

ACCREDITED STANDARDS COMMITTEE

N14 Packaging and Transport of Radioactive
And Non-Nuclear Hazardous Materials

ANSI N14.5-2014

American National Standard

*For Radioactive Materials —
Leakage Tests on Packages for Shipment*



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**ANSI®
N14.5-2014**

**American National Standard
for Radioactive Materials —
Leakage Tests on Packages for Shipment**

Secretariat

Institute for Nuclear Materials Management

Approved **June 19, 2014**

American National Standards Institute, Inc.

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Foreword

(This foreword is not part of American National Standard N14.5-2014)

The Accredited Standards Committee on Packaging and Transportation of Radioactive and Non-Nuclear Hazardous Materials, N14, under whose jurisdiction this Standard was developed, has the following scope:

Standards for the packaging and transportation of fissile and radioactive materials, non-nuclear hazardous materials, including waste and mixed materials, but not including movement or handling during processing and manufacturing operations.

This revision supersedes *American National Standard For Radioactive Materials — Leakage Tests on Packages for Shipment*, ANSI N14.5–1997. The revised Standard provides acceptable methods for demonstrating that Type B packages designed for transport of normal-form radioactive material comply with the regulatory containment requirements specified in Title 10 of the Code of Federal Regulations, Part 71.

To assist a user in meeting regulatory requirements, the Standard describes methods for converting regulatory requirements to allowable leakage rates. Use of these rates will facilitate demonstrating that a Type B package complies with the regulatory requirements during the package design, fabrication, maintenance, periodic, and pre-shipment phases. The standard also provides guidance to account for the physical form of the escaping medium, its physical properties, and conditions under which the medium escapes. The medium may contain radioactive material in gaseous, liquid, or solid forms. Many leakage test procedures are available, but the appropriate procedure will depend on its sensitivity and its applicability to the specific package. The package designer or shipper must assess the concentration of radioactive materials that might escape from the package, under shipping conditions, so that a leakage test procedure with adequate sensitivity can be selected.

An important aspect of this Standard is the use of the term *leaktight*. In this Standard, leaktight is defined as that degree of package containment that in a practical sense precludes any radiologically significant release of radioactive materials.

Finally, this Standard was completely reviewed during the 2014 revision. Definitions have been added for containment boundary, standard conditions and tracer gas, as well as definitions related to calibration. The fabrication leakage rate test components have been clarified to include the base material. Guidance has been added to include packaging design considerations and leakage rate test selection methods, as well as the use of test fixtures in fabrication and periodic leakage rate testing. Leakage rate testing performance and quality assurance guidance have also been updated. Guidance has been removed relating to packages required to provide double containment. In Appendix A, guidance was added to encourage the use of a Leak Test Engineer or a Leak Test Level III during design and testing. The use of standard leaks was expanded upon, guidance was added to several leak test methods, and the term “soap bubble” was changed to “bubble” due to recognition that commercial soap may cause a false-negative test result. In Appendix B, examples were reworked which changed the results of several examples. In Appendix C, the calculation of the A_2 value for the releasable materials was corrected. Throughout the Standard and appendices typographical errors were corrected. Regulatory authorities may accept or reject any or all parts of this Standard, and may require other leakage test provisions not addressed in this Standard.

This document contains three informative appendices that are not considered part of this Standard.

Suggestions for improvement of this Standard will be welcome. They should be sent to the Institute of Nuclear Materials Management, 111 Deer Lake Road, Suite 100, Deerfield, IL 60015, USA.

This Standard was prepared and approved for submittal to ANSI by the Accredited Standards Committee on Packaging and Transportation of Radioactive and Non-Nuclear Hazardous Material, N14. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this Standard, the N14 Committee comprised the following members.

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American National Standard for Radioactive Materials—Leakage Tests on Packages for Shipment

1. Scope and Field of Application

This Standard specifies methods for demonstrating that Type B packages designed for transport of normal form radioactive material comply with the containment requirements of Title 10 of the Code of Federal Regulations Part 71 (10 CFR Part 71).

This Standard describes

- Package release limits
- Methods for relating package release limits to allowable and reference leakage rates
- Minimum requirements for leakage rate test procedures.

This Standard provides requirements for the following leakage rate tests

- Design
- Fabrication
- Maintenance
- Periodic
- Pre-shipment.

This Standard also contains non-mandatory appendices on leakage rate test methods, determination of reference leakage rates, and determinations of activity in the medium.