

**Electromagnetic compatibility (EMC) -- Part 4-8: Testing
and measurement techniques - Power frequency
magnetic field immunity test**

This document is a preview generated by EVS

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 61000-4-8:2010 sisaldab Euroopa standardi EN 61000-4-8:2010 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.03.2010 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 12.02.2010.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 61000-4-8:2010 consists of the English text of the European standard EN 61000-4-8:2010.

This standard is ratified with the order of Estonian Centre for Standardisation dated 31.03.2010 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 12.02.2010.

The standard is available from Estonian standardisation organisation.

ICS 33.100.20

Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute Estonian Standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:
Aru str 10 Tallinn 10317 Estonia; www.evs.ee; Phone: +372 605 5050; E-mail: info@evs.ee

English version

**Electromagnetic compatibility (EMC) -
Part 4-8: Testing and measurement techniques -
Power frequency magnetic field immunity test
(IEC 61000-4-8:2009)**

Compatibilité électromagnétique (CEM) -
Partie 4-8: Techniques d'essai
et de mesure -
Essai d'immunité au champ magnétique
à la fréquence du réseau
(CEI 61000-4-8:2009)

Elektromagnetische Verträglichkeit (EMV) -
Teil 4-8: Prüf- und Meßverfahren -
Prüfung der Störfestigkeit gegen
Magnetfelder mit energietechnischen
Frequenzen
(IEC 61000-4-8:2009)

This European Standard was approved by CENELEC on 2010-02-01. 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 Central Secretariat 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 Central Secretariat 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 77A/694/FDIS, future edition 2 of IEC 61000-4-8, prepared by SC 77A, Low frequency phenomena, of IEC TC 77, Electromagnetic compatibility, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61000-4-8 on 2010-02-01.

This European Standard supersedes EN 61000-4-8:1993 + A1:2001.

EN 61000-4-8:2010 includes the following significant technical changes with respect to EN 61000-4-8:1993: the scope is extended in order to cover 60 Hz. Characteristics, performance and verification of the test generator and related inductive coils are revised. Modifications are also introduced in the test set-up (GRP) and test procedure.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2010-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2013-02-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61000-4-8:2009 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 60068-1 | NOTE Harmonized as EN 60068-1. |
| IEC 61000-2-4 | NOTE Harmonized as EN 61000-2-4. |
-

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<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	-	-

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions.....	7
4 General.....	8
5 Test levels.....	9
6 Test equipment.....	10
6.1 General.....	10
6.2 Test generator.....	10
6.2.1 Current source.....	10
6.2.2 Characteristics and performances of the test generator for different inductive coils.....	10
6.2.3 Verification of the characteristics of the test generator.....	11
6.3 Inductive coil.....	12
6.3.1 Field distribution.....	12
6.3.2 Characteristics of the inductive standard coils 1 m × 1 m and 1 m × 2,6 m.....	12
6.3.3 Characteristics of the inductive coils for table top and floor standing equipment.....	12
6.3.4 Measurement of the inductive coil factor.....	13
6.4 Test and auxiliary instrumentation.....	13
6.4.1 Test instrumentation.....	13
6.4.2 Auxiliary instrumentation.....	14
7 Test set-up.....	14
7.1 Test set-up components.....	14
7.2 Ground (reference) plane for floor standing equipment.....	14
7.3 Equipment under test.....	14
7.4 Test generator.....	15
7.5 Inductive coil.....	15
8 Test procedure.....	15
8.1 General.....	15
8.2 Laboratory reference conditions.....	15
8.2.1 General.....	15
8.2.2 Climatic conditions.....	15
8.2.3 Electromagnetic conditions.....	16
8.3 Carrying out the test.....	16
9 Evaluation of the test results.....	17
10 Test report.....	17
Annex A (normative) Inductive coil calibration method.....	22
Annex B (normative) Characteristics of the inductive coils.....	23
Annex C (informative) Selection of the test levels.....	29
Annex D (informative) Information on power frequency magnetic field strength.....	31
Bibliography.....	33

Figure 1 – Example of application of the test field by the immersion method	18
Figure 2 – Example of schematic circuit of the test generator for power frequency magnetic field	18
Figure 3 – Example of test set-up for table-top equipment	19
Figure 4 – Calibration of the standard coils	19
Figure 5 – Example of test set-up for floor-standing equipment	20
Figure 6 – Example of investigation of susceptibility to magnetic field by the proximity method with the 1 m × 1 m inductive coil	20
Figure 7 – Illustration of Helmholtz coils	21
Figure B.1 – Characteristics of the field generated by a square inductive coil (1 m side) in its plane	25
Figure B.2 – 3 dB area of the field generated by a square inductive coil (1 m side) in its plane	25
Figure B.3 – 3 dB area of the field generated by a square inductive coil (1 m side) in the mean orthogonal plane (component orthogonal to the plane of the coil)	26
Figure B.4 – 3 dB area of the field generated by two square inductive coils (1 m side) 0,6 m spaced, in the mean orthogonal plane (component orthogonal to the plane of the coils)	26
Figure B.5 – 3 dB area of the field generated by two square inductive coils (1 m side) 0,8 m spaced, in the mean orthogonal plane (component orthogonal to the plane of the coils)	27
Figure B.6 – 3 dB area of the field generated by a rectangular inductive coil (1 m × 2,6 m) in its plane	27
Figure B.7 – 3 dB area of the field generated by a rectangular inductive coil (1 m × 2,6 m) in its plane (ground plane as a side of the inductive coil)	28
Figure B.8 – 3 dB area of the field generated by a rectangular inductive coil (1 m × 2,6 m) with ground plane, in the mean orthogonal plane (component orthogonal to the plane of the coil)	28
Table 1 – Test levels for continuous field	9
Table 2 – Test levels for short duration: 1 s to 3 s	10
Table 3 – Specification of the generator for different inductive coils	11
Table 4 – Verification parameter for the different inductive coils	11
Table D.1 – Values of the maximum magnetic field produced by household appliances (results of the measurements of 100 different devices of 25 basic types)	31
Table D.2 – Values of the magnetic field generated by a 400 kV line	31
Table D.3 – Values of the magnetic field in high voltage sub-station areas	32
Table D.4 – Values of the magnetic field in power plants	32

INTRODUCTION

This standard is part of the IEC 61000 series of standards, 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 9: Miscellaneous

Each part is further subdivided into several parts, published either as international standards, 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).

This part is an international standard which gives immunity requirements and test procedures related to "power frequency magnetic field".

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test

1 Scope

This part of IEC 61000 relates to the immunity requirements of equipment, only under operational conditions, to magnetic disturbances at power frequencies 50 Hz and 60 Hz related to:

- residential and commercial locations;
- industrial installations and power plants;
- medium voltage and high voltage sub-stations.

The applicability of this standard to equipment installed in different locations is determined by the presence of the phenomenon, as specified in Clause 4. This standard does not consider disturbances due to capacitive or inductive coupling in cables or other parts of the field installation.

Other IEC standards dealing with conducted disturbances cover these aspects.

The object of this standard is to establish a common and reproducible basis for evaluating the performance of electrical and electronic equipment for household, commercial and industrial applications when subjected to magnetic fields at power frequency (*continuous and short duration field*).

The standard defines:

- recommended test levels;
- test equipment;
- test set-up;
- test procedure.

2 Normative references

The following referenced documents are indispensable for the application 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) – Chapter 161: Electromagnetic compatibility*

3 Terms and definitions

For the purposes of this document the following terms and definitions apply to the restricted field of magnetic disturbances as well as the terms and definitions from IEC 60050(161) [IEV].

3.1

current distortion factor

ratio of the root-mean square value of the harmonics content of an alternating current to the root-mean square value of the fundamental current