



# REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 1.141

CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS

## A. INTRODUCTION

General Design Criteria 54, 55, 56, and 57 of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities," require that piping systems penetrating primary reactor containment be provided with isolation capabilities that reflect the importance to safety of isolating these piping systems. This guide describes a method acceptable to the NRC staff for complying with the Commission's requirements with respect to containment isolation of fluid systems.

## B. DISCUSSION

Working Group ANS-56.2 of the American Nuclear Society Standards Committee ANS-50, Nuclear Power Plant Systems Engineering, has prepared a standard which specifies the minimum design requirements for containment isolation of fluid systems that penetrate the primary containment boundary of light-water-cooled reactors. This standard was approved by the American National Standards Institute (ANSI) Committee N18, Design Criteria for Nuclear Power Plants, and designated ANSI N271-1976, "Containment Isolation Provisions for Fluid Systems."

The provisions of ANSI N271-1976 include minimum design, testing, and maintenance requirements for the isolation of fluid systems that penetrate the primary containment of light-water-cooled reactors. Requirements for the design and testing of power supplies, qualifying of Class 1E equipment, and the design and testing of protection systems are outside the scope of this standard. These areas are not completely covered by the references given in ANSI N271-1976.

\* Copies may be obtained from the American Nuclear Society, 555 North Kensington Avenue, La Grange Park, Illinois 60525.

This standard contains requirements indicated by the verb "shall" and recommendations indicated by the verb "should." The recommendations as well as the requirements of the standard were evaluated with respect to importance to safety. All recommendations are considered to be of sufficient importance to safety to be endorsed along with the requirements given in the standard.

## C. REGULATORY POSITION

The requirements and recommendations for containment isolation of fluid systems that penetrate the primary containment of light-water-cooled reactors as specified in ANSI N271-1976, "Containment Isolation Provisions for Fluid Systems," are generally acceptable and provide an adequate basis for complying with the pertinent containment isolation requirements of Appendix A to 10 CFR Part 50, subject to the following:

1. Section 3.6.4 of ANSI N271-1976 states: "The closed system shall be leak tested in accordance with 5.3 of this standard unless it can be shown by inspection that system integrity is being maintained for those systems operating at a pressure equal to or above the containment design pressure." This exception to system leak testing is also applicable to closed systems inside the containment.

2. Section 4.2.3 of ANSI N271-1976 states: "Sealed closed isolation valves are under administrative controls and do not require position indication in the control room for valve status." Since the containment isolation valves are components of the containment isolation system, which is an engineered-safety-feature system, all power-operated valves should have position indication in the control room.

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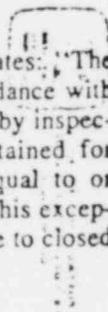
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FOR COMMENT



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3. Section 4.2.5 of ANSI N271-1976 states: "Diversity in means of actuation of automatic isolation valves in series should be considered to preclude common mode failure." The NRC staff's position is that there should be diversity in the parameters sensed (i.e., types of isolation signals) for the initiation of containment isolation.

4. Section 4.4.8 of ANSI N271-1976 gives general design requirements for closed systems. In addition, all branch lines and their isolation valves in closed systems both inside and outside the containment should meet the design criteria of Section 3.5 or Section 3.6.7 if the branch lines constitute one of the containment isolation barriers.

5. In Section 4.6.3 of ANSI N271-1976, reference is made to Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident," for guidance in determining radiation exposures for a loss-of-coolant accident. More appropriate guidance is given in Regulatory Guide 1.89, "Qualification of Class 1E Equipment for Nuclear Power Plants."

6. Section 4.14 of ANSI N271-1976 states: "The piping between isolation barriers or piping which forms part of isolation barriers shall meet the re-

quirements of 3.7 and applicable requirements for isolation barriers." Piping between isolation barriers should meet the applicable requirements of Section 3.5 or Section 3.7.

#### D. IMPLEMENTATION

The purpose of this section is to provide information to applicants regarding the NRC staff's plans for using this regulatory guide.

This guide reflects current NRC staff practice. Therefore, except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein is being and will continue to be used in the evaluation of submittals for construction permit applications until this guidance is revised as a result of suggestions from the public or additional staff review.

For those plants for which the second round of questions (Q2) on the construction permit application has been received by the date of issuance of this guide, the recommendations of this guide will be considered by the staff on a case-by-case basis pursuant to §30.109 of 10 CFR Part 59.



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Public Comments on Regulatory Guide 1.141, "Containment Isolation Provisions For Fluid Systems"

The only public comment on Regulatory Guide 1.141, "Containment Isolation Provisions For Fluid Systems," dated April 1978 was received from Mr. Glenn G. Sherwood, General Electric Co., dated June 1978. The above guide is an endorsement of ANSI Standard N271-1976, Containment Isolation Provisions for Fluid Systems."

A. Summary of Comments

1. Mr. Sherwood is concerned about the application of the appendices and the footnotes of the standard. He suggests adding words in the Regulatory Guide 1.141 to explain that neither appendices nor footnotes of the standard are parts of the standard and therefore are not required for compliance with the guide.
2. Section 3.3.2 of the standard (General Design Criterion 55, of 10 CFR 50) specifies that upon loss of actuating power, automatic isolation valves shall be designed to take the position that provides greater safety. Mr. Sherwood comments that this requirement could be interpreted to mean that all valves shall move to their safe position upon loss of actuating power which is difficult to meet if motor-operated valves are used. Mr. Sherwood suggests different words: "when a single active failure is assumed, at least one isolation valve per pipe line shall take the position of greatest safety."
3. In section 4.2.3 of the standard Mr. Sherwood suggests that an indication circuit shall be classed 1E if its failure could cause a failure of the actuation circuit.

B. Discussion and Resolution of Comments

1. The purpose of adding appendices and footnotes to the ANSI Standard is clearly identified in several ANSI documents as for illustration and not to be included as part of the standard. At the top of the first page of Appendices A, B, and C in the subject standard a parenthetical sentence states that the material in the appendix is not part of the standard but is included for information only. Similar statements for appendices and footnotes appear in ANSI, "Style Manual for Preparation of Proposed American National Standards," August 1972, and in ANSI, "American National Standard Institute Procedures for Management and Coordination of American National Standards," February 1975. Since the purpose of adding appendices and footnotes is so abundantly clear, it is thought that any more clarification in the text of the regulatory guide would be redundant and unnecessary. Therefore no revision to the text of the guide was made as a result of this comment.

2. It is the position of the NRC that the isolation of any fluid line penetrating the containment boundary depends on the need for that line following the accident that required the isolation. If the fluid line is not needed for post-accident emergency operation it is isolated at a speed depending on the nature and quantity of flow in that particular line. Furthermore, it is the NRC's position not to require a particular type of operator on a particular valve whether it is motor operated or otherwise. Section 3.3.2 in the standard merely requires that if a valve is to operate automatically, it has to be designed to move to the position of greater safety upon loss of its actuating power. It is not until the application of the single failure criterion that at least one valve per fluid line taking the position of greater safety will be required as a minimum. That is, all automatic valves in a fluid line are designed to function properly upon loss of their actuating power. Then by postulating a single failure due to unforeseen causes, at least one valve shall take the position of greater safety. Since Section 3.3.2 of the standard does not contradict the above rationale, no revision to the regulatory guide is necessary as a result of this comment.
3. The Instrumentation and Control System Branch (ICSB) of the Office of Nuclear Reactor Regulations reviewed this GE comment and did not concur with their rationale. The ICSB based their conclusion on the fact that the instrumentation for the containment isolation system should satisfy the acceptance criteria for engineered safety features actuation systems and essential auxiliary support systems. The indication circuits being part of the containment isolation system (an engineered safety feature) must meet the IEEE-279 requirements, as discussed in SRP 7.3. Therefore no revision to the regulatory guide is thought necessary as a result of this comment.

VALUE/IMPACT STATEMENT

I. The Proposed Action

A. Description - The proposed action will provide guidance to applicants in meeting the minimum requirements for containment isolation of fluid systems.

B. Need for the Proposed Action - The SRP gives current staff practices. For this important topic, it would be desirable to issue a regulatory guide in order to afford a wider public review of this topic. A national consensus standard has been developed which could provide the technical basis for this guide.

C. Value/Impact of the Proposed Action

1. NRC operations - Since the guide reflects current licensing practice, no impact on NRC operations is anticipated.

2. Other Government Agencies - Not Applicable.

3. Industry - Same as for NRC operations.

4. Public - Not Applicable

D. Decision on the Proposed Action

Guidance should be furnished on containment isolation of fluid systems.

II. Technical Approach

A. Technical Alternatives

Since the guide gives the current methods used to meet the regulations, no technical alternatives are now being considered.

B. Discussion and Comparison of Technical Alternatives

Not Applicable

C. Discussion of Technical Approach

Not Applicable

III. Procedural Approach

A. Procedural Alternatives

Potential SD procedures that may be used to promulgate the proposed action and technical approach include the following:

- Regulation
- Preparation or Revision of Reg. Guide
- ANSI Standard, endorsed by a Reg. Guide
- NUREG Report
- Branch Position

B. Value/Impact of Procedural Alternatives

The endorsement of the standard is the most efficient alternative since it requires the least amount of time and effort to accomplish the task.

December 13, 1978.

Letter to: Accession Unit  
Room 050  
Phillips Building

From: J. Norberg, EMSB

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Subject: Ltr. to Glen G. Sherwood, Mgr. Safety &  
Licensing Operation, GE, concerning his  
comments on R. G. 1.141, "Containment  
Isolation Provisions for Fluid Systems"

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