



U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
 OFFICE OF NUCLEAR REACTOR REGULATION

SECTION 3.9.6

INSERVICE TESTING OF PUMPS AND VALVES

REVIEW RESPONSIBILITIES

Primary - Mechanical Engineering Branch (MEB)

Secondary - Reactor Systems Branch (RSB)

1. AREAS OF REVIEW

The MEB reviews the following areas of the applicant's safety analysis report (SAR) that cover the inservice testing of pumps and valves designated as Class 1, 2, or 3 under the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (hereafter "the Code"), Section III:

1. Inservice Testing of Pumps

- a. The descriptive information in the SAR covering the inservice test program for all Code Class 1, 2, and 3 system pumps is reviewed. The Reactor Systems Branch verifies the code class designations for each listed pump and the completeness of the list.
- b. Reference values for testing for speed, pressure, flow rate, vibration, and bearing temperature at normal pump operating conditions are reviewed.
- c. The pump test schedule, included in the plant technical specifications, is reviewed.
- d. The methods described in the SAR for measuring the reference values and inservice values for the pump parameters listed in I.1.b above are reviewed.

2. Inservice Testing of Valves

- a. The descriptive information in the SAR covering the inservice test program of all Code Class 1, 2, and 3 valves is reviewed. This review does not include those valves defined in IWR-1300 of Section XI of the Code. The Reactor Systems Branch verifies the code class designations for each listed valve and the completeness of the list.
- b. The SAR test program, which includes preservice tests, valve replacement, valve repair and maintenance, indication of valve position, and inservice tests for all valve categories, is reviewed.

 USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to Revision 2 of the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

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II. ACCEPTANCE CRITERIA

The acceptance criteria for the areas of review, described in I of this plan are as follows:

1. Inservice Testing of Pumps

- a. The scope of the applicant's test program is acceptable if it is in agreement with IWP-1000 of Section XI of the Code. Since the pump test program is based on the detection of changes in the hydraulic and mechanical condition of a pump relative to a reference test specified in IWP-3000, the establishment of a reference set of parameters and a consistent test method is a basic criterion of the program.
- b. The pump test program is acceptable if it meets the requirements for establishing reference values and the periodic testing schedule of IWP-3000 of Section XI of the Code. The allowable ranges of inservice test quantities, corrective actions, and bearing temperature tests are established by IWP-3200 and IWP-4300. The pump test schedule in the plant technical specifications is required to comply with these rules.
- c. The test frequencies and durations in the plant technical specifications are acceptable if the provisions of IWP-3300 and IWP-3400 of Section XI of the Code are met. If a pump is normally operated more frequently than once a month, and at the reference conditions, it need not be specially tested. Otherwise, pumps must be tested each month during plant operation, and during shutdown periods if practical. The pumps must be run for at least five minutes under conditions as stable as the system permits. Bearing temperatures must be measured once a year for the duration specified in IWP-3410.
- d. The methods of measurement are acceptable if the test program meets the requirements of IWP-4100, 4200, 4300, 4400, and 4500 of Section XI of the Code with regard to instruments, pressure measurements, temperature measurements, rotational speed, and vibration measurements.

2. Inservice Testing of Valves

- a. To be acceptable, the SAR valve test list must contain all Code Class 1, 2, and 3 valves except those used for operating convenience only, such as manual vent, drain, and test valves, and valves used for maintenance only. The SAR valve list must include a valve categorization which complies with the provisions of IWP-2110 of Section XI of the Code. Each specific valve to be tested by the rules of Subsection IWP is listed in the SAR by type, valve identification number, code class, and IWP-2110 valve category.
- b. The valve test procedures in the plant technical specifications are acceptable if the provisions of IWP-3000 of Section XI of the Code are met with regard to pre-service and periodic inservice valve testing.

III. REVIEW PROCEDURES

The reviewer will select and emphasize material from the procedures described below as may be appropriate for a particular case. For each area of review, the following review procedures are followed:

1. Inservice Testing of Pumps

- a. The scope of the applicant's program is reviewed for agreement with II.1.a of this plan. The program is acceptable if a preservice test program is used to establish reference values. The periodic inservice program must verify the reference values within acceptable limits.
- b. The pump test program procedures must agree with the requirements of II.1.b of this plan. The applicant must justify any exception to II.1.b. The program is best presented in tabular form in the plant technical specifications.
- c. The inservice test frequencies and test durations in the plant technical specifications are reviewed for agreement with II.1.c of this plan.
- d. The test results described in the SAR are reviewed for agreement with II.1.d of this plan. The SAR need only provide the necessary information to permit a conclusion that the methods of measurement and the data acquisition system will provide the needed data. The reviewer does not approve or disapprove the instruments or methods proposed or used.

2. Inservice Testing of Valves

- a. The SAR valve test list and valve category description are reviewed for agreement with II.2.a of this plan.
- b. The valve test program is acceptable if the procedures follow the rules of Section II.2.b of this plan for preservice and periodic inservice testing.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information is provided in accordance with the requirements of this review plan and that his evaluation supports conclusions of the following type, to be included in the staff's safety evaluation report:

"To ensure that all ASME Code Class 1, 2, and 3 pumps and valves will be in a state of operational readiness to perform necessary safety functions throughout the life of the plant, a test program is provided which includes baseline preservice testing and periodic inservice testing. The program provides for both functional testing of the components in the operating state and for visual inspection for leaks and other signs of distress.

"The applicant has stated that the inservice test program for all Code Class 1, 2, and 3 pumps and valves meets the requirements of the ASME Code, Section XI, Subsections IWP and IWV, respectively.

"Compliance with these code requirements constitutes an acceptable basis for satisfying the applicable portions of General Design Criteria 37, 40, 43, and 46."

V. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 37, "Testing of Emergency Core Cooling System."

2. 10 CFR Part 50, Appendix A, General Design Criterion 40, "Testing of Containment Heat Removal System."
3. 10 CFR Part 50, Appendix A, General Design Criterion 43, "Testing of Containment Atmosphere Cleanup Systems."
4. 10 CFR Part 50, Appendix A, General Design Criterion 46, "Testing of Cooling Water System."
5. ASME Boiler and Pressure Vessel Code, Section III and Section XI, Subsections IWP and IWV, American Society of Mechanical Engineers.

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