ARTICLE NE-7000
OVERPRESSURE PROTECTION

NE-7100 GENERAL REQUIREMENTS

NE-7110 SCOPE

(a) A containment vessel shall be protected from the consequence arising from the application of conditions of pressure and coincident temperature that would cause the Service or Test Limits specified in the Design Specification to be exceeded. Pressure relief or vacuum relief devices are not required where the Service or Test Limits specified in the Design Specification are not exceeded.

(b) Pressure relief devices not permanently installed in accordance with NE-7141 shall be removed from the containment vessel before placing the vessel in service.

(c) It is recognized that the fundamental purpose of a containment vessel may be nullified by the incorporation of pressure relief valves discharging directly into the environment. Vacuum relief devices or systems, including venting with controlled discharge or condensation systems, may be essential to protect against differential pressures in excess of design external pressures.

NE-7111 General Definitions

(a) Overpressure, as used in this Article, refers to changes in differential pressure resulting from thermal imbalances and similar phenomena capable of causing a differential pressure change of sufficient duration to be compatible with the dynamic response characteristics of the pressure relief devices listed in this Article.

(b) The basic definitions of pressure relief devices as specified in this Article are given in ASME PTC 25, Safety and Relief Valves.

(c) Primary Pressure is the pressure of the fluid at the inlet of the pressure relief device.

(d) Secondary Pressure is that value of pressure existing in the passage between the actual discharge area and the outlet for which the discharge system of the pressure relief devices shall be designed.

NE-7120 INTEGRATED OVERPRESSURE PROTECTION

Overpressure protection of the components shall be provided by one of the following methods as an integrated overpressure protection:

(a) the use of vacuum relief or pressure relief devices, or both, and their associated pressure-sensing elements; or

(b) a component designed not to exceed Service Limits specified in the Design Specification (pressure relief devices are not required on containment vessels designed and built to safely contain all radioactive substances that may be released into the containment atmosphere).

NE-7130 PROVISIONS FOR CHECKING
OPERATION OF PRESSURE RELIEF DEVICES

NE-7131 Design Provisions

Relief devices shall be designed so that potential impairment of the overpressure protection function from service exposure to fluids can be determined by test or examination.

NE-7132 Construction Provisions

Relief devices shall be constructed and installed so that their correct operation and the reliability of their associated pressure-sensing elements under service or test conditions can be demonstrated, as may be required by regulatory and enforcement authorities having jurisdiction at the nuclear power plant site.

NE-7140 INSTALLATION PROVISIONS

NE-7141 Installation of Relief Devices

(a) The connection between a component and its pressure relief valve shall have a minimum inside diameter equal to or greater than the nominal size of the pressure relief valve inlet. The opening in the connection shall be designed to provide direct and unobstructed flow between the component and its pressure relief valve. Pressure drop resulting from the accumulated line losses between the protected component and the relief valve shall be compatible with the valve performance characteristic.

(b) Spring-loaded pressure relief valves should normally be installed in the upright position with the spindle vertical. Where space or piping configuration precludes such an installation, the valve may be installed in other than the vertical position, provided the following conditions are met:

(1) the valve design is confirmed by the NV Certificate Holder with documentation as being satisfactory for such position; and

(2) the valve has been pressure tested in the same position as the installation.
(b) The certified capacity associated with each set pressure shall not exceed 90% of the average capacity established by the tests. Failure of the individual test capacities to fall within ±5% of the average capacity associated with each set pressure shall be cause for rejection of the test. The reason for the failure shall be determined and the test repeated.

(c) Should additional valves of the same design be constructed at a later date, the results of the tests on the original valve may be included as applicable to the particular test method selected.

**NE-7725.2 Valve Capacity in Excess of Test Facility Limits.**

(a) For valves whose capacity exceeds that of the test facility, the certified capacity may be based on a flow coefficient $K$ (NE-7724.2) determined from either blocked open flow tests or flow model tests, provided the orifice area is such that choked flow conditions are obtained. The certified capacity shall be calculated as directed in NE-7724.3.

(b) The proper operation of the valve shall be demonstrated as prescribed in NE-7722.2.

**NE-7726 Proration of Capacity**

(a) The capacity of a pressure relief valve applied to a system may be prorated to an overpressure greater than the overpressure for which the valve design is certified. This overpressure shall be within the allowable limits of the system.

(b) Depending on the method used for the initial capacity certification:

1. The prorated capacity shall be 90% of the average slope determined in NE-7723 multiplied by the prorated relieving pressure (psia), or;

2. The prorated capacity shall be calculated using the appropriate equation from NE-7724.2 (where $P$ is the prorated relieving pressure (psia) multiplied by the coefficient $K$).

**NE-7727 Laboratory Acceptance of Pressure-Relieving Capacity Tests**

Tests shall be conducted at a place where the testing facilities, methods, procedures, and person supervising the tests (Authorized Observer) meet the applicable requirements of ASME PTC 25, Safety and Relief Valves. The tests shall be made under the supervision of, and certified by, an Authorized Observer. The testing facilities, methods, procedures, and qualifications of the Authorized Observer shall be subject to the acceptance of the ASME Boiler and Pressure Vessel Committee on recommendation from a representative from an ASME designated organization. Acceptance of the testing facility is subject to review within each 5 year period. Capacity test data shall be submitted to the ASME designated organization for review and acceptance.

**NE-7730 CAPACITY CERTIFICATION OF VACUUM RELIEF VALVES**

**NE-7731 General Requirements**

**NE-7731.1 Capacity Certification.** Capacity certification procedures shall be as required in NE-7732 through NE-7735.

**NE-7731.2 Test Media.** Capacity certification tests for vacuum relief valves for air and gas service shall be conducted with dry steam, air, or gas. For steam test purposes the limits of 98% minimum quality and 20°F (11°C) maximum superheat shall apply. Capacity shall be corrected to dry saturated condition from these limits.

**NE-7731.3 Test Method and Pressure.** Capacity tests may be conducted by pressurizing the valve instead of using a vacuum, provided the inlet conditions of the valve (not the vessel) are known and the inlet pressure is not greater than 5 psi (35 kPa), and the direction of flow through the valve is the same on pressure as is experienced on vacuum. Tests shall be conducted at twice the set pressure.

**NE-7731.4 Blowdown.** Blowdown shall be recorded at the time of the test.

**NE-7731.5 Drawings.** Prior to a test, the Certificate Holder shall submit drawings showing the valve construction to the Authorized Observer. The Authorized Observer shall submit the drawings and test results to the ASME designated organization for review and acceptance.

**NE-7731.6 Design Change.** When changes are made in the design of a pressure relief valve in such a manner as to affect the flow path, lift, or performance characteristics of the valve, new tests in accordance with this Article shall be performed.

**NE-7732 Single Valve Method**

(a) Where a single valve at a single pressure is to be capacity tested, the capacity rating may be based on three separate and distinct tests of the single valve at the specified set pressure. The certified capacity rating of the valve shall not exceed 90% of the average capacity established by the tests. Failure of the individual test capacities to fall within ±5% of the average capacity shall be cause for rejection of the test. The reason for the failure shall be determined and the test repeated.

(b) Should additional valves of the same design be constructed at a later date, the results of the test on the original valve may be included as applicable to the particular test method selected.

**NE-7733 Slope Method**

Four valves of each combination of pipe size and orifice size shall be tested. These four valves shall be set at pressures which cover the appropriate range of pressures for which the valves are to be used or set within the range of...