

SLOVENSKI STANDARD

SIST EN 50421:2006

01-december-2006

Produktni standard za prikaz skladnosti samostojnih oddajnikov z osnovnimi ali izvedenimi mejnimi vrednostmi v povezavi z izpostavljenostjo prebivalstva elektromagnetnim sevanjem (30 MHz–40 GHz)

Product standard to demonstrate the compliance of stand alone broadcast transmitters with the reference levels or the basic restrictions related to public human exposure to radio frequency electromagnetic fields (30 MHz - 40 GHz)

Produktnorm zum Nachweis der Übereinstimmung von einzelnen Rundfunksendern mit den Referenzwerten oder den Basisgrenzwerten bezüglich der Exposition der Allgemeinbevölkerung gegenüber hochfrequenten elektromagnetischen Feldern (30 MHz bis 40 GHz)

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Norme produit pour démontrer la conformité des émetteurs de radiodiffusion isolés par rapport aux niveaux de référence ou aux restrictions de base relatifs à l'exposition du public aux champs électromagnétiques (30 MHz - 40 GHz)

Ta slovenski standard je istoveten z: EN 50421:2006

ICS:

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This European Standard was approved by CENELEC on 2005-12-06. 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, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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 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 50421 on 2005-12-06.

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) 2007-01-01

- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-01-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

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1 Scope

This product standard applies to fixed stand alone broadcast transmitter operating in the frequency range 30 MHz to 40 GHz when put on the market. The term broadcast transmitter covers fixed stand alone broadcast transmitters intended for use with external antennas of the same or an other manufacturer.

The object of this standard is to demonstrate the compliance of such equipment with the reference levels or the basic restrictions related to public 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 50420, *Basic standard for the calculation and measurement of human exposure to electromagnetic fields from stand alone broadcast transmitters (30 MHz – 40 GHz)*

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)

3 Physical quantities, units and constants

Physical quantities, units and constants are defined in EN 50420.

4 Definitions

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

4.1

basic restriction

restrictions on exposure to time-varying electric, magnetic, and electromagnetic fields that are based directly on established health effects. In the frequency range from 30 MHz to 10 GHz, the physical quantity used is the specific absorption rate. Between 10 GHz and 40 GHz, the physical quantity is the power density

4.2

broadcasting service

radiocommunication 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

4.3

compliance distance

minimum distance from the antenna where a point of investigation is deemed to be compliant. The set of compliance distances therefore defines the boundary outside which the exposure levels do not exceed the basic restrictions irrespective of the time of exposure. The distances are measured related to the nearest point of the antenna in each investigation direction

4.4

conductivity (σ)

ratio of the conduction-current density in a medium to the electric field strength. Conductivity is expressed in units of siemens per metre (S/m)

4.5**contact current**

current produced in the body involved by human contact with metallic objects in the field. Shocks and burns can be the adverse indirect effects. Contact current relates to an instantaneous effect and so can't be time-averaged

4.6**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

$$E = \frac{F}{q} \quad (1)$$

Electric field strength is expressed in units of volt per metre (V/m)

4.7**induced current**

current circulating inside a human body resulting directly from an exposure to an electromagnetic field

4.8**magnetic field strength (H)**

magnitude of a field vector in a point that results in a force (F) on a charge q moving with the velocity v

$$F = q(v \times \mu H) \quad (2)$$

Magnetic field strength is expressed in units of ampere per metre (A/m)

4.9**modulation**

process, or the result of the process, where some characteristic of the wave (amplitude, frequency or phase) is varied in accordance with another wave or signal. It must also be taken into consideration when carrying out measurements and calculations to determine whether or not the limits are being exceeded

4.10**power density (S)**

radiant power incident perpendicular to a surface, divided by the area of the surface. The power density is expressed in units of watt per square metre (W/m^2)

4.11**reference antenna**

type of antenna specified in basic standard for each type of service

4.12**reference level**

reference levels of exposure are provided for comparison with measured values of physical quantities; compliance with all reference levels given in these guidelines 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.

In the frequency range 30 MHz to 40 GHz the reference levels are expressed as electric field strength, magnetic field strength, power density values and contact currents

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

the 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

4.14**specific absorption rate (SAR)**

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

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dV} \right) \quad (3)$$

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

NOTE SAR can be calculated by

$$SAR = \frac{\sigma E_i^2}{\rho} \quad (4)$$

$$SAR = c_i \left(\frac{dT}{dt} \right)_{t=0} \quad (5)$$

where

E_i : r.m.s. value of the electric field strength in the tissue in V/m,

σ : conductivity of body tissue in S/m,

ρ : density of body tissue in kg/m³,

c_i : specific heat capacity of body tissue in J/kg K,

$\frac{dT}{dt}$: time derivative of temperature in body tissue in K/s.

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4.15**transmitter**

device to generate radio frequency power for the purpose of communication but on its own is not intended to radiate it

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Radio frequency equipment for communication but
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5 Conditions for calculation and measurement

The calculation and/or measurement shall be performed in accordance with EN 50420.

The transmitter shall be operating in accordance with the manufacturer specification. Calculations and/or measurements on broadcast transmitters intended for use with external antennas shall be performed for one reference configuration consisting of a combination of the broadcast transmitter and an antenna system representative of the intended final use.

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.

6 Limits

The transmitter shall comply with the relevant limits for public specified as basic restrictions in Council Recommendation for the general public exposure 1999/519/EC (see Clause 2).

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.

7 Evaluation of results and determination of compliance

If the r.m.s. power averaged over 6 min emitted by the broadcast transmitter is less than or equal to 20 mW then the transmitter is deemed to comply without testing.

If the r.m.s. power averaged over 6 min emitted by the transmitter is more than 20 mW, then *E*, *H*, *induced current* or *SAR* calculations and/or measurements shall be performed according to Clause 5. The results of calculations and/or measurements shall be compared directly to the limits.

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.

NOTE A possibility to deal with uncertainty is to use typical uncertainties of the basic standard EN 55016-4-2, *Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Uncertainty in EMC measurements*.

8 Documentation provided by the equipment manufacturer

The manufacturer shall provide the following information with the equipment:

- a) output power,
- b) type of modulation of the transmitter,
- c) compliance distances for general public exposure,
and, if appropriate,
- d) information on how to determine exposure levels and compliance distances for any optional system configuration not specified in detail in the basic standard.

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