SVENSK STANDARD SS-EN 61000-4-39

Fastställd	Utgåva	Sida	Ansvarig kommitté
2017-12-20	1	1 (1+42)	SEK TK EMC

Elektromagnetisk kompatibilitet (EMC) – Del 4-39: Mät- och provningsmetoder – Utstrålade fält i närområdet – Immunitetsprovning

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

Som svensk standard gäller europastandarden EN 61000-4-39:2017. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61000-4-39:2017.

Nationellt förord

Europastandarden EN 61000-4-39:2017

består av:

- **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
- **IEC 61000-4-39, First edition, 2017 - Electromagnetic compatibility (EMC) - Part 4-39: Testing and measurement techniques - Radiated fields in close proximity - Immunity test**

utarbetad inom International Electrotechnical Commission, IEC.

ICS 33.100.20

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Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

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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.

CENELEC

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

Ref. No. EN 61000-4-39:2017 E

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• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-04-13

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.

Publication	Year	Title	EN/HD	Year
IEC 60050-161	-	International Electrotechnical Vocabulary (IEV) -- Chapter 161: Electromagnetic compatibility	-	-

CONTENTS

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.
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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.

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/ Bluetooth®[1], baby monitors, etc.) have

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[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.

come into widespread use and acceptance. Recognizing the fact that equipment for these new technologies could have the antenna inside the building and even inside the device housing and be omnipresent in nearly any setting including at work, in the home and in public transportation creates new situations for exposure of equipment to RF energy.

With the new digital technologies, the traditional modulation methods of AM and FM has given way to digital modulations with a variety of different amplitude and bandwidth characteristics. While overall time-averaged transmit power levels might have generally decreased over time due to improved network density and migration of services, the maximum possible (peak pulse) power levels in other bands have increased significantly. Moreover, the incorporation of multiple transmitting antennas (to support for example WiFi and Bluetooth links), evolving form factors, higher bit rates to facilitate data transfer and Internet access and the use of wireless headsets have resulted in a more complex and diverse pattern of use and exposure. Increased portability of transmitting devices has also drastically reduced the separation distance between sources of radiated RF energy and equipment likely to be disturbed by that energy.

It should be expected that the wireless technology revolution will continue to evolve with new applications using increasingly higher microwave frequencies.

Immunity testing according to existing standards, such as IEC 61000-4-3, 61000-4-20, 61000-4-21 and 61000-4-22, may not be suitable to assess compatibility with the complex electric and magnetic fields generated by RF emitters located in close proximity (for example, within a few centimetres) of the surface of electronic equipment. The power levels required for the higher disturbance intensities associated with such very small separation distances may make application of some of the existing test standards quite challenging or cost prohibitive.

New technologies use also magnetic fields. The fields are inhomogeneous and vary appreciably in both magnitude and direction over a region of space. Typically they can be generated by motors, power transformers, switching power supplies, higher-powered electronic article surveillance (EAS) gates or transmitters of radio-frequency identification (RFID) systems, inductive charging systems and near field communication (NFC) devices. The fields from such sources decrease rapidly as the distance from the source increases.

Because these new technologies use a very large range of the frequency spectrum it is necessary to use different test methods which consider the physical behavior of magnetic coupling in the lower frequency range and the more electrical based characteristic in the higher frequency range. Additionally, the widely diverging physical and electrical characteristics of equipment types that may be affected by portable transmitters in close proximity, as well as the applications for which such equipment is used, indicate a need for multiple test methods.

At present this document covers magnetic field disturbance sources in the frequency range 9 kHz to 26 MHz.In the frequency range 26 MHz to 380 MHz no testing is yet defined. In the frequency range 380 MHz to 6 GHz testing using a TEM horn antenna is defined. It has been argued that especially in the frequency range above 380 MHz the specified test methods do not take into consideration the possible variations in field impedance from real life close proximity transmitters, which may represent sources having field impedances far below the far field impedance of 377 Ω (predominantly magnetic field sources) and far above 377 Ω (predominantly electrical field sources). In the frequency range above 380 MHz the signal wavelength is such that the reactive nearfield from the source begins at only a few centimeters from the source (around approximately 0,1 λ). At this distance the field impedance approximates more and more to the far field impedance of 377 Ω. The TEM horn antenna represents a field source which is not far from 377 Ω.

Activities are ongoing to identify antenna types that can be characterised by field impedance and radiation pattern over a specified illumination window size, which for the ease of testing should be as large as possible and should preferably cover a large frequency range. Antenna types that are not covered by manufacturer's intellectual property rights, and which can be unambiguously characterised by for instance near field scanning or numerical model characterisation, are preferred for the present basic standard.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-39: Testing and measurement techniques –
Radiated fields in close proximity –
Immunity test

1 Scope

This part of IEC 61000 specifies immunity requirements for electrical and electronic equipment when it is exposed to radiated electromagnetic energy from RF transmitters used in close proximity. It establishes test levels and the required test procedures. The applicable frequency range is 9 kHz to 6 GHz. Fixed-installation equipment being exposed to portable transmitting devices, mobile equipment exposed to fixed transmitting devices and mobile equipment exposed to other mobile transmitting devices are considered.

The object of this document is to establish a common reference for evaluating the immunity requirements of electrical and electronic equipment that is exposed to radiated, RF electromagnetic fields from sources at close distances. It is understood that this part of IEC 61000 does not replace general immunity requirements of electrical and electronic equipment to radiated electromagnetic energy as given in IEC 61000-4-3 and other parts of IEC 61000 and that it is only applicable if an equipment or system is exposed to disturbance sources in close proximity.

In the context of this document, “close proximity” generally refers to a separation distance between the source and victim equipment of less than or equal to 200 mm for frequencies greater than 26 MHz and 500 mm for frequencies lower than 26 MHz.

The test methods documented in this part of IEC 61000 describe consistent methods to assess the immunity of an equipment or system against a defined phenomenon in the respective frequency range. Product committees would consider the applicability of the test and then if necessary select the applicable test method depending on the EUT, frequency range, disturbance source, etc.

NOTE As described in IEC Guide 107, this is a basic EMC publication for use by product committees of the IEC. As also stated in Guide 107, the IEC product committees are responsible for determining whether this immunity test standard should be applied or not, and if applied, they are responsible for determining the appropriate test levels and performance criteria. TC 77 and its sub-committees are prepared to co-operate with product committees in the evaluation of the value of particular immunity tests for their products.

This document deals with immunity tests related to RF magnetic and electromagnetic fields from any source used in close proximity to other electrical or electronic equipment or systems.

This document is an independent test method. Other test methods should not be used as substitutes for claiming compliance with 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 cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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