American National Standard

ANSI/HPS N43.3-2008 (R2018)

For General Radiation Safety—

Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies Up to 10 MeV

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Abstract

This standard establishes guidance for the design and use of installations that use x-ray–generating devices and sealed gamma-ray sources of energies up to 10 MeV for non-medical purposes. Its main objectives are to keep the exposure of persons to radiation to levels as low as reasonably achievable (ALARA) and to ensure that no one receives a dose equivalent greater than the maximum permissible dose equivalent. These objectives may be achieved by the use of engineered controls, firm management controls, safe operating procedures, appropriate equipment, and a comprehensive maintenance and surveillance program. Annexes contain technical information useful for the design of radiation shielding.

Key words: Gamma-ray equipment; radiation installations; radiation safety; x-ray–generating devices

Foreword (This foreword is not a part of American National Standard ANSI/HPS N43.3-2008.)

In 1946, the sectional committee of the American Standard Association issued American War Standard Z54.1-1946, “Safety Code for the Industrial Use of X-rays.” Handbook 93 (Z54.1-1963), “Safety Standard for Non-Medical X-ray and Sealed Gamma-Ray Sources,” issued in 1964, was a revision of a part of the war standard. These standards provided the necessary guidance for the safe installation and use of penetrating radiation used in industry.

The American National Standards Institute Committee N43 examined Z54.1-1963 and determined that a revision was necessary. This task was assigned to Subcommittee N43-5 and the revision was published in 1974 as NBS Handbook 114 (ANSI N543-1974, reaffirmed 1989), “General Safety Standard for Installation Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV.” Subcommittee N43-5 began the revision of ANSI N543-1979 in November 1983 and completed its work in December 1991.

This American National Standard provides guidance for the safe use of x-ray–generating devices and sealed gamma-ray sources with energies up to 10 MeV. Though some principles do not change much over time (for example, time, distance, and shielding), some technologies have changed substantially, warranting a revision of this standard. The last revision of ANSI/HPS N43.3 was in 1993. Since then, there have been considerable changes in the norm regarding dosimetry, radiation detection, and concepts regarding configuration control of hardware and software. This revision attempts to address those changes.

Perhaps the most substantive changes to be found in this revision are:

- changes to SI units from conventional special units such as roentgen,
- updates to references, taking into account the latest information from the international community,
- acceptance of “radiation detection instrument” rather than “radiation survey meter” for some entries into an exposure room,
- discouraging use of continuous alarms unrelated to the need for evacuation,
- calling for the use of professional health physicists and reliance on their professional judgment,
- guidance regarding the use of programmable logic controllers (PLCs), and
- guidance regarding software configuration control.

This standard contains six annexes that are informative and not considered part of this standard.

The Accredited Standards Committee N43, on Equipment for Non-Medical Radiation Applications, had the following personnel at the time it processed and approved this standard:

Chairperson	Gordon M. Lodde
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ABB Industrial Systems, Inc.	John R. Dukes
American Conference of Governmental Industrial Hygienists	Gordon M. Lodde
American Crystallographic Association	Camden Hubbard
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	David W. Lee

Suggestions for improvement of this standard are welcomed. They should be sent to the Health Physics Society, 1313 Dolley Madison Boulevard, Suite 402, McLean, VA 22101.

The subcommittee responsible for development of Handbook 93 (Z54.1-1963), “Safety Standard for Non-Medical X-ray and Sealed Gamma-Ray Sources,” had the following members: C. B. Braestrup (chair), C. E. Coner, and R. H. Duguid.

The N43-5 subcommittee responsible for development of ANSI N543-1974 had the following members: E. L. Criscuolo (chair), John P. Battema, James H. Bly, Carl B. Braestrup, H. L. Cook, Jr., Howard Heffan, Donovan Smith, and Major John C. Taschner.

The N43-5 subcommittee responsible for development of ANSI N43.3-1993 had the following members: Anthony LaMastra (co-chair), John C. Taschner (co-chair), Steven L. Baggett, James H. Bly, Col. David Case, Elmer H. Eisenhower, K. Dieter Markert, William J. Morris, and John Weiler.

The Health Physics Society N43.3 Standards Subcommittee responsible for the current revision had the following members:

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