
Jedrske elektrarne - Merilni, nadzorni in elektroenergetski sistemi - Zahteve za preskušanje elektromagnetne združljivosti (IEC 62003:2020)

Nuclear power plants - Instrumentation, control and electrical power systems - Requirements for electromagnetic compatibility testing (IEC 62003:2020)

Kernkraftwerke - Elektro- und leittechnische Systeme mit sicherheitstechnischer Bedeutung - Anforderungen für die Prüfung der Elektromagnetischen Verträglichkeit

Centrales nucléaires de puissance - Systèmes d'instrumentation, de contrôle-commande et d'alimentation électrique - Exigences relatives aux essais de compatibilité électromagnétique

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EUROPEAN STANDARD

EN IEC 62003

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Nuclear power plants - Instrumentation, control and electrical
power systems - Requirements for electromagnetic compatibility
testing
(IEC 62003:2020)

Centrales nucléaires de puissance - Systèmes
d'instrumentation, de contrôle-commande et d'alimentation
électrique - Exigences relatives aux essais de compatibilité
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sicherheitstechnischer Bedeutung - Anforderungen für die
Prüfung der Elektromagnetischen Verträglichkeit
(IEC 62003:2020)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 62003:2020 (E)**European foreword**

The text of document 45A/1299/FDIS, future edition 2 of IEC 62003, prepared by SC 45A "Instrumentation, control and electrical power systems of nuclear facilities" of IEC/TC 45 "Nuclear instrumentation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62003:2020.

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) 2021-06-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-09-14

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As stated in the nuclear safety directive 2009/71/EURATOM, Chapter 1, Article 2, item 2, Member States are not prevented from taking more stringent safety measures in the subject-matter covered by the Directive, in compliance with Community law.

In a similar manner, this European standard does not prevent Member States from taking more stringent nuclear safety and/or security measures in the subject-matter covered by this standard.

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Endorsement notice

The text of the International Standard IEC 62003:2020 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:

CISPR 11	NOTE	Harmonized as EN 55011
IEC 61000-2-2	NOTE	Harmonized as EN 61000-2-2
IEC 61000-4-25	NOTE	Harmonized as EN 61000-4-25
IEC 61000-6-2	NOTE	Harmonized as EN IEC 61000-6-2
IEC 61513	NOTE	Harmonized as EN 61513
IEC 61800-3	NOTE	Harmonized as EN IEC 61800-3

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-4-2	-	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	-
IEC 61000-4-3	-	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	-	-
IEC 61000-4-4	-	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	-
IEC 61000-4-5	-	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	-
IEC 61000-4-6	-	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	-
IEC 61000-4-8	-	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	-
IEC 61000-4-9	-	<i>Electromagnetic compatibility (EMC) – Part 4-9: Testing and measurement techniques – Impulse magnetic field immunity test</i>	EN 61000-4-9	-
IEC 61000-4-10	-	<i>Electromagnetic compatibility (EMC) – Part 4-10: Testing and measurement techniques – Damped oscillatory magnetic field immunity test</i>	EN 61000-4-10	-
IEC 61000-4-11	-	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	EN 61000-4-11	-
IEC 61000-4-12	-	<i>Electromagnetic compatibility (EMC) – Part 4-12: Testing and measurement techniques – Ring wave immunity test</i>	EN 61000-4-12	-
IEC 61000-4-13	-	Electromagnetic compatibility (EMC) - Part 4-13: Testing and measurement techniques - Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests	EN 61000-4-13	-

EN IEC 62003:2020 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-4-14	-	Electromagnetic compatibility (EMC) - Part 4-14: Testing and measurement techniques - Voltage fluctuation immunity test	EN 61000-4-14	-
IEC 61000-4-16	-	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	-
IEC 61000-4-17	-	Electromagnetic compatibility (EMC) - Part 4-17: Testing and measurement techniques - Ripple on d.c. input power port immunity test	-	-
IEC 61000-4-18	-	Electromagnetic compatibility (EMC) - Part 4-18: Testing and measurement techniques - Damped oscillatory wave immunity test	EN 61000-4-18	IEC -
IEC 61000-4-20	-	Electromagnetic compatibility (EMC) - Part 4-20: Testing and measurement techniques - Emission and immunity testing in transverse electromagnetic (TEM) waveguides	EN 61000-4-20	-
IEC 61000-4-28	-	Electromagnetic compatibility (EMC) - Part 4-28: Testing and measurement techniques - Variation of power frequency, immunity test	EN 61000-4-28	-
IEC 61000-4-29	-	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	-
IEC 61000-4-34	-	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	-
IEC 61000-6-4	-	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	EN 61000-6-4	IEC -
IEC 61000-6-5	-	Electromagnetic compatibility (EMC) - Part 6-5: Generic standards - Immunity for equipment used in power station and substation environment	EN 61000-6-5	-
IEC 61000-6-7	-	Electromagnetic compatibility (EMC) - Part 6-7: Generic standards - Immunity requirements for equipment intended to perform functions in a safety-related system (functional safety) in industrial locations	EN 61000-6-7	-
IEC 61226	-	Nuclear power plants - Instrumentation and control important to safety - Classification of instrumentation and control functions	EN 61226	-
IEC/TR 61000-1-6	-	Electromagnetic compatibility (EMC) - Part 1-6: General - Guide to the assessment of measurement uncertainty	-	-
IEC/TR 61000-2-5	-	Electromagnetic compatibility (EMC) - Part 2-5: Environment - Description and classification of electromagnetic environments	-	-
IEC/IEEE 323	60780--	<i>Nuclear facilities - Electrical equipment important to safety - Qualification</i>	EN 323	60780- -



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Edition 2.0 2020-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Nuclear power plants – Instrumentation, control and electrical power systems –
Requirements for electromagnetic compatibility testing**

**Centrales nucléaires de puissance – Systèmes d'instrumentation, de contrôle-
commande et d'alimentation électrique – Exigences relatives aux essais de
compatibilité électromagnétique**

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CONTENTS

FOREWORD	4
INTRODUCTION	6
1 Scope	8
2 Normative references	8
3 Terms and definitions	10
4 Abbreviated terms	11
5 EMC test requirements	12
6 Electromagnetic environment	13
7 Immunity testing	15
7.1 General	15
7.2 Applicability	15
7.3 Measurement uncertainty	15
7.4 Test requirements	16
7.5 Immunity test considerations for wireless technology	19
8 Emissions testing	20
9 Test considerations	21
10 Test report documentation	22
Annex A (normative) Functional quality criteria of nuclear I&C and electrical EUT for immunity	23
Annex B (informative) Quality characteristics defining the classification of electromagnetic environment severity in the locations where nuclear I&C and electrical power equipment is to be installed	24
Annex C (informative) Explanation for the degrees of severity of tests for EMC immunity	27
C.1 General	27
C.2 Immunity to electrostatic discharges according to IEC 61000-4-2	27
C.3 Immunity to radio-frequency electromagnetic field according to IEC 61000-4-3 (or IEC 61000-4-20)	27
C.4 Immunity to electrical fast transient/burst according to IEC 61000-4-4	28
C.5 Immunity to surge disturbances of large energy according to IEC 61000-4-5	28
C.6 Immunity to conducted disturbances induced by radiofrequency fields according to IEC 61000-4-6	28
C.7 Immunity to power frequency magnetic field according to IEC 61000-4-8	28
C.8 Immunity to pulse magnetic field according to IEC 61000-4-9	29
C.9 Immunity to a damped oscillatory magnetic field according to IEC 61000-4-10	29
C.10 Immunity to voltage dips and short voltage interruptions according to IEC 61000-4-11, IEC 61000-4-29, and IEC 61000-4-34	29
C.11 Immunity to a ring wave surge according to IEC 61000-4-12	29
C.12 Immunity to a distortion of harmonics and interharmonics including mains signalling at AC power port according to IEC 61000-4-13	30
C.13 Immunity to fluctuations of power supply voltage according to IEC 61000-4-14	30
C.14 Immunity to conducted common mode disturbances in the frequency range of 0 Hz to 150 kHz according to IEC 61000-4-16	30
C.15 Immunity to ripple on DC input power ports according to IEC 61000-4-17	30
C.16 Immunity to oscillatory damped disturbances according to IEC 61000-4-18	31

C.17 Immunity to variation of power frequency according to IEC 61000-4-28.....	31
Annex D (informative) Guidance for tests and evaluation of the electromagnetic environment in a nuclear power plant.....	32
Annex E (informative) Guidance for tests and evaluation of conformance with the requirements for emissions and immunity of operating nuclear I&C and electrical equipment.....	33
Annex F (informative) Example form of test plan for nuclear I&C and electrical equipment tests for emissions and immunity	34
Annex G (informative) Example form of test report for nuclear I&C and electrical equipment tests for emissions and immunity	35
Annex H (informative) EMC testing of power electronics and adjustable speed drives.....	36
Bibliography.....	38
Figure 1 – Examples of ports	11
Figure 2 – Example of the situation of a power station	14
Table 1 – Description of applicable EMC immunity and emissions tests for nuclear I&C and electrical equipment important to safety	13
Table 2 – Immunity specifications – Enclosure port.....	16
Table 3 – Immunity specifications – Signal and control ports.....	17
Table 4 – Immunity specifications – Low voltage AC input and output power ports	18
Table 5 – Immunity specifications – Low voltage DC input and output power ports.....	19
Table 6 – Limits for radiated emissions from nuclear I&C and electrical equipment.....	20
Table 7 – Limits for conducted emissions from nuclear I&C and electrical equipment.....	21
Table A.1 – Functional quality criteria of nuclear I&C and electrical EUT for immunity	23
Table B.1 – Quality characteristics defining the classification of electromagnetic environment severity in the locations where nuclear I&C and electrical equipment is to be installed	24
Table H.1 – IEC 61800-3 conducted emissions limits for category C3 power distribution system in the second (typical industrial) environment	36
Table H.2 – IEC 61800-3 radiated emissions limits for category C3 power distribution system in the second (typical industrial) environment.....	37

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**NUCLEAR POWER PLANTS – INSTRUMENTATION, CONTROL
AND ELECTRICAL POWER SYSTEMS – REQUIREMENTS
FOR ELECTROMAGNETIC COMPATIBILITY TESTING**

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 62003 has been prepared by subcommittee 45A: Instrumentation, control and electrical power systems of nuclear facilities, of IEC technical committee 45: Nuclear instrumentation.

This second edition cancels and replaces the first edition published in 2009. This edition constitutes a technical revision.

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

- a) title modified.
- b) expand the scope to encompass Electromagnetic Magnetic Compatibility (EMC) considerations for electrical equipment.
- c) provide guidance for addressing the use of wireless technology.
- d) enhance the description of the electromagnetic environment to provide clarification when selecting custom test levels or for test exemptions.

- e) include example information to be contained within an EMC test plan.
- f) provide guidance for characterization of the electromagnetic environment at the point of installation within a nuclear facility.

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

FDIS	Report on voting
45A/1299/FDIS	45A/1303/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.

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.

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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

a) Technical background, main issues and organization of the standard

This International Standard was prepared and based, to a very strong extent, on the current application of the IEC 61000 series for commercial equipment qualification for electromagnetic compatibility (EMC).

It is intended that this standard be used by operators of nuclear power plants (utilities), systems evaluators and by licensors.

b) Situation of the current standard in the structure of the SC 45A standard series

IEC 62003 is the third level SC 45A document dealing with the issue of qualification for electromagnetic compatibility (EMC) applicable to Instrumentation and Control (I&C) and electrical systems important to safety in nuclear facilities.

For more details on the structure of the SC 45A standard series see item d) of this introduction.

c) Recommendation and limitation regarding the application of this standard

It is important to note that this standard establishes no additional functional requirements for safety systems but clarifies the criteria to be applied for qualification to Electromagnetic and Radio Frequency Interference (EMI/RFI) from the commercial standards.

Aspects for which special requirements and recommendations have been produced, are:

- 1) IEC 61000 series with specific qualifications for nuclear applications around the world;
- 2) regulatory interpretations for requirements on level of qualification necessary and types of recommended testing to address all potential environmental stressors, related to this type of qualification;
- 3) IEC 61000-6-2, Electromagnetic compatibility (EMC) – Part 6-2: Generic Standards – Immunity for industrial environments, addresses requirements for all industrial environments while this standard addresses environments in nuclear facilities specifically.

This standard is intended to align with the guidance contained within IEC 61000-6-5 and IEC 61000-6-7 where possible. Additional considerations from these standards can be used in conjunction with this standard when addressing the EMC of electrical and I&C equipment in nuclear facilities.

d) Description of the structure of the IEC SC45A standard series and relationships with other IEC documents and other bodies documents (IAEA, ISO)

The top-level documents of the IEC SC45A standard series are IEC 61513 and IEC 63046. IEC 61513 provides general requirements for I&C systems and equipment that are used to perform functions important to safety in NPPs. IEC 63046 provides general requirements for electrical power systems of NPPs; it covers power supply systems including the supply systems of the I&C systems. IEC 61513 and IEC 63046 are to be considered in conjunction and at the same level. IEC 61513 and IEC 63046 structure the IEC SC45A standard series and shape a complete framework establishing general requirements for instrumentation, control and electrical systems for nuclear power plants.

IEC 61513 and IEC 63046 refer directly to other IEC SC45A standards for general topics related to categorization of functions and classification of systems, qualification, separation, defence against common cause failure, control room design, electromagnetic compatibility, cybersecurity, software and hardware aspects for programmable digital systems, coordination of safety and security requirements and management of ageing. The standards referenced directly at this second level should be considered together with IEC 61513 and IEC 63046 as a consistent document set.

At a third level, IEC SC45A standards not directly referenced by IEC 61513 or by IEC 63046 are standards related to specific equipment, technical methods, or specific activities. Usually these documents, which make reference to second-level documents for general topics, can be used on their own.

A fourth level extending the IEC SC45 standard series, corresponds to the Technical Reports which are not normative.

The IEC SC45A standards series consistently implements and details the safety and security principles and basic aspects provided in the relevant IAEA safety standards and in the relevant documents of the IAEA nuclear security series (NSS). In particular this includes the IAEA requirements SSR-2/1, establishing safety requirements related to the design of nuclear power plants (NPPs), the IAEA safety guide SSG-30 dealing with the safety classification of structures, systems and components in NPPs, the IAEA safety guide SSG-39 dealing with the design of instrumentation and control systems for NPPs, the IAEA safety guide SSG-34 dealing with the design of electrical power systems for NPPs and the implementing guide NSS17 for computer security at nuclear facilities. The safety and security terminology and definitions used by SC45A standards are consistent with those used by the IAEA.

IEC 61513 and IEC 63046 have adopted a presentation format similar to the basic safety publication IEC 61508 with an overall life-cycle framework and a system life-cycle framework. Regarding nuclear safety, IEC 61513 and IEC 63046 provide the interpretation of the general requirements of IEC 61508-1, IEC 61508-2 and IEC 61508-4, for the nuclear application sector. In this framework IEC 60880, IEC 62138 and IEC 62566 correspond to IEC 61508-3 for the nuclear application sector. IEC 61513 and IEC 63046 refer to ISO as well as to IAEA GS-R part 2 and IAEA GS-G-3.1 and IAEA GS-G-3.5 for topics related to quality assurance (QA). At level 2, regarding nuclear security, IEC 62645 is the entry document for the IEC/SC45A security standards. It builds upon the valid high level principles and main concepts of the generic security standards, in particular ISO/IEC 27001 and ISO/IEC 27002; it adapts them and completes them to fit the nuclear context and coordinates with the IEC 62443 series. At level 2, IEC 60964 is the entry document for the IEC/SC45A control rooms standards and IEC 62342 is the entry document for the ageing management standards.

NOTE 1 It is assumed that for the design of I&C systems in NPPs that implement conventional safety functions (e.g. to address worker safety, asset protection, chemical hazards, process energy hazards) international or national standards would be applied.

NOTE 2 IEC/SC45A domain was extended in 2013 to cover electrical systems. In 2014 and 2015 discussions were held in IEC/SC45A to decide how and where general requirements for the design of electrical systems were to be considered. IEC/SC45A experts recommended that an independent standard be developed at the same level as IEC 61513 to establish general requirements for electrical systems. Project IEC 63046 is now launched to cover this objective. When IEC 63046 is published this NOTE 2 of the introduction of IEC/SC45A standards will be suppressed.