
Oprema za zaščito pred sevanjem – Merilniki ekvivalentne doze v prostoru za nevtronsko sevanje

Radiation protection instrumentation – Neutron ambient dose equivalent (rate) meters

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EUROPEAN STANDARD

EN 61005

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2004

ICS 13.280

English version

**Radiation protection instrumentation –
Neutron ambient dose equivalent (rate) meters
(IEC 61005:2003, modified)**

Instrumentation pour la radioprotection -
Appareils de mesure de l'équivalent
de dose ambient neutron
(ou de son débit d'équivalent de dose)
(CEI 61005:2003, modifiée)

Strahlenschutz-Messgeräte -
Umgebungsäquivalentdosis(leistungs-)
Messgeräte für Neutronenstrahlung
(IEC 61005:2003, modifiziert)

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This European Standard was approved by CENELEC on 2004-10-01. 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, 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

The text of the International Standard IEC 61005:2003, prepared by SC 45B, Radiation protection instrumentation, of IEC TC 45, Nuclear instrumentation, together with the common modifications prepared by the CENELEC BTTF 111-3, Instrumentation for ionizing radiation measurement and protection, was submitted to the formal vote and was approved by CENELEC as EN 61005 on 2004-10-01.

The following dates are proposed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-10-01

Clauses, Subclauses, tables and figures which are additional to those in IEC 61005 are prefixed "Z".

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61005:2003 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

1 Scope and object

First paragraph, item b):

Add a NOTE:

NOTE Z If the Equipment consists of separate detector and measurement assemblies the cable between the two shall be that specified by the manufacturer. If the connection is by other means (e.g. radio waves, infrared) or other cables, it is necessary to apply additional requirements with respect to the specific media.

2 Normative references

See Annex ZA

Correct titles of documents (e.g. ISO 8529-2:2000 and ISO 8529-3:1998).

Add EN 55011 (CISPR 11).

4 General characteristics of the measuring assemblies

4.4 Second paragraph, item b):

Replace at the end of the paragraph "... the effective range shall extend from 1,0 $\mu\text{Sv h}^{-1}$ to 99,9 mSv h^{-1}) " by "... the effective range shall extend from 1,0 to 99,9)".

Add a new subclause after 4.4:

4.Z1 Classification dependent on expected condition of use

An assembly for the measurement of neutron ambient dose equivalent (rate) should be classified, depending on its weight and the mode of use, in one of those three categories:

- fixed station;
- mobile station;
- hand held.

For any hand held apparatus, the maximum necessary measurement time needed for the measurement accuracy (in accordance with the defined performances) has to be less than 30 s and the maximum mass less than 5 kg.

6 Radiation characteristics

6.5.1 Replace the second paragraph by:

If the tests are conducted in simulated neutron fields as described in ISO 12789, the fields used shall be indicated by the manufacturer and they should be in accordance with the field encountered at the work place where the device will be used.

6.6.2.1 Replace in items a) and b) “¹³⁷Cs” by “¹³⁷Cs or ⁶⁰Co *)”

* ⁶⁰Co on particular request by the customer. ((footnote))

Replace item b) by:

b) In a neutron reference field producing an indication of 1 mSv/h, exposure to 10 mSv/h from ¹³⁷Cs photon radiation shall not change this neutron indication by more than 10 %.

The ¹³⁷Cs sources used for the above tests should conform to the requirements of the ISO 4037 series.

6.6.2.2 Replace “¹³⁷Cs” by “¹³⁷Cs or ⁶⁰Co *)”

7 Electrical characteristics

7.4.1 Replace in item a) “2%” by “5%”.

7.7.2 Replace in the note “... mains frequency, then this test ..” by “... mains frequency, the latter test.”

8 Electromagnetic compatibility

8.1 Replace the second paragraph by:

A suitable radioactive stability check device (for example with a 2 GBq Am/Be-source) should be fitted to the dose equivalent (rate) meter to produce during the measurements an indication of approximately ten times the lower limit of the effective range of measurement. The presence of the check source shall not interfere with the tests being undertaken.

8.3 Radiated electromagnetic fields

Replace the title of 8.3.1 by:

8.3.1 General radiated electromagnetic fields

Renumber 8.3.1 as 8.3.1.1 and 8.3.2 as 8.3.1.2. 1)

Delete note 2 to 8.3.1.2 (new numbering).

1) This replacement has to be done where appropriate throughout the standard.

Add a new Subclause 8.3.2:

8.3.2 Radiated electromagnetic fields of mobile phones

8.3.2.1 *Requirements*

The maximum spurious indications (both transient and permanent) of the display or data output due to radiated electromagnetic fields shall be less than 10 % of the indicated value without the fields.

8.3.2.2 *Test method*

The device is placed into an area where it may be completely covered with a radio-frequency field, as described in EN 61000-4-3. Perform the following operations with the electro-magnetic field switched on and off:

- a) The electromagnetic field strength shall be 20 V/m in the frequency range of 800 MHz to 1 000 MHz and 1 400 MHz to 2 400 MHz. The test should be performed using an automated sweep at a rate not greater than $1,5 \times 10^{-3}$ decades per second, or 1 % of the fundamental.

NOTE 40 V/m is chosen to enable the test to be performed in one orientation. 20 V/m is the required intensity.

- b) The signal should be 80 % amplitude modulated with a 1 kHz sine wave.
- c) If an automated sweep is not possible, compliance can be shown through exposure at frequencies (820; 900) MHz and (1,4; 1,5; 1,6; 1,8; 2,0; 2,2 and 2,4) GHz.
- d) If any change of the response greater than one-third of the limits given in 8.3.1 is observed, additional tests (in the range of ± 5 % around this frequency in steps of 1 % if step c) is used) shall be carried out with the assembly in all three orientations as described in EN 61000-4-3.

8.4.2 Delete the note.

8.8 Replace by:

Apply EN 55011 (CISPR 11).

The objective of this test is to appreciate the maximum disturbing electromagnetic field radiated by the material.

All the exits are cabled with their nominal load. One measures the field emitted by the material during a control of operation.

Classify A Group 1 according to EN 55011: with 10 m, the field should not exceed 40 dB(mV/m) in band 30 MHz to 230 MHz, and should not exceed 47 dB(mV/m) in band 230 MHz to 1 000 MHz.

12 Documentation

Add a new subclause after 12.2:

12.Z1 Type test report

At the request of the purchaser, the manufacturer shall make available the report on the type tests performed to the requirements of this standard.

Table 2 **Suppress** “±” in the first dash of line “zero drift”.

Table 3 **Move** the last sentence of footnote e) to a new footnote g) referring only to the 50 °C value.

Delete the indication for footnote e) from the 50 °C value and **replace** by “g”.

Replace in the line “relative humidity” the indication for footnote f) by the value “± 10 %” as given in 11.3.2.

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Table 4 **Add** a new row just below:

Radiated electromagnetic fields of mobile phones	As in EN 61000-4-3	± 10 %	8.3.2
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Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

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.

NOTE Where an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-393	1996	International Electrotechnology Vocabulary Chapter 393: Nuclear instrumentation: Physical phenomena and basic concepts	-	-
IEC 60050-394	1995	Chapter 394: Nuclear instrumentation: Instruments	-	-
IEC 60086-1	2000	Primary batteries Part 1: General	EN 60086-1	2001
IEC 61000-4-2	1995	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	1995
A1	1998	SIST EN 61005:2005	A1	1998
IEC 61000-4-3	2002	Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	2002
IEC 61000-4-4	1995	Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	1995
IEC 61000-4-5	1995	Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	1995
A1	2000		A1	2001
IEC 61000-4-6	1996	Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	1996
A1	2000		A1	2001
IEC 61000-4-8	1993	Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	1993
A1	2000		A1	2001
IEC 61000-4-12	1995	Part 4-12: Testing and measurement techniques - Oscillatory waves immunity test	EN 61000-4-12	1995
A1	2000		A1	2001

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61187 (mod)	1993	Electrical and electronic measuring equipment - Documentation	EN 61187 + corr. March	1994 1995
ISO 4037-1	1996	X and gamma reference radiation for calibrating dosimeters and doserate meters and for determining their response as a function of photon energy Part 1: Radiation characteristics and production methods	-	-
ISO 4037-2	1997	Part 2: Dosimetry for radiation protection over the energy ranges from 8 keV to 1,3 MeV and 4 MeV to 9 MeV	-	-
ISO 4037-3	1999	Part 3: Calibration of area and personal dosimeters and the measurement of their response as a function of energy and angle of incidence	-	-
ISO 8529-1	2001	Reference neutron radiations Part 1: Characteristics and methods of production	-	-
ISO 8529-2	2000	Part 2: Calibration fundamentals of radiation protection devices related to the basic quantities characterizing the radiation field	-	-
ISO 8529-3	1998	Part 3: Calibration of area and personal dosimeters and determination of response as a function of energy and angle of incidence	-	-
ISO 11929-1	2000	Determination of the detection limit and decision threshold for ionizing radiation measurements Part 1: Fundamentals and application to counting measurements without the influence of sample treatment	-	-
ISO 12789	2000	Reference neutron radiations - Characteristics and methods of production of simulated workplace neutron fields	-	-
ICRP Publication 74	1996	Conversion coefficients for use in radiological protection against external radiation	-	-
ICRU Report 43	1988	Determination of dose equivalents from external radiation sources	-	-
ICRU Report 51	1993	Quantities and units in radiation protection dosimetry	-	-
ICRU Report 57	1998	Conversion coefficients for use in radiation protection against external radiation	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
CISPR 11 (mod)	1997	Industrial, scientific and medical (ISM) radio-frequency equipment - Radiodisturbance characteristics - Limits and methods of measurement	EN 55011	1998

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