



American National Standard

ANSI/HPS 43.6-2007

Sealed Radioactive Sources—Classification

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American National Standards Institute, Inc.



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Abstract

This standard establishes a system of classification for sealed radioactive sources based on performance specifications related to radiation safety. It provides a manufacturer of sealed sources with a series of tests for evaluating the safety of the product under specified conditions. It also assists a user of such sources to select a type that suits the intended application insofar as maintenance of source integrity is concerned. Tests are prescribed for all sources for temperature, external pressure, impact, vibration, and puncture over a range of severity. Tests are also prescribed for bending of sources that are very long compared to their diameter or width. Sealed source performance requirements are identified for a variety of source applications in terms of a specific degree of severity of each test.

Key words: Classification; leak test; national standard; radiation safety; radiation sources; radioactive sources; radioactivity; sealed sources; standard

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Foreword

(This foreword is not part of American National Standard ANSI/HPS N43.6-2007.)

Work on this standard was begun in 1962 and culminated in the publication of ANSI N5.10 in 1968. When the original standard was in its final draft form, a copy was sent to the International Standards Organization (ISO). The ISO had been working on standards for sealed sources for several years. When the ANSI version was examined, the ISO decided to adopt the ANSI concept and general format, and ultimately published ISO 2919.

Revised Standard ANSI N542-1977

ANSI procedures require that a standard be reviewed every five years. In 1973 when ANSI N5.10 was reviewed, it was decided to, essentially, duplicate the ISO version in its final draft form that was published as ISO/DIS 2919 in November 1972. Although the ANSI version contained sections on Quality Control and Leak Test Methods, the ISO version deleted these sections and intended to cover these items in separate documents.

This revised American National Standard was published as ANSI N542-1977 and was issued in July 1978. It was accompanied by sections in its appendices on Quality Control and Leak Test Methods. The Quality Control section was expanded to provide a more definitive guide so that production-run sources would have performance characteristics equal to the fully tested sources (prototype, dummy, or other test sources). The Leak Test Methods section was updated to reflect current methods of leak testing.

During the period when this standard was being revised, other groups developed standards for brachytherapy sources and self-luminous sources. An attempt was made to merge these two standards, along with the International Atomic Energy Agency (IAEA) tests for special form, into this revised classification standard. This attempt was not successful, but to make this standard more useful, the standards for brachytherapy sources, self-luminous sources, and the special form tests were summarized in appendices.

Standard ANSI (N43.6)-1977 (R1989)

ANSI Standard N542-1977 was renumbered as ANSI N43.6-1977. Several changes were recommended by the N43 review committee in July 1989. The standard was reissued as ANSI 43.6-1977(R1989) without additional changes.

Revised Standard ANSI N43.6-1997

This 5-year review was completed in February 1996. Changes include those recommended for the 1989 version. The most significant change was increasing the temperature requirement in Table 4 from Class 4 to Class 5 for Category IV Gamma Irradiators due to the potential for fires. Numerous references were updated and an immersion test was added to Annex A. The entire document was converted to a new ANSI style.

Revised Standard ANSI N43.6-2007

Over the years, standards ANSI N43.6 and ISO 2919 have drifted apart in several areas. Effort was made to bring these two standards back into closer harmony and work toward the possibility of a single joint ISO/ANSI standard by the time of the next review. The ISO bend test was added to the standard and several details of other tests were modified to achieve better compatibility between the two standards. Table 2 was updated to include many new radionuclides. Those with half-lives less than 30 days and those with impractically low specific activity were deleted. The new radionuclides have been inserted into the appropriate "toxicity" group of the table based on where similar nuclides appeared in the previous table. The annexes in the previous version were deleted and references were added for other standards covering those subjects. Two new annexes are included in this version. The temperature classification

requirements for gamma irradiator categories II and III were increased from 4 to 5 to be congruent with regulatory concerns and ISO 2919.