BS EN IEC 61326-3-2:2018

BSI Standards Publication

Electrical equipment for measurement, control and laboratory use – EMC requirements

Part 3-2: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – Industrial applications with specified electromagnetic environment (IEC 61326-3-2:2017)

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National foreword

This British Standard is the UK implementation of EN IEC 61326-3-2:2018. It is identical to IEC 61326-3-2:2017. It supersedes BS EN 61326-3-2:2008, which will be withdrawn on 30 November 2021.

The UK participation in its preparation was entrusted to Technical Committee GEL/65/1, System considerations.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Published by BSI Standards Limited 2018

ISBN 978 0 580 89198 4

ICS 25.040.40; 33.100.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2018.

Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61326-3-2

November 2018

ICS 25.040.40; 33.100.20

Supersedes EN 61326-3-2:2008

English Version

Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 3-2: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) - Industrial applications with specified electromagnetic environment (IEC 61326-3-2:2017)

Matériel électrique de mesure, de commande et de laboratoire - Exigences relatives à la CEM - Partie 3-2: Exigences d'immunité pour les systèmes relatifs à la sécurité et pour les matériels destinés à réaliser des fonctions relatives à la sécurité (sécurité fonctionnelle) - Applications industrielles dont l'environnement électromagnétique est spécifié (IEC 61326-3-2:2017)

Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen - Teil 3-2: Störfestigkeitsanforderungen für sicherheitsbezogene Systeme und für Geräte, die für sicherheitsbezogene Funktionen vorgesehen sind (Funktionale Sicherheit) - Industrielle Anwendungen in spezifizierter elektromagnetischer Umgebung (IEC 61326-3-2:2017)

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European foreword

The text of document 65A/820/FDIS, future edition 2 of IEC 61326-3-2, prepared by SC 65A "System aspects" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61326-3-2:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-05-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-11-30

This document supersedes EN 61326-3-2:2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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The text of the International Standard IEC 61326-3-2:2017 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61000 (series)	NOTE	Harmonized as EN 61000 (series)
IEC 61000-1-2:2016	NOTE	Harmonized as EN 61000-1-2:2016 (not modified)
IEC 61000-6-7	NOTE	Harmonized as EN 61000-6-7
IEC 61508 (series)	NOTE	Harmonized as EN 61508 (series)
IEC 61508-1:2010	NOTE	Harmonized as EN 61508-1:2010 (not modified)
IEC 61508-4:2010	NOTE	Harmonized as EN 61508-4:2010 (not modified)
IEC 61784-3	NOTE	Harmonized as EN 61784-3
CISPR 11:2015	NOTE	Harmonized as EN 55011:2016

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050-161	-	International Electrotechnical Vocabulary. Chapter 161: Electromagnetic compatibility	-	-
IEC 61000-4-2	2008	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	2009
IEC 61000-4-3	2006	Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	2006
+ A1	2007		+ A1	2008
+ A2	2010		+ A2	2010
IEC 61000-4-4	2012	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	2012
IEC 61000-4-5	2014	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2014
IEC 61000-4-6	2013	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	2014
IEC 61000-4-8	2009	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	2010
IEC 61000-4-11	2004	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	2004

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IEC 61000-4-16	2015	Electromagnetic compatibility (EMC) - Part 4-16: Testing and measurement techniques - Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz	EN 61000-4-16	2016
IEC 61000-4-29	2000	Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests	EN 61000-4-29	2000
IEC 61000-4-34	2005	Electromagnetic compatibility (EMC) - Part 4-34: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current more than 16 A per phase	EN 61000-4-34	2007
+ A1	2009		+ A1	2009
IEC 61326-1	2012	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements	EN 61326-1	2013
IEC 61326-3-1	2017	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) -General industrial applications	EN 61326-3-1	2017
IEC 61508-2	2010	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems	EN 61508-2	2010

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 3-2: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – Industrial applications with specified electromagnetic environment

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.
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International Standard IEC 61326-3-2 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2008. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- extension of the frequency range up to 6 GHz for the radio-frequency electromagnetic field test according to IEC 61000-4-3,

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- replacement of the performance criterion FS with DS according to the generic standard IEC 61000-6-7,
- adding Table 1 – Aspects to be considered during application of performance criterion DS,
- including immunity tests for devices with current consumption > 16 A according to IEC 61000-4-34,
- updating Figure A.1 and Figure 1 for better readability,
- adding tests according to IEC 61000-4-16 to replace the tests according to IEC 61000-4-6 in the frequency range between 10 kHz and 150 kHz.

IEC 61326-3-2 is to be read in conjunction with IEC 61326-1.

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

FDIS	Report on voting
65A/820/FDIS	65A/826/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.

A list of all the 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 publication will remain unchanged until the stability date indicated on the IEC website 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.

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.

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INTRODUCTION

Functional safety is that part of the overall safety relating to the equipment under control (EUC) and the EUC control system which depends on the correct functioning of the electrical safety-related systems. To achieve this, all items of equipment of the safety-related system which are involved in the performance of the safety functions must behave in a specified manner under all relevant conditions.

The IEC basic safety publication for functional safety of electrical/electronic/programmable electronic safety-related systems is IEC 61508. It sets the overall requirements to achieve functional safety. Sufficient immunity to electromagnetic disturbances is one of those requirements.

The concept of IEC 61508 distinguishes between the consideration of the application and the design of safety-related electrical and electronic systems. The overall safety requirements specification specifies all relevant requirements of the intended application, as follows.

a) definition of the safety functions, based on a risk assessment of the intended application (which functions are intended to reduce risk);

b) appropriate safety integrity level (SIL) for each safety function based on a risk assessment of the intended application;

c) definition of the environment in which the system is intended to work including the electromagnetic environment as required by IEC 61508-2.

The requirements for each safety function are then specified in one or more system safety requirements specifications (SSRS). Hence, with regard to immunity against electromagnetic phenomena, the essential starting point is that the electromagnetic environment and its phenomena are considered in the SSRS, as required by IEC 61508. The safety-related system intended to implement the specified safety function has to fulfil the SSRS, and, from it, corresponding immunity requirements have to be derived for the items of equipment, which results in an equipment requirement specification. With respect to the electromagnetic environment, the SSRS and the equipment requirement specification should be based on a competent assessment of the foreseeable electromagnetic threats in the real environment over the whole operational life of the equipment. Hence, immunity requirements for the equipment depend on the characteristics of the electromagnetic environment in which the equipment is intended to be used.

The equipment manufacturer, therefore, has to prove that the equipment fulfils the equipment requirement specification and the system integrator must prove that the system fulfils the SSRS. Evidence has to be produced by application of appropriate methods. They do not need to consider any other aspects of the application, for example, risk of the application associated to any failure of the safety-related system. The objective is for all equipment in the system to comply with particular performance criteria taking into account functional safety aspects (for example, the performance criterion DS) up to levels specified in the SSRS independent of the required safety integrity level (SIL).

For approaches on how to apply IEC 61326-3 series, see Annex A.

There exists meanwhile the generic EMC standard IEC 61000-6-7 dealing with functional safety aspects in industrial environments. Generic EMC standards are designed to apply for a defined electromagnetic environment, to products for which no dedicated product family EMC/product EMC standards exist. However, for the equipment in the scope of this document, the information given in the generic EMC standard was considered not to be sufficient. More detailed information and specifications were needed, for example specific test set-ups, consideration of the functional earth port or the deliberate differentiation between types of electromagnetic environments relevant for the equipment in the scope of this document.

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Though historically this product standard was developed several years before the generic EMC standard, this 2nd edition considers the information given in the generic EMC standard and applies it where appropriate.

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

Part 3-2: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – Industrial applications with specified electromagnetic environment

1 Scope

This part of IEC 61326 covers all equipment within the scope of IEC 61326-1, but is limited to systems and equipment for industrial applications within a specified electromagnetic environment and intended to perform safety functions as defined in IEC 61508 with SIL 1-3.

The electromagnetic environments encompassed by this product family standard are industrial, both indoor and outdoor, and based on the requirements of the process industry, specifically chemical/petrochemical/pharmaceutical manufacturing plants using the mitigation measures given in Annex C. The difference between the electromagnetic environment covered by this document compared to the general industrial environment (see IEC 61326-3-1) is due to the mitigation measures employed against electromagnetic phenomena leading to a specified electromagnetic environment with test values that have been proven in practice.

The environment of industrial application with a specified electromagnetic environment typically includes the following characteristics:

- industrial area with limited access;
- limited use of mobile transmitters;
- dedicated cables for power supply and control, signal or communication lines;
- separation between power supply and control, signal or communication cables;
- factory building mostly consisting of metal construction;
- overvoltage/lightning protection by appropriate measures (for example, metal construction of the building or use of protection devices);
- pipe heating systems driven by AC main power;
- no high-voltage substation close to sensitive areas;
- presence of CISPR 11 Group 2 ISM equipment using ISM frequencies only with low power;
- competent staff;
- periodical maintenance of equipment and systems;
- mounting and installation guidelines for equipment and systems.

Equipment and systems considered as “proven-in-use” according to IEC 61508 or “prior use” according to IEC 61511 are excluded from the scope of this document.

Fire alarm systems and security alarm systems intended for protection of buildings are excluded from the scope of this document.

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

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cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-161, *International Electrotechnical Vocabulary – Part 161: Electromagnetic compatibility* (available at <http://www.electropedia.org/)

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 61000-4-6:2013, *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 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-4-16:2015, *Electromagnetic compatibility (EMC) – Part 4-16: Testing and measurement techniques – Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz*

IEC 61000-4-29:2000, *Electromagnetic compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests*

IEC 61000-4-34:2005, *Electromagnetic compatibility (EMC) – Part 4-34: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current more than 16 A per phase*
IEC 61000-4-34:2005/AMD1:2009

IEC 61326-1:2012, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

IEC 61326-3-1:__[1], *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety functions (functional safety) – General industrial applications*

IEC 61508-2:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems*

[1] Under preparation. Stage at the time of publication: IEC/DIS 61326-3-1:2016.

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