

American Nuclear Society

REAFFIRMED

August 12, 1998

ANSI/ANS-57.1-1992 (R1998)

**design requirements for light water
reactor fuel handling systems**

an American National Standard

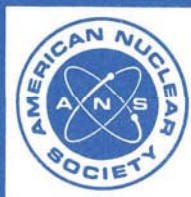
REAFFIRMED

July 20, 2005

ANSI/ANS-57.1-1992 (R2005)

This standard has been reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn. The requirements of this document will be met by using the version of the standards and documents referenced herein. It is the responsibility of the user to review each of the references and to determine whether the use of the original references or more recent versions is appropriate for the facility. Variations from the standards and documents referenced in this standard should be evaluated and documented.

This standard does not necessarily reflect recent industry initiatives for risk informed decision-making or a graded approach to quality assurance. Users should consider the use of these industry initiatives in the application of this standard.



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**American National Standard
Design Requirements for Light Water
Reactor Fuel Handling Systems**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-57.1**

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American National Standard

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Comments on this standard are encouraged and should be sent to Society Headquarters.

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Foreword

(This foreword is not part of American National Standard Design Requirements for Light Water Reactor Fuel Handling Systems, ANSI/ANS-57.1-1992.)

This standard provides minimum design requirements for the designer of fuel handling equipment for water-cooled nuclear power plants. It sets forth design requirements that can assist in design and licensing efforts. It does not, however, relieve the designer of the responsibility for compliance with any specific codes referenced herein. The designer is also reminded of U.S. Nuclear Regulatory Commission (NRC) Regulatory Guides that contain information that should be referred to in designing systems and components. The standard was developed under sponsorship of the American Nuclear Society and was first drafted in 1975. In this revision, it has been updated to reflect current criticality analysis standards and to address the potential for fuel handling systems to handle consolidated spent fuel.

This standard was developed by Working Group ANS-57.1 of the Standards Committee of the American Nuclear Society. The Working Group had the participation of the following members during the period it revised and approved the standard:

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Design Requirements for Light Water Reactor Fuel Handling Systems

1. Introduction and Scope

1.1 Introduction. Handling of nuclear fuel presents unique problems. Consideration must be given to cooling, prevention of criticality, protection from physical damage, and radiological protection.

This standard includes basic requirements for design and fabrication and design provisions to facilitate maintenance and operation. The basis of this standard is that the intended function of the equipment will be performed in an efficient and economical manner that ensures protection to plant personnel and to the public, and that any radiation exposures are maintained as low as reasonably achievable.

1.2 Scope. This standard sets forth the required functions of fuel handling systems at light water reactor nuclear power plants.

It provides minimum design requirements for equipment and tools to handle nuclear fuel and control components safely.

1.3 Limits of Application. The fuel handling system covered by this standard consists of handling equipment used for receiving and inspecting fuel assemblies containing new and recycled uranium; transporting on-site and loading fuel assemblies containing new and recycled uranium or irradiated fuel and control components in the reactor; removing from the reactor, transporting to storage, and inspecting irradiated fuel, transporting irradiated fuel assemblies to rod consolidation equipment within a spent fuel or cask handling pool; transporting rod consolidation canisters to storage; and loading casks for shipment of irradiated fuel from or storage on the site. Rod consolidation is covered in American National Standard Design Criteria for Consolidation of LWR Spent Fuel, ANSI/ANS-57.10-1987 [1].¹

1.4 Application of Codes and Standards. The structural members and mechanical and electrical systems of the fuel handling equipment shall be

designed to meet applicable commercial codes and standards for fabrication and assembly except as specifically supplemented in Section 6, Design Requirements, of this standard.

2. Definitions

auxiliary fuel handling crane. A crane used for handling equipment, fuel units, and new fuel shipping containers.

commercial codes and standards. Standards that would be used in the design of conventional or commercial industrial components or sub-components. Examples of commercial standards include the following: Power Piping, ANSI/ASME-B31.1-1989; ANSI/ASME Boiler and Pressure Vessel Code-1992, Section VIII, "Pressure Vessels," Division 1; Valves—Flanged, Threaded and Welding End, ANSI/ASME B16.34-1988; Overhead Hoists, ANSI/ASME-B30.16-1987; and "Specification for Electric Overhead Traveling Cranes," CMAA-70-1988.

control components. Items included within the reactor vessel that control flow or reactivity and are handled or shifted in position during, when preparing for, and when recovering from fuel loading or refueling. Examples are control rods, flow limiting orifices, and burnable poison rods.

control component change mechanism. Handling equipment used to move control components from one fuel assembly or core location to another or to a temporary storage locations.

failed fuel. Fuel with a perforation of or a defect in the fuel cladding or any distortion or break causing a structural change that requires use of abnormal fuel unit handling procedures or equipment, premature replacement of a fuel assembly, replacement of its component parts, or restrictions on plant operation.

fuel handling machine. Any equipment operating over the spent fuel pool designed for handling fuel units and control components.

¹ Numbers in brackets refer to corresponding numbers in Section 7, References.