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**NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**GB/T 13161-2015**

Replacing GB/T 13161-2003; GB/T 14323-1993

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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  
(English Translation)**

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### Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard replaces GB/T 13161-2003 "Direct reading personal X and gamma radiation dose equivalent and dose equivalent rate monitor" and GB/T 14323-1993 "X, gamma radiation personal alarm device", compared with GB/T 13161-2003 and GB/T 14323-1993 main technology the changes are as follows.

- Integrate different instrument standards for different types of radiation (X, gamma, neutron and beta radiation) into one standard, extending the standard Range of use;
- Electromagnetic compatibility performance requirements and tests increase RF electromagnetic fields, conducted disturbances caused by fast transients or bursts, induced by surges Conducted disturbances, conducted disturbances caused by radio frequency, 50 Hz magnetic field, voltage sag and short interruptions;
- Mechanical performance requirements and tests have increased the flutter test;
- Added "uncertainty" content;
- Removed "storage, transportation, packaging, signs".

This standard uses the translation method equivalent to the use of IEC 61526:2010 "radiation protection equipment to measure X, gamma, neutron and beta radiation personal dose when Volume Hp (10) and Hp (0.07) Direct Reading Personal Dose Equivalent Apparatus.

The documents of our country that have a consistent correspondence with the international documents referenced in this standard are as follows.

- GB/T 8897.1-2008 Primary batteries Part 1. General (IEC 60086-1:2007, MOD)
- GB/T 8897.2-2008 Primary batteries Part 2. Dimensions and electrical performance requirements (IEC 60086-2:2007, MOD)
- GB/T 17626.2-2006 Electromagnetic compatibility test and measurement technology

Electrostatic discharge immunity test (IEC 61000-4-2.

2001, IDT)

---GB/T 17626.3-2006 Electromagnetic compatibility test and measurement technology RF electromagnetic field radiation immunity test (IEC 61000-4-3:2002, IDT)

---GB/T 17626.6-2008 Electromagnetic compatibility test and measurement technology Conducted disturbance immunity of RF field induction (IEC 61000-4-6:2006, IDT)

---GB/T 17626.8-2006 Electromagnetic compatibility test and measurement technology Power frequency magnetic field immunity test (IEC 61000-4-8.

2001, IDT)

---GB/T 17799.2-2003 Electromagnetic compatibility general standard immunity test in industrial environment (IEC 61000-6-2.

1999, IDT)

This standard has made the following editorial changes.

--- Replace IEC 60529:2001 with IEC 60529:2001 and its Amendment1 in "2 Normative References" (1999), and the international standards of the corresponding national standards have been changed to the standards of China;

--- Because the X, gamma personal dose equivalent instrument can also use other ISO phantoms during the test, will be in 7.5, 9.3.5, 9.4.1.2 and 9.4.2.2 the "ISO water slab phantom" was changed to "ISO phantom";

--- Change the "ISO 6980 series standard" in 9.6.2.2 to "GB/T 12164.1-2008, ISO 6980-2:2004 and ISO 6980-3:2006";

--- 9.9.2.2 in the third line "in the case of step increase or decrease the dose equivalent rate of irradiation" changed to "in step increase dose equivalent in the case of rate irradiation", line 6 "in the case of increasing or decreasing the dose equivalent rate of irradiation" is changed to "in stepping reducer" in the case of the irradiation of the equivalent amount rate, the original text is incorrect;

--- Replace 9.9.4.1 "(see Table 4~3 of the sixth line)" with "(see item 10, table 5 and item 8 of Table 6)" and Add "9.9.4" to the "Article Number" in item 10 of Table 4 and Item 8 of Table 5 and Table 6;

---11.7 Delete "60Hz" that does not meet the national conditions;

--- 11.2 in the 11th column description, see "9.4.2" was changed to "see 9.3.2", the original text is incorrect;

--- The third line of the first column of Table 3 "dose rate. Hp (10), Hp (0.07)" is incorrect, changed to "dose rate. H p(10), H p(0.07)";

--- In the fourth column of the fifth row of Table 4 (No. 4), "Introduction this standard applies to active and direct reading personal dose equivalent measuring instruments and monitors. The instrument is used to measure X, gamma, neutron and beta radiation.

The individual doses are equivalent to Hp (10) and Hp (0.07).

For personal dose equivalent Hp (10) or personal dose equivalent rate H p(10) and X and gamma radiation give the two minimums of photon energy Rated range. The first rated range is 20keV~150keV for workplaces using low energy X-rays (eg medical diagnosis), Two rated ranges from 80 keV to 1.5 MeV are used in workplaces where high energy X-rays and/or gamma sources are used (eg industrial). For neutrons Radiation, the minimum rated range of neutron energy is 0.025 eV (thermal neutron) ~ 5 MeV. The rated range can be extended to different radiation field related targets all energy that is covered.

For individual dose equivalents Hp (0.07) and X and gamma radiation, the minimum rated range of photon energy is 20 keV to 150 keV, for beta radiation, the minimum rating range is 0.2 MeV to 0.8 MeV. The rated range can be extended to cover different radiation field related standards Have energy.

Examples of extended nominal ranges are given in Appendix C.

In some applications (eg 6 MaiV photon radiation in the vicinity of a nuclear reactor), it is desirable to measure photon energy up to 10 MeV Personal dose equivalent (rate) Hp (10). In some other applications, it is desirable to measure Hp(10) down to 10 keV.

For personal dose equivalents, it is required to measure the dose values Hp(10) and Hp(0.07) and give the dose rate value H for monitoring.

p(10) and

p (0.07). Measurement of these dose rate values is an option for personal dose equivalents.

Radiation protection instruments measure X, gamma, neutron and Beta radiation personal dose equivalents Hp (10) and Hp (0.07) Direct reading personal dose equivalent

## 1 Scope

This standard applies to personal dose equivalents with the following characteristics.

- a) worn on the human torso or limbs;
- b) measuring individual dose equivalents Hp(10) and Hp(0.07) produced by external X and gamma, neutron and beta radiation, and measuring individual agents Volume equivalent rate H p(10) and H p(0.07);
- c) has a digital display;
- d) may have a personal dose equivalent or personal dose equivalent rate alarm function.

Therefore, this standard applies to the following dose levels (including the respective dose rate) and the measurement of the radiation combination.

- 1) Hp(10) and Hp(0.07) produced by X and gamma radiation;
- 2) Hp(10) and Hp(0.07) produced by X, gamma and beta radiation;
- 3) Hp(10) produced by X and gamma radiation;
- 4) Hp(10) generated by neutron radiation;
- 5) Hp(10) produced by X, gamma and neutron radiation;
- 6) Hp (0.07) produced by X, gamma and beta radiation.

**Note 1:** Unless otherwise stated, when referring to "dose" in this standard, it refers to the individual dose equivalent.

**Note 2:** Unless otherwise stated, when reference is made to "dose meter" in this standard, it is meant to include all personal dose equivalents.

This standard specifies the requirements for dosimeters and their associated readout systems (if provided).

This standard specifies the general characteristics, general test methods, radiation characteristics, and electrical, mechanical, safety, and environmental characteristics of the above dosimeters.

Only the relevant readout system is required to affect the personal dose equivalent readout accuracy and alarm settings and to the reader to the dose meter Resounding requirements.

This standard also specifies the classification of instruments used in Appendix C based on different measurement capabilities.

This standard does not include special requirements for accident or emergency dosimetry, although dosimeters can be used for this purpose. This standard does not apply to testing Dosimeters that measure pulsed radiation (eg, radiation produced by most medical X-ray diagnostic equipment, linear accelerators, or similar devices).

## 2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 2900.81-2008 Electrotechnical terminology Nuclear instrument physical phenomena and basic concepts (IEC 60050-393:2003, IDT) GB/T 2900.82-2008 Electrotechnical terminology nuclear instrumentation, systems, equipment and detectors (IEC