

SLOVENSKI STANDARD

SIST EN 61000-4-39:2017

01-september-2017

**Elektromagnetna združljivost (EMC) - 4-39. del: Preskusne in merilne tehnike -
Sevana polja v bližini - Preskus odpornosti**

Electromagnetic Compatibility (EMC) - Part 4-39: Testing and measurement techniques -
Radiated fields in close proximity - Immunity test

iTeh STANDARD PREVIEW

Compatibilité électromagnétique (CEM) - Partie 4-39: Techniques d'essai et de mesure -
Essais d'immunité aux champs rayonnés à proximité

[SIST EN 61000-4-39:2017](https://standards.iteh.ai/catalog/standards/sist/61000-4-39-2017)

Ta slovenski standard je istoveten z: EN 61000-4-39:2017

<https://standards.iteh.ai/catalog/standards/sist/61000-4-39-2017>

ICS:

33.100.20	Imunost	Immunity
-----------	---------	----------

SIST EN 61000-4-39:2017

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61000-4-39:2017

<https://standards.iteh.ai/catalog/standards/sist/fa274629-1735-4510-8207-90b5926a6053/sist-en-61000-4-39-2017>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61000-4-39

June 2017

ICS 33.100.20

English Version

**Electromagnetic Compatibility (EMC) - Part 4-39: Testing and measurement techniques - Radiated fields in close proximity - Immunity test
(IEC 61000-4-39:2017)**

Compatibilité électromagnétique (CEM) - Partie 4-39:
Techniques d'essai et de mesure - Champs rayonnés à
proximité - Essai d'immunité
(IEC 61000-4-39:2017)

Elektromagnetische Verträglichkeit (EMV) - Teil 4-39: Prüf-
und Messverfahren - Gestrahlte Felder im Nahbereich -
Prüfung der Störfestigkeit
(IEC 61000-4-39:2017)

This European Standard was approved by CENELEC on 2017-04-13. 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, 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: Avenue Marnix 17, B-1000 Brussels

EN 61000-4-39:2017**European foreword**

The text of document 77B/769/FDIS, future edition 1 of IEC 61000-4-39, prepared by SC 77B "High frequency phenomena" of IEC/TC 77 "Electromagnetic compatibility" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61000-4-39:2017.

The following dates are fixed:

- latest date by which the document has to be (dop) 2018-01-13
implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2020-04-13
standards conflicting with the
document have to be withdrawn

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.

Endorsement notice

The text of the International Standard IEC 61000-4-39:2017 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 standard indicated:

IEC 61000-4-3:2006	NOTE	Harmonized as EN 61000-4-3:2006.
IEC 61000-4-3:2006/AMD 1:2008	NOTE	Harmonized as EN 61000-4-3:2006/A1:2008.
IEC 61000-4-3:2006/AMD 2:2010	NOTE	Harmonized as EN 61000-4-3:2006/A2:2010.
IEC 61000-4-20	NOTE	Harmonized as EN 61000-4-20.
IEC 61000-4-21	NOTE	Harmonized as EN 61000-4-21.
IEC 61000-4-22	NOTE	Harmonized as EN 61000-4-22.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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 60050-161	-	International Electrotechnical Vocabulary (IEV) -- Chapter 161: Electromagnetic compatibility	-	-

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 61000-4-39:2017](https://standards.iteh.ai/catalog/standards/sist/fa274629-1735-4510-8207-90b5926a6053/sist-en-61000-4-39-2017)

<https://standards.iteh.ai/catalog/standards/sist/fa274629-1735-4510-8207-90b5926a6053/sist-en-61000-4-39-2017>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61000-4-39:2017

<https://standards.iteh.ai/catalog/standards/sist/fa274629-1735-4510-8207-90b5926a6053/sist-en-61000-4-39-2017>



IEC 61000-4-39

Edition 1.0 2017-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE



BASIC EMC PUBLICATION

PUBLICATION FONDAMENTALE EN CEM

Electromagnetic compatibility (EMC) –
Part 4-39: Testing and measurement techniques – Radiated fields in close
proximity – Immunity test

Compatibilité électromagnétique (CEM) –
Partie 4-39: Techniques d'essai et de mesure – Champs rayonnés à proximité –
Essai d'immunité

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 33.100.20

ISBN 978-2-8322-4082-3

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.

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	10
2 Normative references	10
3 Terms, definitions and abbreviated terms	11
3.1 Terms and definitions.....	11
3.2 Abbreviated terms.....	12
4 General	13
5 Test levels.....	14
5.1 General.....	14
5.2 Test frequencies	14
5.3 Test levels in the frequency range of 9 kHz to 150 kHz	15
5.4 Test levels in the frequency range of 150 kHz to 26 MHz	16
5.5 Test levels in the frequency range of 26 MHz to 380 MHz	16
5.6 Test levels in the frequency range of 380 MHz to 6 GHz	16
6 Test equipment.....	18
6.1 Magnetic field immunity	18
6.1.1 General	18
6.1.2 Magnetic field immunity 9 kHz to 150 kHz	18
6.1.3 Magnetic field immunity 150 kHz to 26 MHz.....	19
6.2 Radiated RF field immunity.....	19
6.2.1 Field generating devices, 26 MHz to 380 MHz	19
6.2.2 Field generating devices, 380 MHz to 6 GHz	19
7 Test setup	20
7.1 Magnetic field immunity	20
7.1.1 Test facility	20
7.1.2 Arrangement of equipment under test	20
7.1.3 Test method using radiating loop	22
7.2 Radiated RF field immunity	22
7.2.1 Test facility	22
7.2.2 Arrangement of equipment under test	22
8 Test procedure	23
8.1 General.....	23
8.2 Climatic conditions.....	23
8.3 Electromagnetic conditions	24
8.4 Arrangement and operating modes of the EUT	24
8.5 Magnetic field immunity	24
8.5.1 Level setting procedure 9 kHz to 150 kHz.....	24
8.5.2 Level setting procedure 150 kHz to 26 MHz	24
8.5.3 Execution of the test	25
8.6 Radiated RF field immunity	27
8.6.1 Level setting procedure	27
8.6.2 Execution of test.....	27
9 Evaluation of test results	30

10 Test report.....	30
Annex A (normative) TEM horn antenna.....	32
A.1 General.....	32
A.2 Frequency range.....	32
A.3 VSWR.....	32
A.4 Field distribution	32
A.5 General design for TEM horn antenna.....	34
Annex B (informative) Test frequencies, levels and modulations	36
B.1 General.....	36
B.2 Magnetic emitters in the range from 9 kHz to 26 MHz	36
B.3 Radio services in the range from 26 MHz to 6 GHz	36
Annex C (informative) In situ testing	39
C.1 General.....	39
C.2 Test procedure.....	39
C.3 Test report	39
Bibliography.....	40
Figure 1 – Overview showing the test methods that could be used for evaluating equipment immunity to disturbances from RF transmitters	13
Figure 2 – Close-proximity test methods addressed in this document.....	14
Figure 3 – Definition of the 80 % amplitude-modulated (AM) test level and the waveshapes occurring at the output of the signal generator.....	15
Figure 4 – Example of the pulse-modulated (50 % duty cycle, 217 Hz) test level and the waveshapes occurring at the output of the signal generator	17
Figure 5 – Example of equipment testing on floor-standing EUT using radiating loop antenna – Frequency range 9 kHz to 150 kHz (100 mm x 100 mm window size)	21
Figure 6 – Example of equipment testing on floor-standing EUT using radiating loop antenna – Frequency range 150 kHz to 26 MHz (80 mm x 80 mm window size)	21
Figure 7 – Principle of equipment testing on floor-standing EUT using TEM horn antenna	23
Figure 8 – Radiating loop level setting	25
Figure 9 – Principle of equipment testing with radiating loop	26
Figure 10 – Example of the test pattern using a 300 mm x 300 mm window size for the uniform area	28
Figure 11 – Arrangement of level setting.....	29
Figure 12 – Example of TEM horn antenna orientations	30
Figure A.1 – Example of field uniformity verification setup	33
Figure A.2 – Field uniformity measurement setup	34
Figure A.3 – Example of field uniformity at 1,5 GHz (simulated) for TEM horn antenna having an aperture dimension of 205 mm x 205 mm.....	34
Figure A.4 – Example of general design principle of TEM horn antenna	35
Table 1 – Test levels for inhomogeneous magnetic fields, 9 kHz to 150 kHz	15
Table 2 – Test levels for inhomogeneous magnetic fields, 150 kHz to 26 MHz	16
Table 3 – Test levels for RF fields from transmitters used in close proximity, 380 MHz to 6 GHz	17

Table 4 – Definition of window size and test distance.....	22
Table 5 – Maximum frequency steps size, magnetic field immunity test	26
Table B.1 – Guidance on test levels of certain RF wireless communications equipment.....	37

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

[SIST EN 61000-4-39:2017](https://standards.iteh.ai/catalog/standards/sist/fa274629-1735-4510-8207-90b5926a6053/sist-en-61000-4-39-2017)

<https://standards.iteh.ai/catalog/standards/sist/fa274629-1735-4510-8207-90b5926a6053/sist-en-61000-4-39-2017>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) –**Part 4-39: Testing and measurement techniques –
Radiated fields in close proximity –
Immunity test****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 61000-4-39 has been prepared by subcommittee 77B: High frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It forms Part 4-39 of the IEC 61000 series. It has the status of a basic EMC publication in accordance with IEC Guide 107.

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

FDIS	Report on voting
77B/769/FDIS	77B/772/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 parts in the IEC 61000 series, published under the general title *Electromagnetic compatibility (EMC)*, 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 web site 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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 61000-4-39:2017](https://standards.iteh.ai/catalog/standards/sist/fa274629-1735-4510-8207-90b5926a6053/sist-en-61000-4-39-2017)

<https://standards.iteh.ai/catalog/standards/sist/fa274629-1735-4510-8207-90b5926a6053/sist-en-61000-4-39-2017>

INTRODUCTION

IEC 61000 is published in separate parts according to the following structure:

Part 1: General

General considerations (introduction, fundamental principles)
Definitions, terminology

Part 2: Environment

Description of the environment
Classification of the environment
Compatibility levels

Part 3: Limits

Emission limits
Immunity limits (in so far as they do not fall under the responsibility of the product committees)

Part 4: Testing and measurement techniques

Measurement techniques
Testing techniques

Part 5: Installation and mitigation guidelines

Installation guidelines
Mitigation methods and devices

Part 6: Generic standards

Part 9: Miscellaneous

Each part is further subdivided into several parts, published either as international standards or as technical specifications or technical reports, some of which have already been published as sections. Others will be published with the part number followed by a dash and a second number identifying the subdivision (example: IEC 61000-6-1).

Particular considerations for IEC 61000-4-39

This part of IEC 61000 is an international standard which gives immunity requirements and test procedures related to radiated disturbances caused by radio-frequency fields from devices used in close proximity.

It is impossible to ignore that the everyday electromagnetic environment has greatly changed. Not long ago, handheld, frequency-modulated (FM) transceivers for business, public safety, and amateur radio communications represented the predominant RF applications. Distribution was limited (for example, by licenses) and in most cases the radiating antennas were outside buildings to get a high efficiency. The situation changed once technology allowed the manufacturing of compact wireless phones with low weight and a reasonable price. Wireless services (DECT, mobile phones, UMTS/WiFi/WiMAX/ Bluetooth¹, baby monitors, etc.) have

¹ Bluetooth is the trade name of a product supplied by Bluetooth SIG. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of this product. Equivalent products may be used if they can be shown to lead to the same results.