



SLOVENSKI STANDARD

SIST EN 62110:2010

01-maj-2010

Merilni postopki za merjenje nivoja električnih in magnetnih polj, ki jih generirajo izmenični napajalni sistemi, z vidika izpostavljenosti ljudi (IEC 62110:2009)

Measurement procedures for electric and magnetic field levels generated by AC power systems with regard to human exposure

Magnetische Felder, die von Wechselstrom-Energieversorgungssystemen erzeugt werden - Messverfahren im Hinblick auf die Exposition der Allgemeinbevölkerung

Procédures pour la mesure des champs électriques et magnétiques générés par les réseaux d'énergie électrique CA en rapport avec l'exposition humaine

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Ta slovenski standard je istoveten z: EN 62110:2009

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 62110

December 2009

ICS 17.220.20; 29.240

English version

**Electric and magnetic field levels generated by AC power systems -
Measurement procedures with regard to public exposure
(IEC 62110:2009)**

Champs électriques et magnétiques
générés par les systèmes d'alimentation
à courant alternatif -
Procédures de mesure des niveaux
d'exposition du public
(CEI 62110:2009)

Magnetische Felder,
die von Wechselstrom-
Energieversorgungssystemen erzeugt
werden -
Messverfahren im Hinblick
auf die Exposition
der Allgemeinbevölkerung
(IEC 62110:2009)

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This European Standard was approved by CENELEC on 2009-11-01. 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: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 106/177/FDIS, future edition 1 of IEC 62110, prepared by IEC TC 106, Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62110 on 2009-11-01.

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) 2010-08-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2012-11-01

Terms defined in Clause 3 appear in *italics* throughout the document.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62110:2009 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 61000-2-2 NOTE Harmonized as EN 61000-2-2:2002 (not modified).

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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 61786 | - ¹⁾ | Measurement of low-frequency magnetic and electric fields with regard to exposure of human beings - Special requirements for instruments and guidance for measurement | - | - |

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¹⁾ Undated reference.

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IEC 62110

Edition 1.0 2009-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Electric and magnetic field levels generated by AC power systems –
Measurement procedures with regard to public exposure**

**Champs électriques et magnétiques générés par les systèmes d'alimentation à
courant alternatif – Procédures de mesure des niveaux d'exposition du public**

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ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRIC AND MAGNETIC FIELD LEVELS GENERATED BY AC POWER
SYSTEMS – MEASUREMENT PROCEDURES
WITH REGARD TO PUBLIC EXPOSURE**

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 62110 has been prepared by IEC technical committee 106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure.

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

| FDIS | Report on voting |
|--------------|------------------|
| 106/177/FDIS | 106/185/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.

Terms defined in Clause 3 appear in *italics* throughout the document.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

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INTRODUCTION

All populations of the world are now exposed to electric and magnetic fields and the levels will continue to increase with developing industry and technology. A number of countries have implemented regulations on public exposure to these fields. Therefore, in order to evaluate human exposure levels to these fields adequately, common measurement procedures are required by not only professionals of national authorities and electric power industries, but also the general public.

This standard is applied to the measurement of fields generated by AC power systems in areas accessible to the public. It establishes a common measurement procedure to evaluate the exposure levels of the human body to electric and magnetic fields among the general public.

The values obtained are for use to determine whether the fields comply with exposure limits by comparing them with the field limits for general public exposure such as the reference levels from the ICNIRP (International Commission on Non-Ionizing Radiation Protection) Guidelines [1]¹⁾, MPE (maximum permissible exposure) from the IEEE (Institute of Electrical and Electronics Engineers) [2] or in national regulations. If the values obtained are higher than the reference level or MPE, it does not necessarily mean that the basic restriction has been exceeded, in which case other methods must be used to ensure that basic restriction is not exceeded.

The values obtained by using the procedures in this standard are for the load conditions occurring at the time of measurement. Therefore, in the case of magnetic field, in order to check compliance with some exposure guidelines or regulations these values may need to be extrapolated to take account of the maximum load of the circuits.

This standard is not applicable to occupational exposure associated with, for example, the operation and/or maintenance of the power systems. Such exposure may occur when working inside a distribution or transmission substation, a power plant, in a manhole or a tunnel for underground cables, or on an overhead line tower or pole.

1) Numbers in square brackets refers to the Bibliography.

ELECTRIC AND MAGNETIC FIELD LEVELS GENERATED BY AC POWER SYSTEMS – MEASUREMENT PROCEDURES WITH REGARD TO PUBLIC EXPOSURE

1 Scope

This International Standard establishes measurement procedures for electric and magnetic field levels generated by AC power systems to evaluate the exposure levels of the human body to these fields. This standard is not applicable to DC power transmission systems.

This International Standard is applicable to public exposure in the domestic environment and in areas accessible to the public.

This standard specifies fundamental procedures for the measurement of fields, and, with regard to human exposure, for obtaining a field value that corresponds to a spatial average over the entire human body.

This standard is not applicable to occupational exposure associated with, for example, the operation and/or maintenance of the power systems. Such exposure may occur when working inside a distribution or transmission substation, a power plant, in a manhole or a tunnel for underground cables, or on an overhead line tower or pole.

2 Normative references

[SIST EN 62110:2010](#)

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions given below apply. Internationally accepted SI-units are used throughout the standard.

NOTE The distinction between “magnetic flux density” and “magnetic field strength” is only relevant when considering magnetic fields in magnetic materials. In air it is common to use “magnetic fields” as a generic term to cover both of these two quantities.

3.1

single-point measurement

procedure to measure the field level at a specified height, used for uniform fields

NOTE The conditions under which the field can be considered as uniform or non-uniform are given in section 5.1.

3.2

three-point measurement

procedure to measure the field levels at three specified heights at a single location, used for non-uniform fields

3.3**five-point measurement**

procedure to measure the field levels at five points at a specified height, used for non-uniform fields generated by field sources below the floor or the ground

3.4**average exposure level**

spatial average over the entire human body of fields to which the individual is exposed

3.5**three-point average exposure level**

arithmetic mean of the three values obtained from the *three-point measurement* or of the largest three values obtained from the *five-point measurement*

NOTE This arithmetic mean is used as an estimate of the *average exposure level* at a single location.

3.6**maximum exposure level**

the maximum of the single-point measurements or *average exposure levels* over the area of interest

3.7**power system**

system consisting of overhead lines and underground cables, substations and other power distribution and transmission equipment. Railway systems are covered by a specific standard and therefore are excluded from the present standard.

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4 Measurement principle for electric and magnetic fields

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4.1 General

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Detailed generic information and requirements regarding measurement of electric and magnetic fields are given in IEC 61786 and in other technical documents such as CIGRE technical brochures [6][8] and IEEE guides [7][9].

4.2 Instruments

Instruments for measuring electric and magnetic fields shall meet the requirements regarding calibration and specification given in IEC 61786 or another appropriate national or international standard. These instruments should be used under appropriate conditions, particularly with regard to electromagnetic immunity, temperature, and humidity, recommended by the manufacturer.

A three-axis instrument measures r.m.s. values of resultant field F_r . A single-axis instrument can be used to obtain F_r by measuring F_x , F_y , and F_z , using Equation (1).

$$F_r = \sqrt{F_x^2 + F_y^2 + F_z^2} \quad (1)$$

where

F_x , F_y , and F_z are r.m.s. values of the orthogonal three-axis components of electric or magnetic fields.

When the field has no harmonics, F_r can also be obtained by measuring F_{\max} and F_{\min} , and then using Equation (2).