

American Nuclear Society

REAFFIRMED

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**fuel oil systems for safety-related
emergency diesel generators**

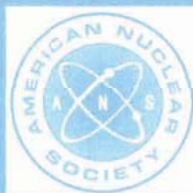
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REAFFIRMED

October 4, 2007
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**American National Standard
Fuel Oil Systems for Safety-Related
Emergency Diesel Generators**

**Secretariat
American Nuclear Society**

**Prepared by the
American Nuclear Society
Standards Committee
Working Group ANS-59.51**

**Published by the
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American National Standard

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Foreword

(This Foreword is not a part of American National Standard Fuel Oil Systems for Emergency Diesel Generators, ANSI/ANS-59.51-1997.)

This standard is applicable to light water reactor nuclear power plants and is one of a series sponsored by the LWR Criteria Management Subcommittee (MC-1) intended to cover the design of auxiliary systems that support the operation of emergency diesel generator units. Other standards in this series that have been or are being developed by this working group are listed below:

Proposed Standard	Subject
ANS-59.52	Lubricating Oil Systems
ANS-59.53	Starting Air Systems
ANS-59.54	Combustion Air Systems
ANS-59.55	Coolant Systems

This standard interfaces with American National Standard Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations, ANSI/IEEE 387-1995, the current version of which was revised by the Nuclear Power Engineering Committee (IEEE/NPEC). The scope of ANSI/IEEE 387-1995 includes "the fuel oil system from the fuel oil day tank to the engine, including filters and strainers between the day tank and the engine." However, no fluid system or component performance or design criteria are specified in that standard. To address these fluid system requirements, this revision to ANS-59.51 includes in its scope the pumps, tanks, piping and piping components, and instrumentation and control functions, as described herein. Based on discussions with the working group chairman for IEEE 387, it was agreed that the intent of that standard is to address only the overall qualifications and boundaries of the diesel generator auxiliary systems and not the specific performance or design criteria, which are addressed in ANS-59.51.

The purpose of this standard and the related standards is to provide guidance to nuclear plant owners, designers, manufacturers, regulatory authorities, and operators in the design of reliable, safety-related, onsite power systems for light water reactors. The reliability of the fuel oil system must be considered when one attempts to satisfy the overall reliability requirements of the diesel generator units. This is particularly important if fuel oil systems have components that are shared between reactor units, and if the single failure criterion is applied.

This standard can also be used for non-safety-related onsite power systems, with several changes to eliminate those requirements which would not normally apply to such equipment. For example, non-safety-related equipment would not normally have to meet American National Standard Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems, ANSI/ANS-58.9-1981 (R1987), the Class 1E Power Systems requirements of American National Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations, ANSI/IEEE 308-1992, and several of the requirements described in American National Standard Nuclear Safety Criteria for Design of Stationary Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983 (R1988) and American National Standard Nuclear Safety Criteria for Design of Stationary Boiling Water Reactor Plants, ANSI/ANS-52.1-1983 (R1988), for safety related equipment, such as Seismic Category I. Other requirements referenced herein—such as American National Standard ASME Boiler and Pressure Vessel Code—1995, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, and American National Standard Quality Assurance Program Requirements for Nuclear Facilities, ANSI/ASME NQA-1-1994—which normally apply to safety-related equipment but which are considered to enhance reliability, as well as the seven day fuel oil supply requirement, could be optional or modified to suit a particular application.

This standard was initially issued by the American Nuclear Society in April 1976. It was revised in 1989 to conform to the latest revisions of ANS-51.1 and ANS-52.1, and to resolve

comments from previous ballots issued in 1982 for reaffirmation, in 1985 for withdrawal, and in 1986 for reaffirmation. This revision agrees with the definitions and requirements of American National Standard Safety and Pressure Integrity Classification Criteria for Light Water Reactors, ANSI/ANS-58.14-1993; ANS-51.1; ANS-52.1; current technology and practices; and information available from industry reports.

U.S. Nuclear Regulatory Commission Regulatory Guide 1.137 endorsed ANSI N195-1976/ANS-59.51 as providing an acceptable method for complying with the pertinent requirements of Title 10, "Energy," Code of Federal Regulations, Part 50, Appendix A, General Design Criterion 17, subject to some clarifications and additional requirements. This revision has considered and incorporated these clarifications and requirements where appropriate.

This revision to the standard has been prepared by Working Group ANS-59.51 of the American Nuclear Society Standards Committee, which had the following membership:

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Fuel Oil Systems for Safety-Related Emergency Diesel Generators

1. Introduction

1.1 Scope. This standard provides functional, performance, and initial design requirements for the fuel oil system for diesel generators that provide safety-related emergency onsite power for light water reactor nuclear power plants. This standard addresses the mechanical equipment associated with the fuel oil system, with the exception of the engine mounted components. These components, which are mounted directly to the engine structure itself, are excluded except to define interface requirements. It also includes the instrumentation and control functional requirements. The standard excludes motors, motor control centers, switchgear, cables, and other electrical equipment used in the operation of the fuel oil system, except to define interface requirements.

1.2 Purpose. The purpose of this standard is to define those features of fuel oil systems required to ensure an adequate fuel supply to safety-related emergency diesel generators, and to provide performance and design criteria to ensure sufficient fuel is available for supply to the emergency diesel generators under all plant conditions.

2. Definitions

Applicable definitions as stated in American National Standard Safety and Pressure Integrity Classification Criteria for Light Water Reactors, ANSI/ANS-58.14-1993 [1]¹ are used in this standard. The following definitions are also applicable to this standard:

design basis event (DBE). An event that is a condition of normal operation, including an anticipated operational occurrence, a design basis accident (or transient), an external event, or a natural phenomenon for which the plant must be designed to ensure that the three basic safety-related functions are achievable. (See Title 10, "Energy", Code of Federal Regulations, Part 50, "Domestic Licensing of Production and Utilization Facilities," Section 50.49 [2].)

emergency diesel generator. A diesel generator unit designed in accordance with American National Standard Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations, ANSI/IEEE 387-1995 [3], and installed to provide a standby power supply in accordance with American National Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations, ANSI/IEEE 308-1992 [4]. The generator provides standby electric power to comply with the pertinent requirements of Title 10, "Energy", Code of Federal Regulations, Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 17, "Electric Power Systems" [5].

fill line. Those components, including piping, valves, and filters, used to provide a means to replace fuel oil into the supply tank.

fuel oil subsystem. That portion of the fuel oil system which supplies fuel to a single diesel generator unit.

fuel oil system. The set of equipment, including pumps, tanks, piping, valves, and fill and vent lines, required to supply fuel to the emergency diesel generators installed in a nuclear power plant. As used here, "system" includes the fuel oil equipment for all of the diesel generators for a nuclear unit.

minimum diesel generator capacity. The minimum electrical output from the diesel generators to ensure the operation of the minimum plant equipment required to prevent unacceptable consequences for any design basis event including the capacity to power the safety-related systems and components.

protected area. An area, encompassed by physical barriers, to which access is controlled.

shall, should, and may. The word "shall" denotes a requirement; the word "should" denotes a recommendation; and the word "may" denotes permission, neither a requirement nor a recommendation.

tanks. All tanks used to support diesel generator operation; where used without modifiers, the word covers day, integral, and supply tanks.

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