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American National Standard Performance Criteria for Active Personnel Radiation Monitors

Accredited by the American National Standards Institute

Sponsored by the
National Committee on Radiation Instrumentation, N42



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Secretariat

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Abstract: Performance and design criteria are provided in this standard for monitors that are worn on the trunk of the body to measure the personal dose equivalent, or the dose equivalent rate from external sources, of ionizing radiation. This is a revision of ANSI N42.20-1995.

Keywords: design criteria, ionizing radiation, monitors, performance criteria, personnel radiation monitors, radiation, radiation instrumentation, radiation monitors

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Introduction

(This introduction is not part of ANSI N42.20-2003, American National Standard Performance Criteria for Active Personnel Radiation Monitors.)

This standard is the responsibility of the Accredited American Standards Committee on Radiation Instrumentation, N42. Committee N42 delegated development of this standard to Subcommittee N42.RPI. Drafts were reviewed by Committee N42, Subcommittee N42.RPI, and other interested parties, and the comments received were utilized in producing the standard as finally approved.

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American National Standard Performance Criteria for Active Personnel Radiation Monitors

1. Overview

1.1 Purpose

The purpose of this standard is to specify performance and design criteria for personal electronic monitors used for the determination of personal dose equivalent, or dose equivalent rate from external sources, of radiation. It is necessary to standardize the performance and design of devices used for this important purpose. Recent developments in this area of instrumentation have necessitated the revision of ANSI N42.20-1995 for these devices. This standard should be used in conjunction with ANSI N42.17a-2003.¹

1.2 Scope

This standard applies to the following types of active electronic devices that are worn on the trunk of the body for the purpose of measuring the personal dose equivalent, or dose equivalent rate from external sources, of radiation. The types of dosimeters, include those designed for measuring, are the following:

Type 1—X, gamma, and high energy beta radiations

Type 2—Neutron radiation

Type 3—X, gamma, high energy beta, and neutron radiations (i.e., total dose)

The standard specifies the design and performance criteria for the personal electronic dose monitors and, if supplied, the associated readout system. It applies to devices used for the measurement of personal dose equivalent (rate) from photon radiations (X-rays and gamma rays) of energies 50 keV to 1.5 MeV, beta radiation of maximum energies greater than 500 keV, and neutron radiation from thermal energies to approximately 15 MeV.

This standard does not include instruments referred to as *chirpers*, which are described in ANSI N13.27-1981. This standard does not specify methods for the proficiency testing and accreditation of dosimetry systems. The standard addresses only the radiation detection portions of instruments with telemetric capability. It also does not address passive devices such as thermoluminescent dosimeters, photographic film dosimeters, or quartz fiber electroscope dosimeters. This standard specifies the following items for active personal electronic dosimeters: required general characteristics; general testing procedures; radiation

¹Information on references can be found in Clause 2.

characteristics; and electrical, mechanical, safety, and environmental characteristics. The standard specifies the criteria for validating the accuracy of stored dosimetry information. This standard should be used for the evaluation of active personal electronic dosimeters as part of a type testing program or a qualification of the devices for purchase and subsequent use in a radiation protection program. The proficiency testing or accreditation of these devices is covered in related standards developed by Accredited Standards Committee (ASC) N13.

1.3 Relationship to international standards

This standard is consistent with standards being developed by IEC TC45/SC45B. In addition to ANSI definitions, it utilizes definitions of IEC 60050-394:1995 [B1]² and ISO standards on reference radiations, but it does not use the ICRU operational quantities given in IEC 60050-394:1995, because they have not yet been adopted in the United States.

2. References

This standard shall be used in conjunction with the following publications. When the following standards are superseded by an approved revision, the revision shall apply.

ANSI N13.11-2001, American National Standard Personnel Dosimetry Performance—Criteria for Testing.³

ANSI N13.27-1981 (Reaff 1992), American National Standard Performance Requirements for Pocket-Size Alarm Dosimeters and Alarm Ratemeters.

ANSI N42.17a-2003, American National Standard Performance Specifications for Health Physics Instrumentation—Portable Instrumentation for Use in Normal Environmental Conditions.

ANSI N42.17c-1989, American National Standard Performance Specifications for Health Physics Instrumentation—Portable Instrumentation for Use in Extreme Environmental Conditions.

ANSI N319-1976 (Reaff 1984), American National Standard for Personnel Neutron Dosimeters/Neutron Energies Less than 20 MeV).⁴

ANSI N323-1978 (Reaff 1993), American National Standard for Radiation Protection Instrumentation Test and Calibration.

ICRU Report 33-1980, Radiation quantities and units.⁵

ICRU Report 51-1993, Quantities and Units in Radiation Protection Dosimetry.

²The numbers in brackets correspond to those of the bibliography in Annex A.

³ANSI publications are available from the Sales Department, American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

⁴ANSI N319-1976 has been withdrawn; however, copies can be obtained from the Sales Department, American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

⁵ICRU publications are available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Suite 800, Bethesda, MD 20814, USA.