INTRODUCTION

Les instruments et matériels relevant du domaine d'application du présent document peuvent souvent être très dispersés géographiquement et fonctionnent donc dans un large éventail de conditions environnementales.

La limitation des émissions électromagnétiques indésirables permet d'éviter qu'un autre matériel, installé à proximité, soit soumis à l'influence du matériel à l'étude. Les limites sont plus ou moins spécifiées dans les publications de l'IEC et du Comité international spécial des perturbations radioélectriques (CISPR) et proviennent donc de ces documents.

Toutefois, il convient que le matériel fonctionne sans dégradation excessive dans un environnement électromagnétique type pour les sites d'utilisation prévus. À cet effet, le document spécifie trois types différents d'environnements électromagnétiques ainsi que les niveaux d'immunité. L'IEC TR 61000-2-5 donne des informations plus détaillées en ce qui concerne les problèmes associés aux environnements électromagnétiques. Les risques particuliers, dus par exemple à des coups de foudre proches ou directs, à l'ouverture d'un circuit ou à un rayonnement électromagnétique exceptionnellement élevé à proximité immédiate, ne sont pas couverts.

Il convient que les systèmes électriques et/ou électroniques complexes exigent tout au long de leur conception et de leur installation une planification de la CEM prenant en compte l'environnement électromagnétique, les exigences particulières et la gravité des défauts.

Cette partie de l'IEC 61326 spécifie les exigences relatives à la CEM qui sont généralement applicables à tout matériel relevant de son domaine d'application. Pour certains types de matériels, ces exigences sont complétées ou modifiées par les exigences particulières d'une ou plusieurs des parties de l'IEC 61326-2 (toutes les parties). Il convient de lire celles-ci conjointement avec les exigences de l'IEC 61326-1.

MATÉRIEL ÉLECTRIQUE DE MESURE, DE COMMANDE ET DE LABORATOIRE – EXIGENCES RELATIVES À LA CEM –

Partie 1: Exigences générales

1 Domaine d'application

La présente partie de l'IEC 61326 spécifie les exigences relatives à l'immunité et aux émissions concernant la compatibilité électromagnétique (CEM) pour les matériels électriques fonctionnant à partir d'une source d'alimentation ou d'une batterie inférieure à 1 000 V en courant alternatif ou 1 500 V en courant continu ou à partir du circuit mesuré. Elle concerne les matériels prévus pour un usage professionnel, pour les processus industriels et pour l'enseignement. Cela comprend les matériels et les dispositifs informatiques pour

– le mesurage et les essais;
– la commande;
– les applications en LABORATOIRE;
– les accessoires prévus pour être utilisés dans les cas susmentionnés (par exemple, matériel de manipulation d'échantillons),

dans un usage en milieu industriel ou non industriel.

Les dispositifs informatiques et les matériels similaires relevant du domaine d'application des appareils de traitement de l'information (ATI) et répondant aux normes de CEM des ATI peuvent être utilisés dans les systèmes relevant du domaine d'application de la présente partie de l'IEC 61326, sans essais supplémentaires s'ils sont adaptés à l'environnement électromagnétique prévu.

En règle générale, la présente norme de famille de produits prévaut sur les normes CEM génériques correspondantes.

Les matériels cités ci-après sont traités dans le présent document.

a) Matériels électriques de mesure et d'essai

   Matériels électriques permettant de mesurer, d'indiquer ou d'enregistrer une ou plusieurs grandeurs électriques ou non électriques, et également des matériels qui ne sont pas des matériels de mesure, tels que générateurs de signaux, étalons, alimentations et transducteurs.

b) Matériels électriques de commande

   Matériels servant à commander une ou plusieurs grandeurs de sortie spécifiques, chacune de ces grandeurs étant déterminée par des réglages manuels, par une programmation locale ou à distance, ou par une ou plusieurs variables d'entrée. Cette catégorie comprend les matériels de mesure et de commande dans les processus industriels (IPMC - industrial process measurement and control), tels que:

   – les régulateurs et contrôleurs de processus;
   – les automates programmables;
   – les blocs d'alimentation des matériels et des systèmes (centralisés ou spécialisés);
   – les indicateurs et les enregistreurs analogiques/numériques;
   – les instruments de processus;
   – les transducteurs, positionneurs, organes de commande intelligents, etc.

c) Matériels électriques de LABORATOIRE, y compris le matériel médical de diagnostic in vitro (IVD – In Vitro Diagnostic)

   Ces matériels servent à préparer ou analyser des matières, ou à mesurer, indiquer ou contrôler les grandeurs physiques. Ces matériels peuvent être aussi utilisés dans des emplacements autres que des laboratoires.

d) Matériels a), b) ou c) ci-dessus équipés de composants ayant une fonction radioélectrique, par exemple pour les communications sans fil.

Les matériels relevant du domaine d'application du présent document peuvent être utilisés dans des environnements électromagnétiques différents; selon l'environnement électromagnétique, différentes exigences concernant les émissions et les essais d'immunité sont applicables.

Le présent document prend en considération trois types d'environnements électromagnétiques:

- l'ENVIRONNEMENT ELECTROMAGNETIQUE ORDINAIRE;
- l'ENVIRONNEMENT ELECTROMAGNETIQUE INDUSTRIEL;
- l'ENVIRONNEMENT ELECTROMAGNETIQUE CONTROLE.

Les exigences correspondantes relatives aux essais d'immunité sont décrites à l'Article 6.

En matière d'exigences relatives aux émissions, les matériels doivent être classés en matériels de classe A ou de classe B, conformément aux exigences et à la procédure de la CISPR 11. Les exigences correspondantes relatives aux émissions sont décrites à l'Article 7.

Les exigences spécifiées relatives aux émissions et à l'immunité ont pour objet d'assurer la compatibilité électromagnétique entre le matériel couvert par le présent document et d'autres matériels susceptible de fonctionner dans des environnements électromagnétiques pris en considération dans le présent document. L'Annexe B donne des recommandations pour une appréciation du risque relatif à l'obtention de la CEM.

2 Références normatives

Les documents suivants cités dans le texte constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60050-161:1990, *Vocabulaire Electrotechnique International (IEV) – Partie 161: Compatibilité électromagnétique*
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
(disponible à l'adresse < http://www.electropedia.org>)

IEC 61000-3-2:2018, *Compatibilité électromagnétique (CEM) – Partie 3-2: Limites – Limites pour les émissions de courant harmonique (courant appelé par les appareils ≤16 A par phase)*

IEC 61000-3-3:2013, *Compatibilité électromagnétique (CEM) – Partie 3-3: Limites – Limitation des variations de tension, des fluctuations de tension et du papillotement dans les réseaux publics d'alimentation basse tension, pour les matériels ayant un courant assigné ≤16 A par phase et non soumis à un raccordement conditionnel*
IEC 61000-3-3:2013/AMD1:2017

IEC 61000-3-11:2017, *Compatibilité électromagnétique (CEM) – Partie 3-11: Limites – Limitation des variations de tension, des fluctuations de tension et du papillotement dans les réseaux publics d'alimentation basse tension – Équipements ayant un courant assigné ≤75 A et soumis à un raccordement conditionnel*

IEC 61000-3-12:2011, *Compatibilité électromagnétique (CEM) – Partie 3-12: Limites – Limites pour les courants harmoniques produits par les appareils connectés aux réseaux publics basse tension ayant un courant appelé >16 A et ≤75 A par phase*

IEC 61000-4-2:2008, *Compatibilité électromagnétique (CEM) – Partie 4-2: Techniques d'essai et de mesure – Essai d'immunité aux décharges électrostatiques*

IEC 61000-4-3:2006, *Compatibilité électromagnétique (CEM) – Partie 4-3: Techniques d'essai et de mesure – Essai d'immunité aux champs électromagnétiques rayonnés aux fréquences radioélectriques*
IEC 61000-4-3:2006/AMD1:2007
IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:2012, *Compatibilité électromagnétique (CEM) – Partie 4-4: Techniques d'essai et de mesure – Essais d'immunité aux transitoires électriques rapides en salves*

IEC 61000-4-5:2014, *Compatibilité électromagnétique (CEM) – Partie 4-5: Techniques d'essai et de mesure – Essai d'immunité aux ondes de choc*
IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:2013, *Compatibilité électromagnétique (CEM) – Partie 4-6: Techniques d'essai et de mesure – Immunité aux perturbations conduites, induites par les champs radioélectriques*

IEC 61000-4-8:2009, *Compatibilité électromagnétique (CEM) – Partie 4-8: Techniques d'essai et de mesure – Essai d'immunité au champ magnétique à la fréquence du réseau*

IEC 61000-4-11:2020, *Compatibilité électromagnétique (CEM) – Partie 4-11: Techniques d'essai et de mesure – Essais d'immunité aux creux de tension, coupures brèves et variations de tension pour les appareils à courant d'entrée inférieur ou égal à 16 A par phase*

CISPR 11:2015, *Appareils industriels, scientifiques et médicaux – Caractéristiques de perturbations radioélectriques – Limites et méthodes de mesure*
CISPR 11:2015/AMD1:2016
CISPR 11:2015/AMD2:2019