National Standards Authority of Ireland

IRISH STANDARD

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National Standards
Authority of Ireland
Dublin 9
Ireland

Tel (01) 807 3800
Tel (01) 807 3838

BASIC STANDARD FOR THE MEASUREMENT OF SPECIFIC ABSORPTION RATE RELATED TO HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS FROM MOBILE PHONED (300 MHZ - 3 GHZ)

This Irish Standard was published under the authority of the National Standards Authority of Ireland and comes into effect on September 7, 2001

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EUROPEAN STANDARD **EN 50361**

NORME EUROPÉENNE

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English version

Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz)

Norme de base relative à la mesure du Débit d'Absorption Spécifique relatif à l'exposition des personnes aux champs électromagnétiques émis par les téléphones mobiles (300 MHz - 3 GHz)

Grundnorm zur Messung der Spezifischen Absorptionsrate (SAR) in Bezug auf die Sicherheit von Personen in elektromagnetischen Feldern von Mobiltelefonen (300 MHz bis 3 GHz)

This European Standard was approved by CENELEC on 2001-07-03. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and 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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 211, Electromagnetic fields in the human environment.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50361 on 2001-07-03.

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) 2002-03-01

- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-03-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex D is normative and annexes A, B and C are informative.

Contents

1 Scope

This basic standard applies to any electromagnetic field (EM) transmitting devices intended to be used with the radiating part of the equipment in close proximity to the human ear including mobile phones, cordless phones, etc. The frequency range is 300 MHz to 3 GHz.

The objective of the standard is to specify the method for demonstration of compliance with the specific absorption rate (SAR) limits for such equipment.

2 Normative references

Council Recommendation 1999/519/EC of 12 July 1999 *on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)* (Official Journal L 197 of 30 July 1999)

International Commission on Non-Ionising Radiation Protection (1998), *Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz).* Health Physics 74, 494-522

ISO/IEC 17025:1999, *General requirements for the competence of testing and calibration laboratories*

IEC "*Guide to the expression of uncertainty in measurement*", Ed. 1, 1995.

Phantom CAD files, *SAM_in, SAM_out* in 3D-IGES and DXF formats, and reference SAR distributions publicly available on CD-ROM.

3 Physical quantities, units and constants

3.1 Physical quantities

The internationally accepted SI-units are used throughout the standard.

Quantity	Symbol	Unit	Dimensions
Current density	J	ampere per square metre	A/m^2
Electric field strength	E	volt per metre	V/m
Electric flux density	D	coulomb per square metre	C/m^2
Electric conductivity	σ	siemens per metre	S/m
Frequency	f	hertz	Hz
Magnetic field strength	H	ampere per metre	A/m
Magnetic flux density	B	tesla (Vs/m^2)	T
Mass density	ρ	kilogram per cubic metre	kg/m^3
Permeability	μ	henry per metre	H/m

Permittivity	ε	farad per metre	F/m
Specific absorption rate	SAR	watt per kilogram	W/kg
Wavelength	λ	metre	m
Temperature	T	kelvin	K
Heat capacity	c_i		J/kg K

NOTE In this standard, temperature is quantified in degrees Celsius, as defined by:

$$T(°C) = T(K) - 273,16$$

3.2 Constants

Physical constant		Magnitude
Speed of light in vacuum	c	$2,998 \times 10^{8}$ m/s
Permittivity of free space	ε_0	$8,854 \times 10^{-12}$ F/m
Permeability of free space	μ_0	$4\pi \times 10^{-7}$ H/m
Impedance of free space	Z_0	120π or 377 Ω

4 Definitions

4.1.1
average (temporal) absorbed power (P_{avg})
the time-averaged rate of energy transfer defined by:

$$\bar{P}_{avg} = \frac{1}{t_2 - t_1} \int_{t_1}^{t_2} P(t)dt \qquad (4.1)$$

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 time

4.1.2
averaging time (t_{avg})
the appropriate time over which exposure is averaged for purposes of determining compliance with the limits

4.1.3
basic restriction
the basic restrictions are the restrictions on exposure to time-varying electric, magnetic, and electromagnetic fields that are based directly on established health effects. Concerning the frequency range of this standard, the physical quantity used is the Specific Absorption Rate (SAR)

4.1.4
boundary effect
in this context the boundary effect is the influence of the boundaries between two media of the phantom on the sensitivity of the probe, as well as the influence of the probe on the field distribution and the current density if the probe approaches the boundary between two media