BRITISH STANDARD

BS EN
50371:2002

Generic standard to demonstrate the compliance of low power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (10 MHz – 300 GHz) — General public

The European Standard EN 50371:2002 has the status of a British Standard

ICS 13.280

National foreword

This British Standard is the official English language version of EN 50371:2002.

The UK participation in its preparation was entrusted to Technical Committee GEL/106, Human exposure to low-frequency and high-frequency electromagnetic radiation, which has the responsibility to:

— aid enquirers to understand the text;

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EUROPEAN STANDARD **EN 50371**

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ICS 13.280

English version

Generic standard to demonstrate the compliance of low power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (10 MHz - 300 GHz) - General public

Norme générique pour démontrer la conformité des appareils électriques et électroniques de faible puissance aux restrictions de base concernant l'exposition des personnes aux champs électromagnétiques (10 MHz - 300 GHz) - Public

Fachgrundnorm zum Nachweis der Übereinstimmung von elektronischen und elektrischen Geräten kleiner Leistung mit den Basisgrenzwerten für die Sicherheit von Personen in elektromagnetischen Feldern (10 MHz bis 300 GHz) - Allgemeine Öffentlichkeit

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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

Ref. No. EN 50371:2002 E

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 50371 on 2001-11-01.

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)	2002-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2004-10-01

Annexes designated "informative" are given for information only.
In this standard, annex A is informative.

Contents

1 Scope

This generic standard applies to low power electronic and electrical apparatus for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies.

The frequency range covered is 10 MHz to 300 GHz.

The object of this standard is to demonstrate the compliance of such apparatus with the basic restrictions on exposure of the general public to electric, magnetic and electromagnetic fields and contact current.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO/IEC 17025 1999 General requirements for the competence of testing and calibration laboratories.

Council Recommendation 1999/519/EC of 12 July 1999: Limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (Official Journal L 199 of 30 July 1999).

3 Terms and definitions

For the purposes of this European Standard, the following definitions apply.

3.1
low power apparatus
a low power electronic and electrical apparatus is an apparatus where the average emitted power over the average time defined in 3.2 is equal to or less than 20 mW. The emitted peak power shall be less than 20 Watts. For pulses of duration less than 30 microseconds and frequencies between 300 MHz and 10 GHz, the average power should be less than 20 x prf mW (prf in Hz)

NOTE The term prf is defined in 3.9.

3.2
averaging time (t_{avg})
the appropriate time over which exposure is averaged for purposes of determining compliance. For frequencies where SAR is the relevant basic restriction, this is 6 minutes in the frequency range from 10 MHz to 10 GHz. In the frequency range from 10 GHz to 300 GHz the averaging time is equal to $68/f^{1,05}$ minutes (where f is in GHz)

3.3
basic restriction
restrictions on exposure to time-varying electric, magnetic, and electromagnetic fields which are based directly on established health effects and biological considerations are termed “basic restrictions”. Depending upon the frequency of the field, the physical quantities used to specify these restrictions are specific absorption rate (SAR), and power density

3.4
reference levels
levels of field strength and currents that can be compared with corresponding measured or calculated values. The reference levels are derived from the basic restrictions using worst-case assumptions about exposure. If the reference levels are met, then the basic restrictions will be complied with, but if the reference levels are exceeded, it does not necessarily mean that the basic restrictions will not be met

3.5
specific absorption rate; specific energy absorption rate (SAR)
the rate at which energy is absorbed per unit mass of body tissue and is expressed in Watts per kg (W/kg)

3.6
specific energy absorption (SA)
the energy absorbed per unit mass of biological tissue, expressed in joules per kilogramme (J/kg)

3.7
power density
the appropriate quantity used for frequencies above 10 GHz, where the depth of penetration in the body is low. It is the radiant power incident perpendicular to a surface, divided by the area of the surface and is expressed in Watts per square metre (W/m^2)

3.8
peak power
the maximum instantaneous power

3.9
pulse repetition frequency (prf)
the number of pulses transmitted per unit time

3.10
emitted power
the total power emitted by the device in the form of electromagnetic fields

NOTE For transmitters that use antennas the total power is irrespective of antenna gain.

4 Compliance criteria

4.1 All electromagnetic fields

If the average power emitted by apparatus operating in the frequency range 10 MHz - 300 GHz is less than or equal to 20 mW and the transmitting peak power is less than 20 W then the apparatus is deemed to comply with the basic restrictions without testing. Averaging time is 6 minutes in the frequency range 10 MHz to 10 GHz. The average time is equal to $68/f^{1,05}$ minutes (where f is in GHz) in the frequency range 10 GHz to 300 GHz.

If the total supply power or the input power to the circuitry producing the greatest emissions in the device is less than or equal to 20 mW then it is assumed that the emitted power is less than 20 mW.

The evaluation of power is only valid if it is made with an uncertainty of less than 30 %.

See justification in annex A.

4.2 Pulse modulated electromagnetic fields with pulse duration less than 30 microseconds

For pulses of duration less than 30 microseconds at frequencies between 300 MHz and 10 GHz, there is also a basic restriction on SA. This is 2 mJ kg^{-1} in any 10 g of tissue in the head. For most pulses, the SAR restriction will be more stringent, but for pulses with a repetition frequency of less than 100 Hz, the SA restriction will predominate. For devices producing pulses with repetition rates below 100 Hz, the average power should be less than 20 x prf mW (prf in Hz).

See justification in annex A.

5 Assessment report

5.1 General

The means and rationale for determining the emitted power shall be recorded. This can e.g. be done by making reference to a mandatory product standard stating a maximum emitted average power of less than or equal to 20 mW and that the peak power is less than 20 W.

All the information needed for performing repeatable assessments, tests, calculations, or measurements giving results within the required calibration and uncertainty limits shall be recorded.

Further guidelines on the assessment report can be found in 5.10 of EN ISO/IEC 17025.

5.2 Equipment related information

Relevant information on the settings of controls and the intended usage of the equipment shall be recorded. For transmitters intended for use with external antennas at least one typical combination of transmitter and antenna shall be assessed. The technical specification of this antenna shall be documented in such details that the boundary where the basic restrictions are met can be identified e.g. by documented radiation patterns.

- Description of the device including type designation serial number, etc.
- Instructions needed for the user in order to use the apparatus within compliance with the basic restrictions.

Annex A
(informative)

Justification for compliance criteria

A.1 Justification for compliance criterion in the frequency range 10 MHz to 10 GHz

The justification for this criterion is that the most stringent basic restriction at frequencies between 10 MHz and 10 GHz is on localised SAR in the head. Any device with output power below 20 mW cannot produce an exposure exceeding this restriction under the most pessimistic exposure conditions.

The simplest and most conservative assumption is that all the transmitted power is absorbed within 10 g of tissue (see 4.1). The basic restriction is 2 W/kg so any unit which supplies less than 20 mW (= 2/100 W) from its antenna port, averaged over 6 minutes, will meet the basic restriction.

A.2 Justification for compliance criterion in the frequency range 10 GHz to 300 GHz

In the frequency range 10 GHz to 300 GHz, the basic restriction is 10 W m^{-2} averaged over any 20 cm^2 of exposed area with a spatial maximum of 200 W m^{-2} averaged over 1 cm^2.

The most conservative assumption is that all the transmitted power is absorbed within the specified area, therefore any device which supplies less than 20 mW will meet the basic restriction. The average time is equal to $68/f^{1,05}$ minutes (where f is in GHz).

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