AMERICAN NATIONAL STANDARD

REACTOR PLANTS AND THEIR MAINTENANCE

Self-Operated and Power-Operated Safety-Related Valves Functional Specification Standard

ANSI N278.1 - 1975

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PLEASE SEE ASME MANUAL AS-11

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This standard was approved by the American National Standards Committee N45 and its Secretariat, and it was subsequently approved and designated N278.1–1975 by the American National Standards Institute on September 18, 1975.

FOREWORD

(This foreword is not part of American National Standard Self-operated and Power-operated Safety-Related Valves Functional Specification Standard)

This standard is one of a series of power plant equipment standards provided to assure that safety-related equipment will function as specified. The standard was developed under sponsorship of the American Society of Mechanical Engineers (ASME) as an effort by the American National Standards Committee N45 on Reactor Plants and Their Maintenance. This committee has been chartered to promote the development of standards for the location, design, construction, and maintenance of nuclear reactors and plants embodying nuclear reactors, including equipment, methods, and components specifically for this purpose.

In October of 1972, the N45 Committee of ANSI established a task force to prepare a series of standards to assure that safety-related valves would function as specified. This standard provides for the specification of the required functional characteristics of these valves. Utilization of this standard will provide assurance that the functional requirements of valves are fully described so that valves can be designed to provide safe, reliable operation for all foreseeable conditions including preoperational tests and extreme limits of plant design conditions.

Suggestions for improvement gained in the use of this standard will be welcomed. They should be sent to the secretary, American National Standards Committee N45, The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, New York 10017.

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*Effective November 1973
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H. Lichtenberger, Combustion Engineering, Incorporated, Windsor, Connecticut

I. H. Mandil, MPR Associates, Incorporated, Washington, D.C.

Donald Vanderburg, Yankee Atomic Electric Company, Westboro, Maryland

The Task Force responsible for this standard included the following personnel during its development:

Name of Representative	Organization Represented
W. A. Bush, Chairman	Oak Ridge National Laboratory
P. R. Burroughs	Atomic Energy of Canada Limited
F. Clemenson	Atomic Energy Commission
G. A. Jolley	Henry Vogt Machine Company
G. W. Knieser	Anchor/Darling Valve Company
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FUNCTIONAL SPECIFICATION STANDARD

1 SCOPE

This standard establishes requirements for functional specification for safety-related self-operated and power-operated valves for applications in a nuclear power plant.

2 DESIGN SPECIFICATION RELATIONSHIP

This standard provides detailed definition of functional requirements that supplements piping and valve codes and standards applicable to valves in safety-related piping systems whose safety-related function is to open, close, or regulate fluid flow. The requirements of this standard may be provided as part of the Valve Design Specification or as a separate document. Compliance with the requirements of this standard is intended to assure that the operating conditions and safety-related functions of the valve have been adequately defined, permitting valve and actuator manufacturers to identify designs of products and materials to be used in the manufacture of those products that will be adequate for the service.

3 FUNCTIONAL SPECIFICATION

It is the responsibility of the Owner who intends a valve to be in compliance with this standard to provide or cause to be provided a Functional Specification which identifies the safety-related function of the valve and provides for the delineation of the following.

a. Structural Requirements, see Section 3.2
b. Operational Requirements, see Section 3.3
c. Seat Leakage Limits, see Section 3.4
d. Pressure Relief Valve Characteristics, see Section 3.5
e. Special Material Requirements, see Section 3.6
f. Installation Requirements, see Section 3.7
g. Maintenance Requirements, see Section 3.8

3.1 Valve Application Characteristics

The application characteristics of each valve shall be identified by listing whichever of the following descriptive terms are appropriate.

a. Power-operated
b. Self-operated
c. Pressure relief
d. Frequent use
e. Infrequent use
f. Low leakage
g. Nominal leakage
h. Normally open
i. Normally closed

3.1.1 *Frequent use* is defined as requiring functional operation, including exercising and testing, in excess of 500 times over the life of the valve.

3.1.2 *Low leakage* is defined as valves in which the Manufacturer's main seat leakage acceptance test limit is 2 cubic centimeters of water per hour per inch of diameter of nominal valve size.

3.1.3 *Nominal leakage* is defined as valves in which the Manufacturer's main seat leakage acceptance test limit is 10 cubic centimeters of water per hour per inch of diameter of nominal valve size.

3.1.4 The leakage definitions described above are not applicable to those flow-control valves which are not intended to also serve as isolation or stop valves.

3.2 Structural Requirements

The following information shall be specified.

a. The design pressure and temperature.
b. The normal operating pressure and temperature.
c. The flow capacity at a stated pressure differential.
d. Time-temperature data for significant thermal transients, with number of cycles (see ASME Boiler and Pressure Vessel Code, Section III NB 3500).
e. The seismic acceleration and dynamic loadings that the valve assembly shall be capable of withstanding without loss of functional capability.
f. Loadings from structural supports and restraints acting directly on valve, if any.
g. Fundamental frequency of valve assembly.