BS EN 50364:2010

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Limitation of human exposure to electromagnetic fields from devices operating in the frequency range 0 Hz to 300 GHz, used in Electronic Article Surveillance (EAS), Radio Frequency Identification (RFID) and similar applications

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National foreword

This British Standard is the UK implementation of EN 50364:2010. It supersedes BS EN 50364:2002 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/106, Human exposure to low frequency and high frequency electromagnetic radiation.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English version

Limitation of human exposure to electromagnetic fields from devices operating in the frequency range 0 Hz to 300 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 300 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 300 GHz betrieben und in der elektronischen Artikelüberwachung (en: EAS), Hochfrequenz-Identifizierung (en: RFID) und ähnlichen Anwendungen verwendet werden

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 106X, 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 2009-11-01.

This European Standards supersedes EN 50364:2001.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

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– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2012-11-01

This European Standard has to be read in conjunction with EN 62369-1:2009 "*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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Contents

1 Scope

This product standard applies to devices operating within the frequency range 0 Hz to 300 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 the RTTE 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 the Low Voltage Directive 2006/95/EC, 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 References

2.1 Normative references

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.

EN 62369-1:2009, *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* (IEC 62369-1:2008)

2.2 Regulatory references

The EC recommendation

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, of 1999-7-30, p.59-70

The RTTE Directive

Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity, Official Journal L 91 of 1999-4-7, p.10-28

The Low Voltage Directive

Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to Electrical Equipment designed for use within certain voltage limits, Official Journal L 374 of 2006-12-27, p. 10-19

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

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
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 EN 62369-1.

4 Exposure conditions and limits

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

The limits shall be the values of basic restrictions and reference levels from the EC Recommendation. It should 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. The EC Recommendation bases its values on the work provided in the ICNIRP Guidelines, which may be consulted for background information on the derivation of the values concerned. This applies to equipment used by, or in proximity to, the general public.

Equipment which meets the requirements for general public exposure as given in this document may be used in an occupational environment. 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 is not expected to occupy areas intended exclusively for workers

In cases where occupational exposure is greater than the exposure for the general public the occupational exposure level shall also be assessed but not compared against the values in the EC Recommendation for conformity assessment purposes. In such cases information on installation and use shall be provided in the user documentation sufficient to maintain the exposure of the general public below the values provided in the EC Recommendation. Information on the occupational exposure levels shall be available for employers making risk assessments and the source of the information shall be identified in the user documentation.

Some equipment may be used only in an occupational environment (general public access is prohibited or regulated in such a way as to be similar to occupational use). In such cases, where occupational exposure is greater than the levels allowed for general public exposure, the equipment must be defined for occupational use. This standard can only then be used for the purpose of presumption of conformity with applicable Directives when there is an identified distance in the product documentation for general public exposure and evaluation is made for compliance at that distance. Information on the occupational exposure levels should be made available for employers making risk assessments and the information, or source of the information, shall also be identified in the user documentation.

5 Evaluation of compliance

5.1 General

The EC Recommendation shall be consulted to determine whether an exposure assessment is required for the general public. 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 EN 62369-1, Clause 4. The general conditions as defined in that clause shall apply to all equipment.

5.2 Evaluation of emitted EMF

5.2.1 Assessment methods

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. The exposure distances shall be as described in EN 62369-1, Table 1 and Figures 3 to 11, measured from the edge or face of the equipment nearest to the relevant position of exposure. For equipment which is similar but does not match the categories provided, then other positioning may be used provided it uses the same principles as the positioning provided in EN 62369-1. Any variations in positioning shall be documented.

5.2.2 Assessment to show compliance with derived reference levels

Measurements shall be made according to EN 62369-1, using one of the methods from EN 62369-1, 4.2, as appropriate. The method used, the assessment set-up and the results shall be documented.

The results shall be compared with the EC Recommendation, Annex III – Reference levels, using values provided in Table 2 of that document, and any applicable notes to the table.

5.2.3 Assessment to show compliance with basic restrictions

Assessment shall be made according to EN 62369-1, using one of the methods from EN 62369-1, 4.3, 4.4 or 4.5 as appropriate. The method used, the assessment set-up and the results shall be documented. Where numerical modelling is used, the details of the body model, the source model construction and any validations shall also be documented.

EN 62369-1, Annex B (informative), provides additional information for numerical modelling:

– for frequencies up to 10 MHz, the results used for induced current density comparison shall be those derived for Central Nervous System (CNS) tissue in the head and/or trunk of the body (brain and/or spinal cord tissue) as appropriate to the type of exposure;

– for frequencies above 100 kHz, 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 frequencies between 100 kHz and 10 MHz, results for both induced current density in CNS tissue and SAR (or power density) shall be evaluated, as described in the bullet points above.

The results shall be compared with the EC Recommendation, Annex II – Basic restrictions, using values provided in Table 1 of that document, and any applicable notes to the table.

5.3 Evaluation of limb currents and contact currents from conductive objects

This subclause is applicable for equipment that emits single or multiple frequencies at up to 110 MHz. Evaluation shall be made according to EN 62369-1, 4.6. The method used, the assessment set-up and the results shall be documented.

For general public exposure, the results shall be compared with the EC Recommendation, Annex III – Reference levels, using values provided in Table 3 of that document and the paragraph beneath.

5.4 Assessment of devices which emit multiple frequencies

The operating nature of equipment covered by this product standard is such that they operate on one or more discrete frequencies with other frequencies suppressed by more than 30 dB. Where this is the case, the exposure assessment shall be made at the declared operating frequency or frequencies without requiring all other frequencies to be assessed. If this is not the case, then the exposure assessment must be made at all frequencies that are not suppressed by more than 30 dB.

For equipment that can emit more than one frequency, but not all frequencies simultaneously, then the frequency or frequencies which are most representative of the worst exposure condition shall be used. Again emitted frequencies suppressed by more than 30 dB need not be considered.

In situations where simultaneous exposure to fields of different frequencies does occur, the possibility that these exposures will be additive in their effects must be considered. Assessment based on such additive effects shall be performed separately for each effect. The assessment shall be made according to EN 62369-1, Clause 6. Separate evaluations and comparisons shall be made for thermal and electrical stimulation effects on the body, and for non-simultaneous effects.

For general public exposure, the summation shall be made according to the EC Recommendation, Annex IV.

5.5 Assessments after delivery or installation

There is no requirement for assessments to be made after installation or delivery. The installer of the equipment should make such checks as are specified by the manufacturer to ensure that the equipment is operating according to its designed parameters, but this is not a requirement of this standard.

If there are parameters of the equipment that have to be set at installation which would affect the compliance according to this product standard, these changes shall be made. Details of such changes shall be clearly defined in the documentation for the equipment along with any tests, measurements or checks necessary to ensure that the changes have been implemented correctly.

6 Assessment uncertainty

The uncertainty of the assessment shall be calculated as defined in EN 62369-1, Clause 8. Further information on uncertainty can be obtained from EN 62369-1, Annex D.

The assessment requirements within this product standard are defined with respect to the dimensions of a standard person in a standing position. Measurement protocols for subsets of the population are not defined, as the EC Recommendation and the ICNIRP Guidelines already include safety factors that take account of the variability associated with more susceptible members of the population, and thus offer protection to all. There is no requirement to add additional uncertainty or safety factors to the values to take account of this.

The uncertainty for the assessment (both measurements and calculations) shall be considered, as described in EN 62369-1, Clause D.2. In all cases the actual measured or calculated values shall be used for comparison with exposure guidelines. Uncertainty values shall be recorded but shall not be included in the comparison, provided that the total assessed uncertainty is less than or equal to that specified in EN 62369-1, Table 3; or if the assessment is proven to always overestimate the exposure (i.e. a conservative result).

7 Evaluation report

The evaluation report shall be made according to EN 62369-1, Clause 9. The layout and exact information contained in the report will vary depending on the methods used in the evaluation. The comparison of the results with the appropriate values from the EC Recommendation shall always be included in, or documented together with, the evaluation report.

Bibliography

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. 494-522

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