

**Product standard to
demonstrate the
compliance of
broadcast station
transmitters with the
reference levels and
the basic restrictions
related to public
exposure to radio
frequency
electromagnetic fields
(3 MHz – 30 MHz)**

ICS 13.280; 17.220.20; 33.170

National foreword

This British Standard is the UK implementation of EN 50476:2008.

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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2008

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ISBN 978 0 580 56859 6

Amendments/corrigenda issued since publication

Date	Comments

**Product standard to demonstrate the compliance
of broadcast station transmitters with the reference levels
and the basic restrictions related to public exposure
to radio frequency electromagnetic fields (3 MHz - 30 MHz)**

Norme produit pour démontrer
la conformité des émetteurs de service
de radiodiffusion, aux niveaux
de référence et aux restrictions de base
pour l'exposition du public,
dans les bandes HF (3 MHz à 30 MHz)

Produktnorm zum Nachweis
der Übereinstimmung von
Rundfunksendern mit den Referenzwerten
und den Basisgrenzwerten bezüglich
der Exposition der Allgemeinbevölkerung
gegenüber hochfrequenten
elektromagnetischen Feldern
(3 MHz bis 30 MHz)

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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

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 formal vote and was approved by CENELEC as EN 50476 on 2008-04-01.

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) 2009-04-01
 - latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2011-04-01
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Contents

1	Scope	4
2	Normative references	4
3	Terms and definitions	4
4	Conditions for calculation and measurement	6
5	Limits	6
6	Evaluation of results and determination of compliance.....	7
7	Documentation provided by the equipment manufacturer	7
	Annex A (informative) Declaration of conformity with EN 50476.....	8
	Annex B (informative) A-deviations	10
	Bibliography.....	11

1 Scope

This standard applies to short wave broadcast transmitters operating in the frequency range 3 MHz to 30 MHz.

The object of this standard is to demonstrate the compliance of such equipment with the basic restrictions (directly or indirectly via compliance with reference levels) related to public human exposure to radio frequency electromagnetic fields.

2 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 50475, *Basic standard for the calculation and the measurement of human exposure to electromagnetic fields from broadcasting service transmitters in the HF bands (3 MHz - 30 MHz)*

3 Terms and definitions

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

3.1

antenna

device that serves as a transducer between a guided wave (e.g. coaxial cable) and a free space wave, or vice versa

3.2

basic restriction

restrictions of 1999/519/EC [1] on exposure to time-varying electric, magnetic, and electromagnetic fields that are based directly on established health effects

3.3

broadcasting service

radio communication service in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, television transmissions or other types of transmission

3.4

compliance distance

minimum distance from the antenna to a point of investigation where field level is deemed to be compliant to the limits

3.5

compliance boundary

surface around the antenna outside of which all field levels are deemed to be compliant to the limits

3.6

contact current (IC)

contact current between a person and an object exposed to the field, is expressed in amperes (A). A conductive object in an electric field can be charged by the field

3.7**current density (J)**

current density is defined as the current flowing through a unit cross section perpendicular to its direction in a volume conductor such as the human body or part of it, expressed in amperes per square meter (A/m²)

3.8**induced current**

current induced inside the body as a result of direct exposure to electromagnetic fields, expressed in the unit ampere (A)

3.9**electric field strength (E)**

magnitude of a field vector at a point that represents the force (**F**) on a positive small charge (*q*) divided by the charge

$$E = \frac{F}{q}$$

electric field strength is expressed in units of volt per meter (V/m)

3.10**magnetic field strength (H)**

vector quantity obtained at a given point by subtracting the magnetization **M** from the magnetic flux density **B** divided by the permeability of free space μ_0 :

$$H = \frac{B}{\mu_0} - M$$

Magnetic field strength is expressed in the unit ampere per metre (A/m)

NOTE In vacuum, the magnetic field strength is at all points equal to the magnetic flux density divided by the permeability of free space: $H = B / \mu_0$

3.11**modulation**

process by which a quantity that characterises an oscillation or wave is constrained to follow the values of a characteristic quantity of a signal

NOTE Two modulation, in particular, are used for this standard: AM (Amplitude Modulation) and COFDM (Coded Orthogonal Frequency Division Multiplex); it must also be taken into consideration when carrying out measurements and calculations to determine whether or not the limits are being exceeded by adding the modulation factor to the carrier r.m.s. value.

3.12**reference levels**

reference levels of exposure are provided by 1999/519/EC [1] for comparison with measured values of physical quantities; compliance with all reference levels will ensure compliance with basic restrictions. If measured values are higher than reference levels, it does not necessarily follow that the basic restrictions have been exceeded, but a more detailed analysis is necessary to assess compliance with the basic restrictions

3.13**root-mean-square (r.m.s.)**

r.m.s. value is obtained by taking the square root of the average of the square of the value of the periodic function taken throughout one period

3.14**specific absorption rate (SAR)**

time derivative of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of given mass density (ρ)

$$\text{SAR} = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dV} \right)$$

SAR is expressed in units of watt per kilogram (W/kg)

3.15**shortwave broadcasting**

the frequency band between 3 MHz and 30 MHz is called the short wave band. Broadcast transmission in this frequency range is therefore called shortwave broadcasting

3.16**transmitter**

device to generate radio frequency power for the purpose of communication

NOTE A transmitter does not radiate the energy by itself, it needs to be connected to an antenna.

4 Conditions for calculation and measurement

The near field of a short wave antenna may extend to a considerable distance. This may result in field-strengths falling below the levels at locations close to the array, then rising again with increasing distance from the antennas (especially for curtain arrays). However, at large distances, once the far-field region is entered, the field-strength levels follow the normal pattern of decreasing with increased distance from the antenna.

The calculation and/or measurement shall be performed in accordance with EN 50475.

The transmitter shall be operating in accordance with the manufacturer specification.

Calculations and/or measurements on broadcast transmitters shall be performed on the final installation.

The distances from the radiating antenna at which the calculations and/or measurements shall be performed, shall be the compliance distances for general public as specified by the transmitter equipment manufacturer.

5 Limits

The transmitter shall comply with the relevant limits for public specified as basic restrictions in the Council Recommendation for the general public exposure 1999/519/EC [1].

Compliance with the reference level will ensure compliance with the relevant basic restriction. If the measured or calculated value exceeds the reference level, it does not necessarily follow that the basic restriction will be exceeded. However, whenever a reference level is exceeded, it is necessary to test compliance with the relevant basic restriction and to determine whether additional protective measures are necessary.

6 Evaluation of results and determination of compliance

The equipment is deemed to fulfil the requirements of this standard if the calculated and/or measured values are less than or equal to the limits at the compliance distances.

7 Documentation provided by the equipment manufacturer

The manufacturer shall provide the following information with the equipment:

- a) output power, type of modulation of the transmitter;
- b) compliance distances for general public exposure;

and, if appropriate,
- c) information on how to determine exposure levels and compliance distances for any optional system configuration not specified in detail in the basic standard.

Annex A
(informative)

Declaration of conformity with EN 50476

This declaration can be used as a uniform way of giving information of compliance to interested parties.

Information to whom it may concern

DECLARATION OF CONFORMITY WITH EN 50476

Manufacturer, or representative,

hereby declares that the equipment

is in full compliance with the requirements of this standard, when connected to the reference antenna, at the distances of

at which the calculations and/or measurements have been performed.

Special operating conditions:

Other relevant information:

Date: _____

Signature

Annex B (informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CENELEC national member.

This European Standard does not fall under any Directive of the EC.

In the relevant CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

<u>Clause</u>	<u>Deviation</u>
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General	Switzerland (Ordinance relating to Protection from Non-Ionising Radiation, SR 814.710 of 23 December 1999 (as of 1 January 2008))
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This product standard must not be applied to installations which are covered by the Ordinance relating to Protection from Non-Ionising Radiation, i.e. stationary transmission installations for broadcasting and other wireless applications, as well as transmission installations for mobile telecommunication systems and wireless local loops as far as the compliance testing with the installation limit values of the Ordinance is concerned.

Bibliography

- [1] *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 199 of 30 July 1999

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