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**(istoveten EN 50364:2001)**

Limitation of human exposure to electromagnetic fields from devices operating in the frequency range 0 Hz to 10 GHz, used in Electronic Article Surveillance (EAS), Radio Frequency Identification (RFID) and similar applications

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English version

**Limitation of human exposure to electromagnetic fields  
from devices operating in the frequency range 0 Hz to 10 GHz,  
used in Electronic Article Surveillance (EAS),  
Radio Frequency Identification (RFID) and similar applications**

Limitation de l'exposition humaine aux champs électromagnétiques émis par les dispositifs fonctionnant dans la gamme de fréquences de 0 Hz à 10 GHz, utilisés pour la surveillance électronique des objets (EAS), l'identification par radiofréquence (RFID) et les applications similaires

Begrenzung der Exposition von Personen gegenüber elektromagnetischen Feldern von Geräten, die im Frequenzbereich von 0 Hz bis 10 GHz betrieben und in der elektronischen Artikelüberwachung (en: EAS) Hochfrequenz-Identifizierung (en: RFID) und ähnlichen Anwendungen verwendet werden

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This European Standard was approved by CENELEC on 2001-05-01. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, 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**

## Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 106X (former 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 50364 on 2001-05-01.

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) 2002-04-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2004-04-01

This European Standard has to be read in conjunction with EN 50357.

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## Contents

<b>Foreword</b> .....	<b>1</b>
<b>1 Scope</b> .....	<b>4</b>
<b>2 Normative references</b> .....	<b>4</b>
2.1 The Basic Standard .....	4
2.2 The EC recommendation .....	4
2.3 The ICNIRP Guidelines.....	4
<b>3 Definitions</b> .....	<b>4</b>
<b>4 Exposure limits</b> .....	<b>5</b>
4.1 General public exposure .....	5
4.2 Occupational exposure .....	5
4.3 Other exposure .....	5
<b>5 Evaluation of compliance</b> .....	<b>6</b>
5.1 Evaluation of emitted EMF .....	6
5.2 Evaluation of limb currents and contact currents from conductive objects.....	7
5.3 Assessment of devices which emit multiple frequencies .....	7
5.4 Assessments after delivery or installation.....	7
<b>6 Assessment uncertainty</b> .....	<b>7</b>

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## 1 Scope

This product standard applies to devices operating within the frequency range 0 Hz to 10 GHz, used in electronic article surveillance (EAS), radio frequency identification (RFID) and similar applications.

This product standard may be used for demonstration of compliance to the requirements of Council Directive 1999/5/EC, with regard to the limitation of human exposure to electromagnetic fields (EMFs). There are additional requirements covered by the Directive, which are not included in this product standard.

This product standard may be used for demonstration of compliance to the requirements of Council Directive 73/23/EEC, with regard to the limitation of human exposure to EMFs. There are additional requirements covered by the Directive, which are not included in this product standard.

It should be noted that the supplier of a specific piece of equipment might not know the overall exposure environment in which the equipment is being used. This product standard can only assess the human exposure from the specific equipment under evaluation when being used according to the supplier's guidelines.

Other standards can apply to products covered by this document. In particular this document is not designed to evaluate the electromagnetic compatibility with other equipment; nor does it reflect any product safety requirements other than those specifically related to human exposure to electromagnetic fields.

## 2 Normative references

### 2.1 The Basic Standard

EN 50357, Evaluation of human exposure to electromagnetic fields (EMFs) from devices used in electronic article surveillance (EAS), radio frequency identification (RFID) and similar applications

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### 2.2 The EC recommendation

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European 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, L199, 30.7.1999, p.59

### 2.3 The ICNIRP Guidelines

International Commission on Non-Ionising Radiation Protection, Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz), Health Physics Volume 74, Number 4, April 1998, p. 494

## 3 Definitions

### 3.1

#### Basic Restrictions

restrictions on exposure to electric, magnetic and electromagnetic fields that are based directly on established health effects and biological considerations

### 3.2

#### Reference Levels (or Derived Reference Levels)

levels provided for practical exposure assessment purposes. They are derived from Basic Restrictions. Respect of the reference level will ensure respect of the relevant Basic Restriction. If the reference level is exceeded, it does not necessarily follow that the Basic Restriction will be exceeded

### 3.3

#### **EMF**

electric, magnetic or electromagnetic field

### 3.4

#### **EAS**

electronic article surveillance

### 3.5

#### **induced current density**

electromagnetic field induced current per unit area inside the body

### 3.6

#### **power density**

power per unit area normal to the direction of electromagnetic wave propagation

### 3.7

#### **RFID**

radio frequency identification

### 3.8

#### **specific absorption rate (SAR)**

the physical quantity in which the Basic Restrictions of protection guidelines are defined in part of the frequency range specified in the scope. For a detailed definition see the Basic Standard.

## 4 Exposure limits

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In all cases, the equipment documentation shall clearly state the intended use condition as defined below.

### 4.1 General public exposure

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This applies to equipment used by, or in proximity to, the general public. Any equipment defined and assessed for general public exposure may also be used in an occupational environment.

The limits shall be the values of Basic Restrictions and Reference Levels from the EC Recommendation. It must be noted that the tables of values referred to in the following sections are explained and rationalised in the text of the EC Recommendation and the associated notes adjoining the tables.

### 4.2 Occupational exposure

This applies to equipment used only in an occupational environment (where general public access is prohibited or regulated in such a way as to be similar to occupational use). The equipment must be defined for occupational use only.

The limits shall be the values of Basic Restrictions and Reference Levels, appropriate for occupational exposure, from the ICNIRP Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). It must be noted that the tables of values referred to in the following subclauses are explained and rationalised in the text of ICNIRP Guidelines and the associated notes adjoining the tables.

### 4.3 Other exposure

If the end use of the equipment could be either occupational or by the general public, the equipment shall be assessed as if it is for general public use, and defined as such.

If the end use of the equipment is unknown, or not clear, the equipment shall be assessed as if it is for general public use, and defined as such.

If the equipment could be used under occupational conditions, but in an area where the general public may be exposed, then the exposure shall be assessed against the general public requirements under the conditions expected for that exposure situation. However the general public are not expected to occupy areas intended exclusively for workers.

For all other exposure conditions, the equipment shall be assessed and defined for general public use.

## 5 Evaluation of compliance

The EC Recommendation shall be consulted to determine whether an exposure assessment is required. Certain types of equipment and applications may be excluded or given special consideration. It must be noted that such consideration may not be on a harmonised basis.

The measurements and calculations to demonstrate equipment compliance shall be made according to clause 4 of the Basic Standard. The general conditions as defined in that clause shall apply to all equipment. The exposure mode shall be declared according to clause 4 of this product standard.

### 5.1 Evaluation of emitted EMF

If an exposure assessment is necessary the emitted EMF shall be evaluated using one of the following methods. It is not necessary to demonstrate compliance using more than one method.

#### 5.1.1 Measurements to show compliance with Derived Reference Levels

Measurements shall be made according to the Basic Standard, subclause 4.1, using the method from either 4.1.1 or 4.1.2 as appropriate.

For general public exposure, the results shall be compared with the EC Recommendation, Annex III – Reference Levels, using values provided in Table 2 of that document.

For occupational exposure, the results shall be compared to the ICNIRP Guidelines, from the section on Reference Levels, using values provided in Table 6 of that document.

#### 5.1.2 Measurements and analysis to show compliance with Basic Restrictions

Evaluation shall be made according to the Basic Standard, subclause 4.2, using subclauses as appropriate to the frequencies being considered.

For general public exposure, the results shall be compared with the EC Recommendation, Annex II – Basic Restrictions, using values provided in Table 1 of that document.

For occupational exposure, the results shall be compared to the ICNIRP Guidelines, from the section on Basic Restrictions, using values provided in Tables 4 and 5 (occupational exposure) of that document.

#### 5.1.3 Numerical modelling to show compliance with Basic Restrictions

Evaluation shall be made according to the Basic Standard, subclause 4.3. The results used for induced current density comparison shall be those derived for Central Nervous System Tissue in the head and/or trunk of the body (brain and/or spinal cord tissue) as appropriate to the type of exposure. The results used for SAR or power density comparison shall be the whole body average, and the localised average taken over 10 g of contiguous tissue.

For general public exposure, the results shall be compared with the EC Recommendation, Annex II – Basic Restrictions, using values provided in Table 1 of that document.

For occupational exposure, the results shall be compared to the ICNIRP Guidelines, from the section on Basic Restrictions, using values provided in Tables 4 and 5 (occupational exposure) of that document.