ATTACHMENT 65001.07
INSPECTION OF ITAAC-RELATED INSTALLATION OF VALVES

PROGRAM APPLICABILITY: 2503

65001.07-01 INSPECTION OBJECTIVE

01.01 To verify that the design bases and vendor design information are correctly translated into the installation of the valve.

01.02 To determine whether the valve installation and related licensee quality control activities are being performed in accordance with Design Control Document (DCD), design specifications, Code requirements, procedures, and regulatory requirements.

01.03 To determine whether the technical requirements in the facility Safety Analysis Report (SAR) associated with safety-related valve testing have been adequately translated to the construction specifications, drawings, and work procedures as evidenced by the installed results, and the related quality assurance activities are being performed in accordance with design specifications, Code requirements, procedures, and regulatory requirements.

01.04 To determine whether valve installation welding is being conducted in accordance with the DCD, design specifications, American Society of Mechanical Engineers (ASME) Code requirements, and procedures.

01.05 To confirm proper setup of switches for the actuators for power-operated valves to verify that the valves are capable of performing their safety functions under design-basis conditions.

01.06 To determine, through independent observation and evaluation, that the safety-related valve general records, welding records, and the test and verification records reflect that work was accomplished in accordance with the design specifications, Code requirements, and procedures. Also to evaluate whether the records for the valves indicate any other potential weaknesses such as generic problems or management control inadequacies that could have safety significance.

01.07 To evaluate the adequacy of the implementation of the quality assurance program requirements related to installation activities and assure problems are entered into the corrective action process.

65001.07-02 INSPECTION REQUIREMENTS AND GUIDANCE

The scope of this procedure includes most valves, regardless of the type of operator (e.g., motor, hydraulic, air, squib, self actuating, etc.), as a separate category of mechanical components because of the unique nature in which they are described in the ITAAC.

Check valves are included. Those valves related to containment isolation are covered in IP 65001.11, "Containment Integrity and Penetrations."

NUREG-0800, Standard Review Plan, Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applications," and ASME Boiler and Pressure Vessel Code (BPVC) Section III, NQA-1 "Quality Assurance Requirements for Nuclear Facility Operations" provide guidance concerning all phases of this procedure. The ASME Code for Operation and Maintenance of Nuclear Power Plants also includes requirements for safety-related valves. The NRC regulations in Section 55a of 10 CFR Part 50 incorporate by reference the ASME BPVC and Operations and Maintenance (OM) Code with specific limitations and modifications.

The regulatory basis for safety-related valves is found in 10 CFR 50, Appendix B; for example, Criterion III, Design Control, Criterion IV, Procurement Document Control, and Criterion XI, Test Control. In addition, the ASME BPVC, Section III, Parts NB, NC, and ND, and the ASME OM Code contain requirements for fabrication, installation, testing and certifying capacities, and tagging the safety-related valves.

The requirements apply to both installed and on the shelf safety-related valves and risk significant valves. The ASME BPVC Code and OM Code contains detailed information on testing and tagging the valves.

02.01 General Installation. Select a sufficient number of valves and components, to include all targeted valve ITAACs, covering general installation requirements for review. Through direct inspection, confirm that the following attributes, as applicable, have been met:

Valve Installation

a. Installation requirements for valves include: proper location or placement; quantity; valve and actuator orientation; alignment; material type/shape/size; volumetric flow rate; flow direction; special features such as coatings and insulation; seismic and other mounting and support requirements; torquing of bolts; proper lubrication for each valve and actuator (including stem, gearbox, and limit switch, as applicable); and compliance with tolerance/clearance requirements.

b. All packaging material is removed at the time of installation in accordance with the installation procedure. Once the safety and pressure relief valves are installed, the valve gags should not be used to keep the valve from opening. Verify that all foreign matter is removed and is excluded from re-entering the valve and its operator. Verify that the method of protection and or exclusion is in accordance with the manufacturer’s guidance. Remove caps from grease reliefs for actuators on motor-operated valves.

c. Precautions to prevent valve damage during placement and mounting are used.

d. Availability and utilization of specially trained personnel and special tools or equipment which conform to the manufacturer's instructions.

e. Correct drawings and work procedures are available to installers. Installation requirements, construction drawings, specifications, and work procedures are of the latest issue.

f. Hold points are observed and quality inspections are properly conducted, in accordance with standards and procedures.

g. Heavy loads, lifting, and rigging are in accordance with procedures and requirements.

h. Preparation, installation, and inspection records meet quality program requirements.

i. Field changes for the work being observed have been processed in accordance with the program requirements.

j. Design features to prevent potential pressure locking and thermal binding of safety-related power-operated gate valves are satisfied as appropriate for the valve application and performance.

k. Design requirements for environmental qualification of valves and their actuators are satisfied. For example, motors used on motor-operated valves must be appropriately designed with moisture relief T-drains as applicable to their environmental application.

Guidance: This inspection should be performed as often as significant valve installation activities are taking place, but no less than every six months during the component installation construction period, which is expected to be about 30 months.

While generic QA implementation such as receiving inspections, component storage, and records storage are inspected separately, the inspector should remain mindful of any problems that reflect on performance in these areas and report these to appropriate NRC personnel. The inspector should pay particular attention to the traceability of material and equipment to prevent the use of incorrect materials and parts. The inspector should ensure that required identification of the valve is maintained by vendor tags or other appropriate means, either on the valve or on records traceable to the valve, as required, and that required markings are on the valve. The valves shall conform, as required, to the procurement drawings and specifications and to the applicable codes. Some specific areas to inspect are as follows:

a. Verify that the code plate required by the ASME Boiler and Pressure Vessel Code, Section III, Part NB 7000, on the pressurizer safety valves contains a pressure and temperature rating greater than or equal to the system set-pressure. Verify that the sum of the rated capacities recorded on the safety valve ASME Code plates exceeds the max generation rate plus a safety factor.

b. During a walk-down, inspect the elevation of the Automatic Depressurization

System stage 4 valve discharge to verify that the minimum elevation of the bottom inside surface of the outlet conforms to the level indicated on the design drawings. Verify that the isometric drawings show the same elevation. Verify that the discharge of the stage 4 valves is directed into the steam generator compartments.

c. Verify that the passive core cooling system's accumulator discharge check valves and core makeup tank discharge check valves are a different check valve type and are different from each other by reviewing the data on the vendor tags on the valves. While walking down the system, ensure that the valves are installed in the correct direction.

Field observations can include independent measurement/observation or observation of licensee/contractor inspections of the valves. While all attributes do not need to be reviewed for each sample, the majority should be reviewed and samples/attributes reviewed should include all facets of installation activities.

Records should document status of the installed valves and confirm that required inspections have been performed by qualified personnel. They should also confirm that all installation requirements and ITAAC requirements have been met. The records should be properly stored in accordance with quality assurance requirements.

Typical problems which can occur in this area include, but are not limited to:

a. Inadequate or unclear guidance for installers and inspectors.

b. Use of inadequate/ uncalibrated tools for installation and measurement.

c. Weak management/coordination resulting in skipped hold points or other errors in installation.

d. Record retrieval/storage problems.

e. Incorrect orientation of valve or actuator. For example, gate valves should have their valve stems in a vertical orientation because of the potential for excessive valve disc drag if stem is in a horizontal orientation. Motors and limit switch compartments for motor-operated valves should not be oriented below the actuator gearbox because of the potential for grease leakage into the motor or switch compartment.

f. Improper switch settings for valve actuators that can lead the valve being incapable of performing its safety function or damaging the valve.

Squib Valves

a. Verify squib valve to be installed is consistent with design requirements and specific application.

b. Verify that squib actuator design has been qualified for its application.

c. Verify that the squib valve orientation is proper for the flow direction.

d. Verify that electrical wiring is consistent with design requirements, and continuity of actuation circuitry with control room is established.

Guidance.

Squib valves are designed to remain closed and leaktight until necessary to perform their safety function. Upon receiving an electrical signal to perform its safety function, the squib valve actuator initiates an explosive charge to open the valve and allow unrestricted fluid flow through pipeline. Squib valves cannot be reclosed and must be replaced following their opening.

On a sample basis, the inspector should verify that the squib valve being installed satisfies the design specification for the particular application. There are different sizes and types of squib valves that could be used at an individual nuclear power plant. Each squib valve design must be qualified to perform the safety function for which the squib valve is intended. The inspector should verify that the squib valve being installed has been qualified for its intended application. The squib valve must be installed so that the flow path is not blocked by valve internal parts following actuation. The inspector should verify that the orientation of the squib valve is appropriate for the direction of fluid flow upon actuation. The squib valve must have proper electrical connections to ensure actuation when required to perform its safety function. The inspector should verify that the electrical connections are consistent with the design drawings and that continuity of the actuation circuitry is established with the control room. Alarm circuitry should also be in place in the event that continuity is lost. Proper operation of the squib valve position indication should be manually tested with confirmation from the control room.

02.02 Component Welding. If welding is required for valve installation, select a sufficient sample of welds to review so that the inspection objectives will be demonstrated. Confirm the attributes listed in IP 65001.B “Welding,” have been met.

Guidance. This inspection should be coordinated with IP 65001.B “Welding” and IMC 2504 guidance. Sample size will be dependent on guidance from these procedures and the targeted ITAAC set.

The inspector should determine what specific acceptance criteria are established and select those for observation that are best confirmed through observation. Others should be confirmed through record/data review. The inspector should try to focus on those testing activities related to the more safety significant valves.

The samples should include sufficient variety to assure the different welding processes and material combinations are observed for each sub-contractor, group or division performing ITAAC-related welding. This scope applies to both observations and record reviews. A variety of non-destructive examination processes should also be included in the inspection sample.

Records should provide traceability to all aspects of the welding activity including weld procedures used, welders, material certifications, inspections performed and their results, inspectors, and qualification records for procedures and personnel. These records, including radiographs, should be retained and stored in accordance with QA requirements. If welding is required for valve installation (other than pipe welding), select one or two welds for a minimum of five of the valves for review. Through direct observations and/or record reviews, confirm the attributes listed in IP 65001.B "Welding," as applicable, have been met.

02.03 Post Installation Activities. Select a sufficient number of valves and components, to include all targeted valve ITAACs, but concentrating on the more significant ITAAC-related components previously selected for Section 02.01. Do not limit the sample to those previously selected. Through direct inspection, confirm these valves are properly protected and maintained considering the following attributes, as applicable:

a. Licensee surveillance activities are being performed.

b. Protection is provided from adverse conditions, such as: protection against adverse temperature, humidity, flooding, and foreign materials such as dirt, dust, bottles, cans, and general debris.

c. Lubrication, rotation, and electrical resistance checks are being performed. Verify that proper lubricant is used for valve stems, gearboxes, and limit switches, as applicable. Stem lubrication procedure for motor-operated valves should provide for removal of old lubricant and replacement with new lubricant over the entire stem, including the stem nut area.

d. Valve status records are maintained.

e. Stamps, tags, markings, etc. are in use to prevent the oversight of required inspections, completion of tests, or acceptance. Methods of prevention of inadvertent operation are maintained.

f. Periodic continuity checks for the squib valve initiator, actuator internals inspections, and valve position indication are performed. Valve manufacturer maintenance recommendations are being implemented. Squib valve initiator and booster assembly replacement program is established to ensure that qualified life for explosive charge is maintained with removal and installation of replacement assemblies at proper time intervals.

Guidance: Post-installation activities should be observed often enough throughout the construction period to support a conclusion that the valves are properly serviced and

managed until final turnover from construction management to operations management.

The actuators for squib valves include explosive charges that have a limited qualified life. The squib valve initiator and booster assembly must be periodically replaced to ensure that the explosive charge will be available to perform its safety function to open the valve upon initiation of a safety signal. The inspector should verify that the squib valve initiator and booster assembly replacement program is being implemented to ensure that the assemblies remain capable of performing their safety functions. The inspector should verify that the procurement program maintains an adequate supply of squib valve initiator and booster assemblies for the replacement program.

02.04 Testing and Verification. Select a sufficient number of valve ITAAC-related testing and verification activities to assure testing and verification are conducted in accordance with established procedures and acceptance criteria have been met.

Inspection requirements include:

a. Verify proper test and verification activity and frequency in accordance with post-installation, pre-service, or inservice test program, as applicable.

b. Verify use of appropriately signed and dated test and verification procedures for valve testing and verification.

c. Verify calibration of test equipment.

d. Verify qualification of test and other personnel participating in testing and verification activities.

e. Confirm safety of personnel and equipment during test and verification activities.

f. Verify that preconditioning of valve performance is not specifically or inadvertently occurring in preparation for the test and verification activity.

g. Review licensee evaluation of test data and verification results in comparison to acceptance criteria.

h. Review corrective action in response to test data and verification results that do not satisfy acceptance criteria.

Guidance: This inspection should be coordinated with IP 65001.C “Construction Testing,” IP 65001.D “Operational Testing’” and IMC 2504 guidance. Sample size will be dependent on guidance from these procedures and the targeted ITAAC set.

The inspector should determine what specific acceptance criteria are established and select those for observation that are best confirmed through direct observation. Others should be confirmed through record/data review.

A sample of some of the valves to be reviewed is as follows:

a. The pressurizer safety valves provide over-pressure protection in accordance with Section III of the ASME Boiler & Pressure Vessel Code. Verify that testing and analysis was conducted in accordance with the ASME Code, Section III, to verify the valve set pressure. Review the paperwork that came from the vendor and was shipped with the valves. Verify that a set pressure test was conducted that verified that the set pressure was correctly set.

b. Exercise testing of the check valves with active safety function will be performed under pre-operational test pressure, temperature, and fluid flow conditions. Each check valve shall change positions as required by specifications and procedures.

c. Licensees must perform post-installation testing, preservice testing, and inservice testing for the safety-related power-operated valves. Post-installation tests confirm that the power-operated valve is operating consistent with the functional design and qualification for the valve and its actuator. Preservice tests establish baseline reference performance of the valve and its actuator. Inservice tests provide for the assessment of operational readiness of the power-operated valve to perform its safety function. The licensee must demonstrate that the power-operated valve is capable of performing its safety function under design-basis conditions through the functional design and qualification program, and flow tests following installation of the power-operated valve. IP73756.52 provides inspection guidance for evaluating the functional design, qualification, and inservice testing program for pumps, valves, and dynamic restraints. In addition, testing of the as-installed motor operated valves will be performed under pre-operational flow, differential pressure, and temperatures conditions. Verify that a test report exists which concludes that each valve changes position under design conditions. After loss of power, the remotely operated valves assume the indicated loss of motive power position. Verify that testing of these installed valves is performed under the conditions of loss of motive power.

d. The automatic depressurization valves perform an active safety-related function to change position. Tests will be performed that demonstrate the valve to operate under design conditions. Verify that a test report exists which concludes that each motor operated valve changes position under design conditions.

e. Qualification reports should be available for each squib valve design to be used at the nuclear power plant. The inspector should review those qualification reports and verify that conditions and recommendations of those reports have been addressed by the licensee. If squib valves cannot be tested in situ because of potential damage to the valve or piping, the licensee should implement a laboratory program to test the squib valve initiator and booster assembly following its removal to confirm that the replacement frequency is appropriate. The licensee should establish a corrective action process to expand the scope of removal of squib valve initiator and booster assemblies if a tested assembly fails to operate properly. Tests of squib valves will be performed that demonstrate the capability of the valve to operate under its design conditions. Testing and verification of squib valves should include initiator continuity checks, and removal of actuator internal

subassemblies for visual inspection and manual confirmation of smooth operation. The squib valve position indication should be manually tested with confirmation from the control room. Verify that a test report exists which concludes that each squib valve changes position under design conditions.

f. The Reactor Coolant System provides automatic depressurization during design basis events. Tests and analyses should be performed to determine the effective flow area through each stage 1, 2, 3 ADS valves. Verify a report exists which concludes that the effective flow area through each stage ADS valves are greater than or equal to the minimum area specified in the design documents.

02.05 Problem Identification and Resolution. The inspector should confirm that problems identified during the inspection are entered into the licensee/constructor corrective action program in accordance with program requirements. The inspector may review licensee actions to address similar or related problems that were previously identified, in order to check the extent of condition and confirm the effectiveness of the licensee's corrective measures.

Guidance: This inspection is to assure that problems are entered into the applicable process to assure corrective actions appropriate to the circumstances are developed and prioritized. Inspections of Quality Assurance Program implementation, effectiveness of Problem Identification and Resolution, and Self-Assessment will be performed under the IMC 2504 process.

65001.07-03 RESOURCE ESTIMATE

Inspection resources necessary to complete this inspection procedure are estimated to be 1040 hours of direct inspection effort over the course of plant construction.

65001.07-04 REFERENCES

NUREG-0800, Standard Review Plan, Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applications,"

ASME BPVC Section III, NQA-1 "Quality Assurance Requirements for Nuclear Facility Operations".

10 CFR 50, Appendix B, Criteria III, Design Control, Criteria IV, Procurement Document Control, and XI, Test Control.

ASME Boiler and Pressure Vessel Code, Section III, Parts NB, NC, and ND.

ASME Code for Operation and Maintenance of Nuclear Power Plants.

Attachment 1: Revision History for IP 65001.07

Attachment 1

Revision History For IP 65001.07

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	07/29/08 CN 08-021	Researched commitments for 4 years and found none. Initial issuance to support ITAAC related inspections under 10CFR52.	N/A	N/A	N/A