American Nuclear Society

REAFFIRMED

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(R2007)

lubricating oil systems for safety-related emergency diesel generators

an American National Standard

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reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn.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
Lubricating Oil Systems for Safety-Related Emergency Diesel Generators

Secretariat
American Nuclear Society

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American National Standard

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Foreword

(This Foreword is not a part of American National Standard for Lubricating Oil Systems for Safety-Related Emergency Diesel Generators, ANSI/ANS-59.52-1998.)

This standard is applicable to light water reactor nuclear power plants and is one of a series of standards, 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-59.51	Fuel 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. That standard does not address fluid system or component performance or design criteria. To address these fluid system requirements, this standard 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 ANSI/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-59.52.

The purpose of this standard, and the related standards under development, 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 lubricating oil systems must be considered when satisfying the overall reliability requirements of the diesel generator units. This is particularly important if lubricating 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, 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, could be optional or modified to suit a particular application.

This revision to the standard has been prepared by Working Group ANS-59.5x of the Standards Committee of the American Nuclear Society, which had the following membership.

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Contents

Lubricating Oil Systems for Safety-Related Emergency Diesel Generators

1. Introduction

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

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

2. Definitions

Applicable definitions as stated in American National Standard Nuclear Safety Criteria for the Design of Stationary Light Water Reactors, ANSI/ANS-58.14-1993 [1],[1] shall be used for this standard. The following definitions shall also be applicable to this standard:

auto-load. The automatic application of loads to the diesel generator in a predetermined sequence.

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 (EDG). 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 diesel generators provide standby electric power to comply with the pertinent requirements of 10CFR50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 17, "Electric Power Systems" [5].

emergency start and operation. Automatic start and subsequent running or loading of the diesel engine, or both, in response to a safety signal such as emergency core cooling or loss of offsite power.

engine-driven oil pump. A pump which receives its motive power directly from the diesel engine and provides proper lubricating oil circulation under all operating conditions.

engine lubricating oil cooler. A heat exchanger that provides cooling of the lubricating oil to maintain temperature within specified operating limits.

keep-warm oil pump. An electric motor driven pump that circulates warm oil through the engine when the unit is in standby.

keep-warm heater. A heater used to warm the lubricating oil to within specified limits while the engine is in standby, to enhance engine starting reliability.

manual start. The starting of a diesel engine by operator action.

minimum required storage capacity. The minimum required quantity of lubricating oil to provide for engine consumption and operating needs during safety-related functions.

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