

# American Nuclear Society

**use of borosilicate-glass  
Raschig rings as a neutron absorber  
in solutions of fissile material**

**an American National Standard**

## **REAFFIRMED**

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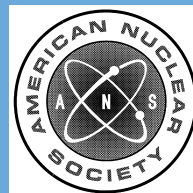
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**American National Standard  
Use of Borosilicate-Glass  
Raschig Rings as a Neutron Absorber  
in Solutions of Fissile Material**

Secretariat  
**American Nuclear Society**

Prepared by the  
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## Foreword

(This Foreword is not a part of American National Standard Use of Borosilicate Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material, ANSI/ANS-8.5-1996.)

This standard provides guidance for the use of borosilicate-glass Raschig rings as a neutron absorber for criticality control in plants processing fissile materials. It also specifies maximum concentrations of homogeneous solutions of uranium and plutonium in vessels of unlimited size when packed with rings.

This standard was first approved as N16.4-1971, revised as ANSI/ANS-8.5-1979, and again revised as ANSI/ANS-8.5-1986, as a result of the prescribed periodic review. Although the general use of neutron absorbers, including Raschig rings, for criticality control dates back to 1958, some applications were recorded as early as the mid-1940s.

The early experimental data forming the basis for some of the specifications in this standard and a review of the early experience with Raschig rings were reported by Nichols et.al.\* before the first publication of this standard. Additional data that provides bases for other portions of this standard have also been published.\*\*

Changes in this revision of the standard are primarily in two areas. First, references to specific methods of analysis of Raschig ring properties have been removed and collected in the Appendix, to illustrate suggested methods which may be used. Whatever methods are used must be documented and independently reviewed. Second, emphasis has been placed on the use of control Raschig rings and trends in their (non-destructively) measured properties to determine the frequency of maintenance tests. Both of these reflect up-to-date concepts in assuring that the properties needed for criticality safety actually exist, and continue to exist, during service in vessels packed with Raschig rings.

Working Group ANS-8.5 had the following membership during the creation of this revision:

N. Ketzlach, Chairman, *Individual*  
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\* J. P. Nichols, C. L. Schuske, and D. W. Magnuson, *Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material*, Y-DCD-8, Oak Ridge Y-12 Plant, Oak Ridge, TN, 1971.

\*\* P.B. Adams, "Glass Containers for Ultrapure Solutions," Chapter 14 in *Ultrapurity*, edited by M. Zieff and R. Speights, Marcel Dekker, Inc., New York, 1972; and N. Ketzlach, "Proposed Extension of Raschig Ring Standard to Low Enriched Uranium Fuels," *Nuclear Technology*, 42, 65, 1979.

The development of the standard and its maintenance were performed under Subcommittee ANS-8, Fissionable Materials Outside Reactors, of the Standards Committee of the American Nuclear Society. At the time of approval of the revision ANS-8 had the following membership:

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