

Radiation protection instrumentation — Measurement of personal dose equivalents $H_p(10)$ and $H_p(0,07)$ for X, gamma, neutron and beta radiations — Direct reading personal dose equivalent meters and monitors

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National foreword

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**Radiation protection instrumentation -
Measurement of personal dose equivalents $H_p(10)$
and $H_p(0,07)$ for X, gamma, neutron and beta radiations -
Direct reading personal dose equivalent meters and monitors
(IEC 61526:2005, modified)**

Instrumentation pour la radioprotection -
Mesure des équivalents de dose
individuels $H_p(10)$ et $H_p(0,07)$
pour les rayonnements X, gamma,
neutron et bêta -
Appareils de mesure à lecture directe
et moniteurs de l'équivalent
de dose individuel
(CEI 61526:2005, modifiée)

Strahlenschutz-Messgeräte -
Messung der Tiefen- und
der Oberflächen-Personendosis
 $H_p(10)$ und $H_p(0,07)$
für Röntgen-, Gamma-,
Neutronen- und Betastrahlung -
Direkt ablesbare Personendosimeter
und -monitore
(IEC 61526:2005, modifiziert)

This European Standard was approved by CENELEC on 2006-10-01. 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.

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CENELEC

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

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Foreword

The text of the International Standard IEC 61526:2005, 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, Nuclear instrumentation and radiation protection instrumentation, was submitted to the formal vote and was approved by CENELEC as EN 61526 on 2006-10-01.

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with the EN have to be withdrawn (dow) 2009-10-01

Annexes ZA and ZB have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61526:2005 was approved by CENELEC as a European Standard with agreed common modifications.

CONTENTS

INTRODUCTION.....	6
1 Scope and object.....	7
2 Normative references	8
3 Terms and definitions	10
4 Units and list of symbols	16
4.1 Units	16
4.2 List of symbols	16
5 Mechanical characteristics	18
5.1 Size	18
5.2 Mass	18
5.3 Case	19
5.4 Switches	19
6 General characteristics	19
6.1 Personal dose equivalent meter classification	19
6.2 Indication	19
6.3 Dosimeter markings.....	19
6.4 Retention of radioactive contamination.....	19
6.5 Ranges for dose equivalent and dose equivalent rate	19
6.6 Effective range of measurement.....	19
6.7 Rated range of an influence quantity	20
6.8 Use of more than one dosimeter	20
6.9 Zero effect and indication due to natural environmental radiation	20
6.10 Resettable dose or dose rate alarms	20
6.11 Indication of malfunction	21
7 General test procedures	21
7.1 Nature of tests.....	21
7.2 Reference conditions and standard test conditions	21
7.3 Tests for influence quantities of type F	21
7.4 Tests for influence quantities of type S.....	22
7.5 Choice of phantom for testing	22
7.6 Position of dosimeter for the purpose of testing	22
7.7 Position of dosimeter during use	22
7.8 Minimum rated range of influence quantity	22
7.9 Low dose equivalent rates	22
7.10 Statistical fluctuations.....	23
7.11 Production of reference radiation	23
8 Additivity of indicated value	23
8.1 Requirements	23
8.2 Method of test	23
8.3 Interpretation of the results	23

9	Radiation performance requirements and tests	24
9.1	General	24
9.2	Consideration of the uncertainty of the conventional true value	24
9.3	Linearity of the response	24
9.4	Variation of the response due to dose rate dependence of dose measurements	25
9.5	Variation of the response due to photon radiation energy and angle of incidence	27
9.6	Variation of the response due to neutron radiation energy and angle of incidence	28
9.7	Variation of the response due to beta radiation energy and angle of incidence	30
9.8	Retention of dose equivalent reading	31
9.9	Overload characteristics	31
9.10	Alarm	32
9.11	Model function	34
10	Electrical and environmental performance requirements and tests	34
10.1	General	34
10.2	Power supplies – Battery operation	34
10.3	Ambient temperature	36
10.4	Relative humidity	37
10.5	Atmospheric pressure	38
10.6	Sealing	38
10.7	Storage	38
11	Electromagnetic performance requirements and tests	38
11.1	General	38
11.2	Electrostatic discharge	39
11.3	Radiated electromagnetic fields	39
11.4	Radiated electromagnetic fields of mobile phones or wireless LAN	40
11.5	Conducted disturbances induced by fast transients or bursts	40
11.6	Conducted disturbances induced by surges	40
11.7	Conducted disturbances induced by radio-frequencies	41
11.8	50 Hz/60 Hz magnetic field	41
11.9	Voltage dips and short interruptions	41
12	Mechanical performance, requirements and tests	42
12.1	General	42
12.2	Drop test	42
12.3	Vibration test	42
12.4	Microphonics test	43
13	Uncertainty	43
14	Documentation	43
14.1	Type test report	43
14.2	Certificate	43
15	Operation and maintenance manual	44

Annex A (normative) Statistical fluctuations	52
Annex B (informative) Procedure to determine the variation of the relative response due to radiation energy and angle of radiation incidence	54
Annex ZA (informative) Usage categories of personal dosimeters	56
Annex ZB (normative) Normative references to international publications with their corresponding European publications	57
Table 1 – Symbols (and abbreviated terms)	16
Table 2 – Reference conditions and standard test conditions	45
Table 3 – Radiation characteristics of $H_p(0,07)$ dosimeters for X, gamma and beta radiation	46
Table 4 – Radiation characteristics of $H_p(10)$ dosimeters for X and gamma radiation	47
Table 5 – Radiation characteristics of $H_p(10)$ dosimeters for neutron radiation	48
Table 6 – Electrical and environmental characteristics of dosimeters	49
Table 7 – Electromagnetic disturbance characteristics of dosimeters	50
Table 8 – Mechanical disturbances characteristics of dosimeters	51
Table A.1 – Number of instrument readings required to detect true differences (95 % confidence level) between two sets of instrument readings on the same instrument	53

INTRODUCTION

This International Standard applies to non-passive, direct reading personal dose equivalent meters and monitors used for measuring the personal dose equivalents $H_p(10)$ and $H_p(0,07)$ for X, gamma, neutron and beta radiations.

For the personal dose equivalent $H_p(10)$ or the personal dose equivalent rate $\dot{H}_p(10)$ and for X and gamma radiations, the energy range from at least 20 keV to 1,5 MeV is considered in the standard and for neutron radiation, from at least thermal neutrons to 15 MeV.

For the personal dose equivalent $H_p(0,07)$ and for X and gamma radiations, the energy range from at least 30 keV to 250 keV is covered and for beta radiation, all mean energies above 60 keV (the energy required to penetrate the dead layer of the skin of 0,07 mm).

In some applications, for example at a nuclear reactor installation where 6 MeV photon radiation is present, measurement of personal dose equivalent (rate) $H_p(10)$ for photon energies up to 10 MeV should be required. In some other applications, measurement of $H_p(10)$ down to 10 keV should be required.

For personal dose equivalent meters, requirements for measuring of the dose quantities $H_p(10)$ and $H_p(0,07)$ and for monitoring of the dose rate quantities $\dot{H}_p(10)$ and $\dot{H}_p(0,07)$ are given. The measurement of these dose rate quantities is an option for personal dose equivalent meters.

Establishments in some countries may wish to use this type of personal dose equivalent meter as the basis of a personal monitoring service approved for dose record-keeping purposes for radiation workers.

RADIATION PROTECTION INSTRUMENTATION – MEASUREMENT OF PERSONAL DOSE EQUIVALENTS $H_p(10)$ AND $H_p(0,07)$ FOR X, GAMMA, NEUTRON AND BETA RADIATIONS – DIRECT READING PERSONAL DOSE EQUIVALENT METERS AND MONITORS

1 Scope and object

This International Standard applies to personal dose equivalent meters with the following characteristics:

- a) They are worn on the trunk or the extremities of the body.
- b) They measure the personal dose equivalents $H_p(10)$ and $H_p(0,07)$ from external X and gamma, neutron and beta radiations, [C] and may measure the personal dose equivalent rates $\dot{H}_p(10)$ and $\dot{H}_p(0,07)$. [C]
- c) They have a digital indication.
- d) They may have alarm functions for the personal dose equivalents or personal dose equivalent rates.

This standard is therefore applicable to the measurement of the following combinations of [C] dose quantities (including the respective dose rates) and radiation [C]

- 1) $H_p(10)$ and $H_p(0,07)$ from X and gamma radiations;
- 2) $H_p(10)$ and $H_p(0,07)$ from X, gamma and beta radiations;
- 3) $H_p(10)$ from X and gamma radiations;
- 4) $H_p(10)$ from neutron radiations;
- 5) $H_p(10)$ from X, gamma and neutron radiations;
- 6) $H_p(0,07)$ from X, gamma and beta radiations.

NOTE 1 When reference is made in this standard to "dose", this is meant to indicate personal dose equivalent, unless otherwise stated.

NOTE 2 When reference is made in this standard to "dosemeter", this is meant to include personal dose equivalent meters and monitors, unless otherwise stated.

This standard specifies requirements for the dosimeter and, if supplied, for its associated readout system.

This standard specifies, for the dosimeters described above, general characteristics, general test procedures, radiation characteristics as well as electrical, mechanical, safety and environmental characteristics. The only requirements specified for associated readout systems are those which affect its accuracy of readout of the personal dose equivalent and alarm settings and those which concern the influence of the reader on the dosimeter.

This standard also specifies classes of personal dose equivalent meters in relation to retention of stored information (see 6.1). [C] In addition, usage categories are given in Annex ZA with respect to different measuring capabilities. [C]

[C] This standard does not cover special requirements for accidental or emergency dosimetry although the dosimeters may be used for this purpose. The standard does not apply to dosimeters used for measurement of pulsed radiation where the dose rate in the pulse exceeds the specification such as that emanating from linear accelerators or similar equipment. [C]

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.

IEC 60050-151:2001, *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices*

IEC 60050-393:2003, *International Electrotechnical Vocabulary (IEV) – Chapter 393: Nuclear instrumentation – Physical phenomena and basic concepts*

IEC 60050-394:1995, *International Electrotechnical Vocabulary (IEV) – Chapter 394: Nuclear instrumentation: Instruments*

IEC 60068-2-32:1975, *Environmental testing – Part 2: Tests – Test Ed: Free fall*
Amendment 2 (1990)¹

IEC 60086-1:2000, *Primary batteries – Part 1: General*

IEC 60359:2001, *Electrical and electronic measurement equipment – Expression of performance*

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test – Basic EMC Publication*
Amendment 1 (1998)
Amendment 2 (2000)¹

IEC 61000-4-3:2002, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test*
Amendment 1 (2000)
Amendment 2 (2001)¹

IEC 61000-4-5:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*
Amendment 1 (2000)¹

IEC 61000-4-6:2003, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:1993, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 8: Power frequency magnetic field immunity test*
Amendment 1 (2000)¹

¹ A consolidated edition of these documents is available.

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-6-2:1999, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

IEC 61187:1993, *Electrical and electronic measuring equipment – Documentation*

IEC/TR 62461:2006, *Radiation protection instrumentation – Determination of uncertainty in measurement*

ISO 4037-1:1996, *X and gamma reference radiation for calibrating dosimeters and dose-rate meters and for determining their response as a function of photon energy – Part 1: Radiation characteristics and production methods*

ISO 4037-2:1997, *X and gamma reference radiation for calibrating dosimeters and dose-rate meters and for determining their response as a function of photon energy – 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, *X and gamma reference radiation for calibrating dosimeters and dose-rate meters and for determining their response as a function of photon energy – Part 3: Calibration of area and personal dosimeters and the measurement of their response as a function of energy and angle of incidence*

ISO 6980:1996, *Reference beta radiations for calibrating dosimeters and dose-rate meters and for determining their response as a function of beta-radiation energy*

ISO 8529-1:2001, *Reference neutron radiations – Part 1: Characteristics and methods of production*

ISO 8529-2:2000, *Reference neutron radiations – Part 2: Calibration fundamentals related to the basic quantities characterising the radiation field*

ISO 8529-3:1998, *Reference neutron radiations – Part 3: Calibration of area and personal dosimeters and determination of response as a function of energy and angle of incidence*

ISO 12789:2000, *Reference neutron radiations – Characteristics and methods of production of simulated workplace neutron fields*

ISO 12789-2, *Reference neutron radiations – Part 2: Calibration fundamentals of radiation protection devices related to the basic quantities characterizing simulated workplace neutron fields*

Guide to the Expression of Uncertainty in measurement, International Organization for Standardization (ISO), Geneva Switzerland (1995)

ICRU report 51:1993, *Quantities and units in radiation protection dosimetry*

ICRU report 60:1999, *Fundamental Quantities and Units for Ionizing Radiation*

3 Terms and definitions

For the purposes of this document, the definitions given in IEC 60050(393), IEC 60050(394), IEC 60359 and ICRU Report 51, as well as the following terms and definitions, apply.

3.1

acceptance test

contractual test to prove to the customer that the device meets certain conditions of its specification

[IEV 394-20-9; IEV 151-16-23]

3.2

additional indication

D

additional indication, *D*, caused by the effect of an influence quantity of type S

NOTE All requirements for influence quantities of type S are given with respect to the value of the additional indication *D*.

3.3

calibration (for the purpose of this standard)

quantitative determination of the reference calibration factor, N_0 , and the correction for non-linear response, r_n under a controlled set of standard test conditions for which all the m relative response values, r_q , are unity and all the l additional indications, D_p , are zero

3.4

calibration factor

quotient N , of the conventional true value of a quantity, $H_{t,r}$ and the indicated value, $H_{i,r}$, at the point of test for a specified reference radiation under specified reference conditions. It is expressed as

$$N = \frac{H_{t,r}}{H_{i,r}}$$

NOTE 1 (See ISO 4037-3) The calibration factor N is dimensionless when the instrument indicates the quantity to be measured. A dosimeter indicating the conventional true value correctly has the calibration factor of one.

NOTE 2 (See ISO 4037-3) The reciprocal of the calibration factor is equal to the response under reference conditions. In contrast to the calibration factor, which refers to the reference conditions only, the response refers to any condition prevailing at the time of measurement.

NOTE 3 (See ISO 4037-3) The value of the calibration factor may vary with the magnitude of the quantity to be measured. In such cases, a dosimeter is said to have a non-linear response.

3.5

coefficient of variation

ratio of the standard deviation s to the arithmetic mean $\bar{x}$ of a set of n measurements x_i given by the following formula:

$$v = \frac{s}{\bar{x}} = \frac{1}{\bar{x}} \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2}$$

[IEV 394-20-14]

3.6 combined standard uncertainty

u_c
estimated standard deviation of the measurement result

NOTE See 'Guide to the Expression of Uncertainty in Measurement' (GUM) 2.3.4 (ISO).

3.7 conventional true value of a quantity

value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose

NOTE 1 "Conventional true value" is sometimes called assigned value, best estimate of the value, conventional value or reference value.

[IEV 394-20-10, modified; GUM B.2.4]

NOTE 2 A conventional true value is, in general, regarded as being sufficiently close to the true value for the difference to be insignificant for the given purpose.

NOTE 3 For example, within an organization, the result of a measurement obtained with a secondary standard instrument may be taken as the conventional true value of the quantity to be measured.

3.8 correction for non-linear response

quotient, r_n , of the response, R , under specified conditions where only the quantity to be measured is varied and the reference response, R_0 . It is expressed as

$$r_n = \frac{R}{R_0}$$

NOTE For an instrument with linear response, r_n is equal to one.

3.9 effective range of measurement

range of values of the quantity to be measured over which the performance of a dosimeter meets the requirements of this standard

[IEV 394-20-16, modified]

3.10 expanded uncertainty

U
measure of uncertainty that defines an interval about the measurement result within which the value of the measurand is confidently believed to lie. Obtained by multiplying the combined standard uncertainty by a coverage factor k

NOTE See 'Guide to the Expression of Uncertainty in Measurement' 2.3.5 (ISO).

3.11 indicated value (for the purpose of this standard)

value, H_i , given by the digital indication of the dosimeter

3.12 influence quantity

quantity that is not the measurand but that effects the result of the measurement

NOTE For example, temperature of a micrometer used to measure length.

[IEV 394-20-27; GUM B.2.10]

3.13**influence quantity of type F**

influence quantity whose effect on the indicated value is a change in response

NOTE Examples are radiation energy and angle of radiation incidence (see 9.5 to 9.7) and dose rate when measuring the dose.

3.14**influence quantity of type S**

influence quantity whose effect on the indicated value is an additional indication independent of the indicated value

NOTE Examples are electromagnetic disturbance (see Clause 11) and microphonics (see 12.4).

3.15**lower limit of effective range of measurement**

H_0

lowest dose(rate) value included in the effective range of measurement

3.16**maximum possible measuring time**

longest measuring time within which all requirements of this standard are fulfilled

3.17**measured value (using response)**

value, H_m , determined from the indicated value, H_i , by applying the model function for the measurement. An example of a model function is given below. The measured value is determined by applying the reference calibration factor, N_0 , the correction for non-linear response, r_n , the l additional indications, D_p , for the influence quantities of type S and the m relative response values, r_q , for the influence quantities of type F

$$H_m = \frac{N_0}{r_n \prod_{q=1}^m r_q} \left[H_i - \sum_{p=1}^l D_p \right]$$

NOTE 1 The model function of the measurement is necessary for any determination of the uncertainty according to the ISO guide to the expression of uncertainty in measurement (see ISO guide section 3.1.6, 3.4.1 and 4.1).

NOTE 2 With the calibration controls adjusted according to the manufacture's instructions, the reference calibration factor, the correction for non-linear response and all relative response values are set to one and the additional indications are set to zero, these settings cause an uncertainty of measurement which can be determined from the measured variation of the response values and the measured additional indications. For a dosimeter tested according to this standard, all these data are available.

3.18**minimum rated range**

smallest range being specified of an influence quantity or instrument parameter over which the dose equivalent meter will operate within the respective variation of the relative response in order to comply with this standard

3.19**non-linear response**

variation of the calibration factor with the variation of the magnitude of the quantity to be measured

3.20

personal dose equivalent

$H_p(d)$

dose equivalent in soft tissue at a specified point in the human body at a depth d

NOTE The recommended depths are 10 mm for penetrating radiation and 0,07 mm for superficial radiation.

[IEV 393-14-97]

3.21

personal dose equivalent meter

assembly intended to measure the personal dose equivalent with a digital dose indication

3.22

personal dose equivalent rate

$\dot{H}_p(d)$

quotient of $dH_p(d)$ by dt , where $dH_p(d)$ is the increment of personal dose equivalent in the time interval dt

$$\dot{H}_p(10) = \frac{dH_p(10)}{dt}$$

Units of personal dose equivalent rate are a quotient of the sievert or its decimal multiples or submultiples by a suitable unit of time (for example mSv h⁻¹)

3.23

point of test

point at which the conventionally true value is determined and at which the reference point of the dosimeter is placed for calibration and test purposes

3.24

qualification tests

tests which are performed in order to verify that the requirements of a specification are fulfilled. Qualification tests are subdivided into type tests and routine tests

3.25

rated range

range of a quantity to be measured, observed supplied or set, assigned to the instrument

3.26

rated range of use

range of values of an influence quantity within which the requirements concerning operating error are satisfied

NOTE In this standard, the operating error is given by the limits of the respective variation of the relative response or the additional indication.

3.27

reference calibration factor

calibration factor, N_0 , for a reference value, $H_{t,r,0}$, of the quantity to be measured. With $H_{i,r,0}$ being the respective indicated value, it is expressed as

$$N_0 = \frac{H_{t,r,0}}{H_{i,r,0}}$$

3.28**reference conditions**

conditions of use prescribed for testing the performance of a measuring instrument or for intercomparison of results of measurements

[IEV 394-20-25; VIM 5.7]

NOTE 1 The reference conditions generally include reference values or reference ranges for the influence quantities affecting the measuring instrument.

NOTE 2 For an instrument with linear response, the value for the quantity to be measured may be chosen freely in agreement with the properties of the instrument to be calibrated. For an instrument with non-linear response, the indicated value H_i should be equal to $H_{t,r,0}/N_0$ (see 3.27).

3.29**reference orientation**

an orientation of the dosimeter with respect to the direction of the incident radiation stated by the manufacturer

NOTE The dosimeter is positioned in the reference orientation during calibration.

3.30**reference point of an assembly**

☐ physical mark on a piece of equipment or assembly to be used in order to position it at the point of test where the conventionally true value of the quantity to be measured is known ☐

[IEV 394-20-15, modified]

3.31**☐ reference response**

R_0

response of the assembly under reference conditions to unit reference dose (rate) and is expressed as:

$$R_0 = \frac{H_{i,r,0}}{H_{t,r,0}}$$

where $H_{t,r,0}$ is a reference (conventionally true) value of the quantity to be measured for a specified reference radiation under specified reference conditions and $H_{i,r,0}$ is the respective indicated value.

NOTE 1 The background value may be automatically taken in account by an algorithm included in the measurement system.

NOTE 2 The reference response is the reciprocal of the reference calibration factor. ☐

3.32**relative expanded uncertainty**

U_{rel}

expanded uncertainty divided by the result of the measurement

3.33

relative response

quotient, r , of the response, R , and the reference response, R_0 , at the point of test under specified conditions:

$$r = \frac{R}{R_0}$$

[C] NOTE The reference response R_0 is always measured at 0° radiation incidence at the reference energy, see 3.31. **[C]**

3.34

response of a radiation measuring assembly

ratio, under specified conditions, given by the relation:

$$R = \frac{v}{v_c}$$

where v is the value of the quantity measured by the equipment or assembly under test and v_c is the conventionally true value of this quantity

[IEV 394-20-21]

NOTE 1 The input signal to a measuring system may be called stimulus; the output signal may be called the response.

NOTE 2 Using the symbols of this standard, the response is the ratio of the indicated value of a quantity, H_i , and the conventional true value of that quantity, H_t , at the point of test:

$$R = \frac{H_i}{H_t}$$

NOTE 3 For an instrument with non-linear response, the indicated value, H_i , may be the same as that obtained, $H_{i,r,0}$, when determining the reference response, R_0 .

NOTE 4 For the specified reference conditions, the response is the reciprocal of the calibration factor.

3.35

routine test

a test to which every device is subjected by the manufacturer or by the user to confirm compliance with certain criteria

[IEV 394-20-08, modified; IEV 151-04-16, modified]

3.36

standard test conditions

a value, values, or range of values of an influence quantity or instrument parameter, which are permitted when carrying out calibrations or tests on another influence quantity or instrument parameter (see table 2)

3.37

standard uncertainty

u_i

estimated standard deviation of each component of uncertainty that contributes to the uncertainty of the measurement result

NOTE See 'Guide to the Expression of Uncertainty in Measurement' 2.3.1 (ISO).

3.38

supplementary tests

tests intended to provide supplementary information on certain characteristics of the dosimeters

3.39**type test**

conformity test made on one or more items representative of the production

[IEV 394-20-28; IEV 151-16-16, modified]

3.40**uncertainty of a measurement**

parameter, associated with the result of a measurement, that characterises the dispersion of the values that could reasonably be attributed to the measurand

NOTE 1 The parameter may be, for example, a standard deviation (or a given multiple of it), or the half-width of an interval having a stated level of confidence.

[IEV 394-20-40]

NOTE 2 For more details, see GUM B.2.18.

4 Units and list of symbols**4.1 Units**

In the present standard, the units of the International System (SI) are used. The definition of radiation quantities and dosimetric terms are given in IEV 393, IEV 394 and ICRU report 51. Nevertheless, the following units may be acceptable in common usage:

- For energy: electron-volt (symbol eV). $1 \text{ eV} = 1,602 \cdot 10^{-19} \text{ J}$.
- For time: year, day, hour (symbol h), minute (symbol min).

Multiples and submultiples of SI unit may be used, according to the SI system.

The SI unit of dose equivalent is the sievert (symbol Sv). $1 \text{ Sv} = 1 \text{ J kg}^{-1}$.

4.2 List of symbols

Table 1 gives a list of the symbols (and abbreviated terms) used.

Table 1 – Symbols (and abbreviated terms)

Symbol	Meaning	Unit
α	Angle of radiation incidence	deg
α_{max}	Maximum value of α within rated range of use	deg
$\Delta h_{\text{i,mix}}$	Relative change in indication caused by subsequent and mixed exposure, see Clause 8	—
D	Additional indication	Sv
d	Depth in soft tissue. Recommended depths are 10 mm and 0,07 mm	m
D_p	Additional indication due to influence quantity no. p of type S	Sv
$\bar{E}$	Mean radiation energy	eV
H_0	Lower dose(rate) limit of the effective range of measurement	Sv (Sv h ⁻¹)
H_a	Dose(rate) value to which the alarm is set	Sv (Sv h ⁻¹)

$\dot{H}_{\text{high}}$	Stabilized dose rate reading after an increase in dose rate	Sv h ⁻¹
H_i	Indicated dose(rate) value	Sv (Sv h ⁻¹)
$H_{i,K}$	Indicated dose value due to a single irradiation with the conventional true dose value H_K	Sv
$H_{i,K+L}$	Indicated dose value due to a combined irradiation with the conventional true dose value $H_K + H_L$	Sv
$H_{i,L}$	Indicated dose value due to a single irradiation with the conventional true dose value H_L	Sv
$H_{i,\text{nat}}$	Accumulated dose in the environment	Sv
$H_{i,r}$	Indicated dose(rate) value under specified reference conditions	Sv (Sv h ⁻¹)
$H_{i,r,0}$	Reference value of the indicated dose(rate) due to exposure to $H_{t,r,0}$	Sv (Sv h ⁻¹)
H_m	Measured dose(rate) value	Sv (Sv h ⁻¹)
$H_p(0,07)$	Personal dose equivalent at a depth 0,07 mm	Sv
$H_p(10)$	Personal dose equivalent at a depth 10 mm	Sv
$H_{\text{true,nat}}$	Expected personal dose equivalent due to natural environmental radiation	Sv
$\dot{H}_p(0,07)$	Personal dose equivalent rate at a depth 0,07 mm	Sv h ⁻¹
$\dot{H}_p(10)$	Personal dose equivalent rate at a depth 10 mm	Sv h ⁻¹
$\dot{H}_{\text{true,nat}}$	Known personal dose equivalent rate due to natural environmental radiation	Sv h ⁻¹
$H_p(d)$	Dose equivalent in soft tissue at a specified point in the human body at a depth d	Sv
H_t	Conventional true dose (rate) value	Sv (Sv h ⁻¹)
$H_{t,r}$	Conventional true dose(rate) value under specified reference conditions	Sv (Sv h ⁻¹)
$H_{t,r,0}$	Reference dose(rate) value of the quantity to be measured	Sv (Sv h ⁻¹)
$I_{\text{low},1}$	Supply current of the dosimeter when the indication is $M_{\text{low},1}$	A
$I_{\text{low},2}$	Supply current of the dosimeter when the alarm sounds and the visual alarm is displayed after the alarm is set on its lowest range	A
k	Coverage factor (see GUM)	—
K	Symbol of radiation condition K, for example 3 mSv and N-80	—
l	Number of influence quantities of type S	—
L	Symbol of radiation condition L, for example 4 mSv and S-Co	—
m	Number of influence quantities of type F	—
$M_{\text{low},1}$	Indication of the dosimeter under the same conditions as given for M_{nom} , but when the battery voltage is low, for example the dosimeter indicates “Low battery” for the first time.	Sv
M_{nom}	Indication of the dosimeter under given conditions when the battery voltage has its nominal value.	Sv