

© Copyright SEK. Reproduction in any form without permission is prohibited.

Hushållsapparater och liknande bruksföremål – Mätning av elektromagnetiska fält med avseende på exponering

*Measurement methods for electromagnetic fields of household appliances
and similar apparatus with regard to human exposure*

Som svensk standard gäller europastandarden EN 62233:2008. Den svenska standarden innehåller den officiella engelska språkversionen av EN 62233:2008.

Nationellt förord

Europastandarden EN 62233:2008

består av:

- **europastandardens ikraftsättningssdokument**, utarbetat inom CENELEC
- **IEC 62233, First edition, 2005 - Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 50366, utgåva 1, 2003 och SS-EN 50366/A1, utgåva 1, 2006, gäller ej fr o m 2012-12-01.

ICS 97.030

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringssarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utdriften av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringssarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringssverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtidens standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 62233

April 2008

ICS 97.030

Supersedes EN 50366:2003 + A1:2006

English version

**Measurement methods for electromagnetic fields of household appliances
and similar apparatus with regard to human exposure**
(IEC 62233:2005, modified)

Méthodes de mesures des champs
électromagnétiques des appareils
électrodomestiques et similaires
en relation avec l'exposition humaine
(CEI 62233:2005, modifiée)

Verfahren zur Messung
der elektromagnetischen Felder
von Haushaltgeräten und ähnlichen
Elektrogeräten im Hinblick
auf die Sicherheit von Personen
in elektromagnetischen Feldern
(IEC 62233:2005, modifiziert)

This European Standard was approved by CENELEC on 2007-12-01. 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, 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: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 62233:2005, prepared by IEC TC 106, Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure, together with common modifications prepared by a Joint Editing Group of the Technical Committee CENELEC TC 61, Safety of household and similar electrical appliances, and CENELEC TC 106X, Electromagnetic fields in the human environment, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 62233 on 2007-12-01.

This European Standard supersedes EN 50366:2003 + A1:2006, to which it is technically equivalent.

The following dates are applicable:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2008-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2012-12-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62233:2005 was approved by CENELEC as a European Standard with agreed common modifications as given below.

CONTENTS

1 Scope	13
2 Normative references	15
3 Terms and definitions	15
3.1 Physical quantities and units	15
3.2 Terms and definitions	15
4 Choice of test method and limit sets	19
5 Measuring methods	19
5.1 Electric fields	19
5.2 Frequency range	19
5.3 Measuring distances, positions and operating mode	21
5.4 Magnetic field sensor	21
5.5 Measuring procedures for magnetic fields	21
5.6 Measurement uncertainty	29
5.7 Test report	31
6 Evaluation of results	31
Annex A (normative) Test conditions for the measurement of magnetic flux density	39
Annex B (informative) Exposure limits	55
Annex C (normative) Determination of coupling factors	59
Annex D (informative) Examples using the limits of Annex B	71
Bibliography	87
Figure 1 – Recommendations for the choice of the test method starting with the evaluation against the reference levels	33
Figure 2 – Example for dependency on frequency of the reference levels with smoothed edges	35
Figure 3 – Example for a transfer function A corresponding to the reference level of Figure 2	35
Figure 4 – Schematic diagram of the reference method	37
Figure A.1 – Measuring position: top / front (see 3.2.7)	49
Figure A.2 – Measuring position: around (see 3.2.7)	49
Figure A.3 – Measuring distances for induction hobs and hotplates	53
Figure C.1 – Hot spot	59
Figure C.2 – Gradient of flux density and integral G	61
Figure C.3 – Equivalent coil position	61
Figure C.4 – Gradients of flux density and coil	63

Figure C.5 – Coupling factor $a_C(r)$ with 0.1 S/m, $A_{\text{sensor}}=100 \text{ cm}^2$, for the whole human body (re-scaled using ICNIRP limits)	69
Figure D.1 – Measurement of the magnetic flux	73
Figure D.2 – Normalized field distribution along the tangential distance r_0	75
Figure D.3 – Numerical model of a homogenous human body	77
Figure D.4 – Details of the construction of the head and shoulders	79
Figure D.5 – Position of source Q against model K	81
Table A.1 – Measuring distances, sensor location and operating conditions.....	41
Table B.1 – Basic restrictions for general public exposure to time varying electric and magnetic fields for frequencies up to 10 GHz – Excerpts	55
Table B.2 – Reference levels for general public exposure to time-varying electric and magnetic fields (unperturbed rms values) – Excerpts	55
Table B.3 – Basic limitations for general public exposure applying to various regions of the body up to 3 kHz – Excerpts	57
Table B.4 – Magnetic field limits for general public exposure: exposure of head and torso – Excerpts.....	57
Table C.1 – Value G [m] of different coils.....	63
Table C.2 – Value of factor $k[\frac{A/m^2}{T}]$ at 50 Hz for the whole human body.....	65
Table D.1 – Transfer function with ICNIRP general public exposure.....	71
Table D.2 – Transfer function with IEEE general public exposure.....	71
Table D.3 - Coupling factor $a_c(r1)$	73

MEASUREMENT METHODS FOR ELECTROMAGNETIC FIELDS OF HOUSEHOLD APPLIANCES AND SIMILAR APPARATUS WITH REGARD TO HUMAN EXPOSURE

1 Scope

This International Standard deals with electromagnetic fields up to 300 GHz and defines methods for evaluating the electric field strength and magnetic flux density around household and similar electrical appliances, including the conditions during testing as well as measuring distances and positions.

Appliances may incorporate motors, heating elements or their combination, may contain electric or electronic circuitry, and may be powered by the mains, by batteries, or by any other electrical power source.

Appliances include such equipment as household electrical appliances, electric tools and electric toys.

Appliances not intended for normal household use but which nevertheless may be approached by the public, or may be used by laymen, are within the scope of this standard.

This standard does not apply to:

- apparatus designed exclusively for heavy industrial purposes;
- apparatus intended to be part of the fixed electrical installation of buildings (such as fuses, circuit breakers, cables and switches);
- radio and television receivers, audio and video equipment, and electronic music instruments;
- medical electrical appliances;
- personal computers and similar equipment;
- radio transmitters;
- apparatus designed to be used exclusively in vehicles;

The fields of multifunction equipment which is subjected simultaneously to different clauses of this standard and/or other standards shall be assessed using the provisions of each clause/standard for the relevant functions in operation.

Abnormal operation of the appliances is not taken into consideration.

This standard includes specific elements to assess human exposure:

- definition of sensor;
- definition of measuring methods;
- definition of operating mode for appliance under test;
- definition of measuring distance and position.

The measurement methods specified are valid from 10 Hz to 400 kHz. In the frequency range above 400 kHz and below 10 Hz appliances in the scope of this standard are deemed to comply without testing unless otherwise specified in IEC 60335 series.

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 60335 (all parts), *Safety of household and similar electrical appliances*

IEC 61786, *Measurement of low-frequency magnetic and electric fields with regard to exposure of human beings – Special requirements for instruments and guidance for measurements*

IEC 62311, *Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)²⁾*

CISPR 14-1, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*

2) To be published.