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IRISH STANDARD

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ICS 33.060.01  
33.100.01

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

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EUROPEAN STANDARD

**EN 50361**

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2001

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ICS 33 060.01, 33 100 01

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.

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**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.

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## 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.

<u>Quantity</u>	<u>Symbol</u>	<u>Unit</u>	<u>Dimensions</u>
Current density	J	ampere per square metre	A/m <sup>2</sup>
Electric field strength	E	volt per metre	V/m
Electric flux density	D	coulomb per square metre	C/m <sup>2</sup>
Electric conductivity	$\sigma$	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 <sup>2</sup> )	T
Mass density	$\rho$	kilogram per cubic metre	kg/m <sup>3</sup>
Permeability	$\mu$	henry per metre	H/m

Permittivity	$\varepsilon$	farad per metre	F/m
Specific absorption rate	SAR	watt per kilogram	W/kg
Wavelength	$\lambda$	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:

$$T(^{\circ}\text{C}) = T(\text{K}) - 273,16$$

### 3.2 Constants

<u>Physical constant</u>		<u>Magnitude</u>
Speed of light in vacuum	$c$	$2,998 \times 10^8$ m/s
Permittivity of free space	$\varepsilon_0$	$8,854 \times 10^{-12}$ F/m
Permeability of free space	$\mu_0$	$4\pi \times 10^{-7}$ H/m
Impedance of free space	$Z_0$	$120\pi$ or $377 \Omega$

## 4 Definitions

### 4.1.1

#### average (temporal) absorbed power ( $P_{avg}$ )

the time-averaged rate of energy transfer defined by:

$$P_{avg}^- = \frac{1}{t_2 - t_1} \int_{t_1}^{t_2} P(t) dt \quad (4.1)$$

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

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