



Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN IEC 62003:2020

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

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

09/2020



National Foreword

This European Standard EN IEC 62003:2020 was adopted as Luxembourgish Standard ILNAS-EN IEC 62003:2020.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

<https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html>

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

ILNAS-EN IEC 62003:2020

EUROPEAN STANDARD **EN IEC 62003**

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2020

ICS 27.120.20

English Version

**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
électromagnétique
(IEC 62003:2020)

Kernkraftwerke - Elektro- und leittechnische Systeme mit
sicherheitstechnischer Bedeutung - Anforderungen für die
Prüfung der Elektromagnetischen Verträglichkeit
(IEC 62003:2020)

This European Standard was approved by CENELEC on 2020-09-14. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

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

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.

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.

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.

Publication	Year	Title	EN/HD	Year
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	-

<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 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 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 60780-323	-	<i>Nuclear facilities - Electrical equipment important to safety - Qualification</i>	EN 60780-323	-



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**

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