SLOVENSKI STANDARD
SIST EN 62369-1:2009

01-september-2009

Nadomešča:
SIST EN 50357:2002

Vrednotenje izpostavljenosti ljudi elektromagnetnim sevanjem kratkega dosega (SRD) na različnih področjih uporabe v frekvenčnem območju od 0 GHz do 300 GHz - 1. del: Sevanja naprav, ki se uporabljajo za elektronski nadzor blaga, radiofrekvenčno razpoznavanje in podobne sisteme (IEC 62369-1:2008)

Evaluation of human exposure to electromagnetic fields from short range devices (SRDs) in various applications over the frequency range 0 GHz to 300 GHz -- Part 1: Fields produced by devices used for electronic article surveillance, radio frequency identification and similar systems

Ermittlung der Exposition von Personen gegenüber elektromagnetischen Feldern im Frequenzbereich 0 Hz bis 300 GHz durch Geräte mit kurzer Reichweite für verschiedene Anwendungen -- Teil 1: Felder, die durch Geräte erzeugt werden, die zur elektronischen Artikelüberwachung, Hochfrequenz-Identifizierung und für ähnliche Anwendungen verwendet werden

Evaluation de l'exposition humaine aux champs électromagnétiques produits par les dispositifs radio à courte portée dans la plage de fréquence 0 GHz à 300 GHz -- Partie 1: Champs produits par les dispositifs utilisés pour la surveillance électronique des objets, l'identification par radiofréquence et les systèmes similaires

Ta slovenski standard je istoveten z: **EN 62369-1:2009**

ICS:

13.280	Varstvo pred sevanjem	Radiation protection

SIST EN 62369-1:2009 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62369-1

March 2009

ICS 33.050

Supersedes EN 50357:2001

English version

Evaluation of human exposure to electromagnetic fields from short range devices (SRDs) in various applications over the frequency range 0 GHz to 300 GHz - Part 1: Fields produced by devices used for electronic article surveillance, radio frequency identification and similar systems

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This European Standard was approved by CENELEC on 2009-03-01. 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

Ref. No. EN 62369-1:2009 E

Foreword

The text of the International Standard IEC 62369-1:2008, prepared by IEC TC 106, Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 62369-1 on 2009-03-01 without any modification.

This European Standard supersedes EN 50357:2001.

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)	2010-03-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2012-03-01

Endorsement notice

The text of the International Standard IEC 62369-1:2008 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 61566	NOTE	Harmonized as EN 61566:1997 (not modified).
IEC 62209-1	NOTE	Harmonized as EN 62209-1:2006 (not modified).
IEC 62311	NOTE	Harmonized as EN 62311:2008 (modified).
ISO/IEC 17025	NOTE	Harmonized as EN ISO/IEC 17025:2005 (not modified).

IEC 62369-1

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Part 1: Fields produced by devices used for electronic article surveillance, radio frequency identification and similar systems

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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EVALUATION OF HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS FROM SHORT RANGE DEVICES (SRDS) IN VARIOUS APPLICATIONS OVER THE FREQUENCY RANGE 0 GHz to 300 GHz –

Part 1: Fields produced by devices used for electronic article surveillance, radio frequency identification and similar systems

FOREWORD

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International Standard IEC 62369-1 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
106/156/FDIS	106/159/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.

The list of all parts of IEC 62369 series, published under the title *Evaluation of human exposure to electromagnetic fields from short range devices (SRDs) in various applications over the frequency range 0 GHz to 300 GHz*, can be found on the IEC website.

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.

INTRODUCTION

Electromagnetic fields interact with the human body and other biological systems through a number of physical mechanisms. The main mechanisms of interaction are based on nervous system effects and heating. These effects are dependent on frequency and are defined by biologically relevant quantities. Based on these scientifically established health effects, there are international, regional and sometimes national exposure requirements. These are set as basic restrictions on quantities, which are not necessarily directly measurable, and contain high safety factors to ensure a high level of protection. These quantities may be determined either by calculation for each case, or by measuring a reference value that has a pre-derived relationship to them, usually under worst-case, far-field conditions. Respect of the reference value will ensure respect of the relevant basic restriction, except in some specific near field situations which would normally be identified or highlighted within the applicable exposure guidelines. If the measured quantity exceeds the reference value, it does not necessarily follow that the basic restriction is also exceeded. Under those circumstances, more detailed evaluation techniques will be necessary which are specific to that type of equipment and exposure.

This document is part of a multi-part standard covering the evaluation of human exposure to electromagnetic fields from short range devices (SRDs) in various applications over the frequency range from 0 GHz to 300 GHz.

EVALUATION OF HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS FROM SHORT RANGE DEVICES (SRDS) IN VARIOUS APPLICATIONS OVER THE FREQUENCY RANGE 0 GHz to 300 GHz –

Part 1: Fields produced by devices used for electronic article surveillance, radio frequency identification and similar systems

1 Scope

This part of IEC 62369 presents procedures for the evaluation of human exposure to electromagnetic fields (EMFs) from devices used in electronic article surveillance (EAS), radio frequency identification (RFID) and similar applications. It adopts a staged approach to facilitate compliance assessment. The first stage (Stage 1) is a simple measurement against the appropriate derived reference values. Stage 2 is a more complex series of measurements or calculations, coupled with analysis techniques. Stage 3 requires detailed modelling and analysis for comparison with the basic restrictions. When assessing any device, the most appropriate method for the exposure situation may be used.

At the time of writing this International Standard, electronic article surveillance, radio frequency identification and similar systems do not normally operate at frequencies below 1 Hz or above 10 GHz. EMF exposure guidelines and standards can cover a wider range of frequencies, so clarification on the required range is included as part of the evaluation procedures.

The devices covered by this document normally have non-uniform field patterns. Often these devices have a very rapid reduction of field strength with distance and operate under near-field conditions where the relationship between electric and magnetic fields is not constant. This, together with typical exposure conditions for different device types, is detailed in Annex A.

Annex B contains comprehensive information to assist with numerical modelling of the exposure situation. It includes both homogeneous and anatomical models as well as the electrical properties of tissue.

This International Standard does not include limits. Limits can be obtained from separately published human exposure guidelines. Different guidelines and limit values may apply in different regions. Linked into the guidelines are usually methods for summation across wider frequency ranges and for multiple exposure sources. These shall be used. A simplified method for summation of multiple sources is contained in Annex C. This has to be used with care as it is simplistic and will overestimate the exposure; however it is useful as a guide, when the results of different evaluations are in different units of measure which are not compatible.

Different countries and regions have different guidelines for handling the uncertainties from the evaluation. Annex D provides information on the two most common methods.

A bibliography at the end of this standard provides general information as well as useful l information for the measurement of electromagnetic fields. See [1],[2],[3],[4],[5],[6][1)].

Similar national or international standards may be used as an alternative.

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1) Figures between brackets refer to the bibliography.

2 Normative references

None.

3 Terms, definitions, and abbreviations

The internationally accepted SI units are used throughout this document.

3.1 Quantities

Quantity	Symbol	Unit	Dimension
Magnetic flux density	*B*	tesla (Vs/m^2)	T
Electric flux density	*D*	coulomb per square metre	Cm^{-2}
Electric field strength	*E*	volt per metre	Vm^{-1}
Frequency	*f*	hertz	Hz
Magnetic field strength	*H*	ampere per metre	Am^{-1}
Current density	*J*	ampere per square metre	Am^{-2}
Power density	*S*	watt per square metre	Wm^{-2}
Specific absorption rate	*SAR*	watt per kilogram	Wkg^{-1}
Temperature	*T*	kelvin	K
Permittivity	ε	farad per metre	Fm^{-1}
Wavelength	λ	metre	m
Permeability	μ	henry per metre	Hm^{-1}
Mass density	ρ	kilogram per cubic metre	kgm^{-3}
Electric conductivity	σ	siemens per metre	Sm^{-1}

3.2 Constants

Physical constant	Symbol	Magnitude
Velocity of light in free space	c	$2{,}998 \times 10^8$ ms^{-1}
Permittivity of free space	ε_0	$8{,}854 \times 10^{-12}$ Fm^{-1}
Permeability of free space	μ_0	$4\pi \times 10^{-7}$ Hm^{-1}
Impedance of free space	Z_0	120π (or 377) Ω

3.3 Terms and definitions

3.3.1
antenna
antennas are conductive elements that radiate, and/or receive energy in the radio frequency spectrum

3.3.2
average (temporal) absorbed power
***P*avg**
time – averaged rate of energy transfer defined by:

$$P_{\text{avg}} = \frac{1}{t_2 - t_1} \int_{t1}^{t2} P(t)dt$$

where t_1 and t_2 are the start and stop time of the exposure (the period $t_2 - t_1$ is the exposure duration)

3.3.3
averaging time
***t*avg**
appropriate time over which exposure is averaged for purposes of determining compliance

3.3.4
bandwidth
range or band of frequencies in the electromagnetic spectrum within which a system is capable of receiving and transmitting

3.3.5
basic restrictions (or basic limits)
values for human exposure to time-varying electric, magnetic, and electromagnetic fields that are based on levels for which there are established health effects, with a high level of safety included. These values may be defined in terms of induced current density, in-situ electric field, specific absorption rate or similar dosimetric quantity

3.3.6
carrier
frequency used to carry data by appropriate modulation of the carrier waveform

3.3.7
conductivity
σ
ratio of the conduction–current density in a medium to the electric field strength in the medium

$$J = \sigma E$$

3.3.8
current density
J
electromagnetic field-induced current per unit area inside the body

3.3.9
deactivator
device which changes transponders so that they no longer respond

3.3.10
dielectric constant
ε
See permittivity.

3.3.11
electric field strength
E
magnitude of a field vector at a point that represents the force (*F*) on an infinitely small charge (*q*) divided by the charge

$$E = \frac{F}{q}$$

3.3.12
electric flux density
D
magnitude of a field vector that is equal to the electric field strength (*E*) multiplied by the permittivity (ε)

$$D = \varepsilon E$$

3.3.13
electronic article surveillance
EAS

system which detects the presence of transponders, which is often used for anti-theft purposes

3.3.14

exposure
exposure occurs whenever and wherever a person is subjected to electric, magnetic or electromagnetic fields or to touch currents other than those originating from physiological processes in the body and other natural phenomena

3.3.15
exposure level
value of the quantity under analysis when a person is exposed to electromagnetic fields or touch currents

3.3.16
exposure requirements
standard, recommendation, set of guidelines or limits or other document that defines exposure levels for guidance, assessment or compliance purposes

3.3.17
far-field
that region of the field of an antenna where the angular field distribution is essentially independent of the distance from the antenna. In this region (also called the free space region), the field has a predominantly plane-wave character, i.e. locally uniform distribution of electric field strength and magnetic field strength in planes transverse to the direction of propagation

3.3.18
harmonics
multiples of a principal frequency, invariably exhibiting lower amplitudes