

American Nuclear Society

**single failure criteria for light water
reactor safety-related fluid systems**

an American National Standard

REAFFIRMED

February 12, 2015

ANSI/ANS-58.9-2002 (R2015)

February 24, 2009

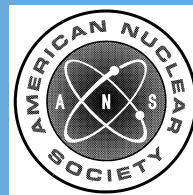
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This standard has been reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn. The requirements of this document will be met by using the version of the standards 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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Addendum to Foreword

ANSI/ANS-58.9-2002 Single Failure Criteria for LWR Safety-Related Fluid Systems

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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.

**American National Standard
Single Failure Criteria for Light Water
Reactor Safety-Related Fluid Systems**

**Secretariat
American Nuclear Society**

**Prepared by the
American Nuclear Society
Standards Committee
Working Group ANS-58.9**

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American National Standard

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Foreword

(This Foreword is not a part of American National Standard Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems, ANSI/ANS-58.9-1981, (Revision of N658-1976/ANS-51.7).)

The General Design Criteria for Nuclear Power Plants, published by the U.S. Atomic Energy Commission¹ in Title 10, Code of Federal Regulations, Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," effective May 21, 1971, requires that certain fluid systems important to safety be designed as follows:

Suitable redundancy in components and features....shall be provided to assure that....the system safety function can be accomplished, assuming a single failure.

It was pointed out in the preface to the General Design Criteria that:

The conditions under which a single failure of a passive component in a fluid system shall be considered in designing the system against a single failure are under development.

This standard was initially approved and issued by the American National Standards Institute (ANSI) in June 1976, as American National Standard Single Failure Criteria for Pressurized Water Reactor (PWR) Fluid Systems, N658-1976 (ANS-51.7).

In January 1978, a joint working group consisting of ANS-51.7 and ANS-52.4, was established to convert N658 (ANS-51.7) into a Light Water Reactor (LWR) Standard. The membership consisted of:

B. G. Schultz, Chairman, *Stone & Webster Engineering Corporation*
G. Fidler, *Westinghouse Electric Corporation*
G. Martine, *Bechtel Power Corporation*
J. Norberg, *Nuclear Regulatory Commission*

P. B. Stephens/A. N. Tschaeche, *General Electric Company*
R. Weir, *Tennessee Valley Authority*
G. Wrobel, *Rochester Gas and Electric Corporation*

In revising the standard to an LWR version, the working group reflected current industry practice, provided the practice was consistent with American National Standards Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, N18.2-1973 (ANS-51.1), and Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants, ANSI/ANS-52.1-1978.

There was discussion by the working group concerning the need for guidance on post-LOCA maintenance. The group concluded that such guidance was needed. The rationale is that for potential incidents that would require long recovery periods, such as a loss-of-coolant accident, the safety systems provided to mitigate their consequences must have long-term reliability. Therefore, additional requirements beyond single-failure criteria are prudent for those safety systems. To provide this added insurance of long-term performance capability, those systems shall be designed for inservice maintenance and repair. Although this requirement is not a single-failure criterion, the requirement is included in this standard to be certain it is appropriately treated in the design of the affected safety systems.

Draft 3, dated October 1978, resulted from a consensus approval ballot by working groups ANS-51 and ANS-52. This draft was forwarded for ballot to the American Nuclear Society's Nuclear Power Plant Standards Committee (NUPPSCO).

¹Superseded by the U.S. Nuclear Regulatory Commission (NRC) - January 1975.

The NUPPSCO ballot resulted in four negative votes. The working group met in May 1979 to resolve all NUPPSCO comments. This resulted in Draft 4, dated May 1979.

The May 1979 draft was reballoted by NUPPSCO. It resulted in eight negative votes. The working group met in February 1980 to resolve all comments.

Resolution of all ballots since January 1978 resulted in the following substantive changes:

1. Changed PWR criteria to LWR criteria with appropriate rewording.
2. Updated definitions to be consistent with NUPPSCO Policy 2.1. Substantive revisions or additions included the following:

Operator Error

Active Failure

Passive Failure

Safety Supporting Systems

Safe Shutdown

Safety Function

3. Provided exemptions for systems in accordance with NUPPSCO Policy 2.2.
4. Provided additional criteria for operator mitigation of single failures.
5. Provided additional guidance on passive failure of ventilation ductwork.
6. Revised format to reflect criteria, design requirements, and analysis requirements.
7. Modified Sections 3.1 through 3.3 to reflect NUPPSCO Policy 2.2.
8. Deleted the original Foreword from N658-1976 (ANS-51.7) and consolidated the remainder.

In agreement with the July 1979 meeting minutes from NUPPSCO, it is considered that any additional impacts on this standard due to the TMI-2 (Three Mile Island-2) accident will fall in the area of requirements in addition to or coincidental with the single failure criteria, not with the implementation of the single failure criteria. Such additional requirements are presently being evaluated by the ANS-58.5 Working Group.

Nothing in this standard is intended to imply that the use of the single failure criterion, by itself, is sufficient to characterize the required reliability of components or systems.

The American Nuclear Society's Nuclear Power Plant Standards Committee (NUPPSCO) had the following membership at the time of its approval of this standard.

J. F. Mallay, Chairman
M. D. Weber, Secretary

Name of Representative	<i>Organization Represented</i>
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R. E. Basso	Catalytic, Inc.
R. G. Benham	General Atomic Company (for the Institute of Electrical and Electronics Engineers, Inc.)
O. W. Bilharz, Jr. (Alt.)	Knolls Atomic Power Laboratory (for the Institute of Electrical and Electronics Engineers, Inc.)
R. V. Bettinger	Pacific Gas and Electric Company
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D. A. Campbell	Westinghouse Electric Corporation
C. O. Coffey	Kaiser Engineers
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