



# **NRC Perspective – Historical Evolution of Code Requirements For Check Valve Testing**

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## Discussion

- 10 CFR 50.55a Rulemaking
- Evolution of ASME OM Code & Check Valve Test Requirements for Inservice Testing of Light-Water Reactor Power Plants

## **10 CFR 50.55a Rulemaking**

- Currently reviewing ASME OM Code 2009 Edition, 2011 Addenda, and 2012 Edition for next rule making
- Scheduled to be published and issued for public comment August 2015
- NRC staff plans to add a condition endorsing the use of Code Case OMN-20, “Inservice Test Frequency”, without requiring NRC approval
- Final rulemaking scheduled to be published August 2016

## **Code Requirement History**

- 1880 – American Society of Mechanical Engineers (ASME) was founded to provide a setting for engineers concerned by the rise of industrialization and mechanization which was mainly powered by steam
- 1884 – The first Boiler Testing Code established
- 1905 – Grover Shoe Factory Disaster in Brockton, Massachusetts - boiler explosion resulted in 58 deaths and 117 injuries
- 1905 – Massachusetts established a 5 man “Board of Boiler Rules” whose charter was to write a boiler law for the state
- 1908 – First set of Boiler Laws was published

## **Code Requirement History**

- 1911 – ASME established a committee for the purpose of formulating standard rules for the construction of steam boilers and other pressure vessels
- 1915 – Boiler & Pressure Vessel Code (BPVC) published
- 1954 – Atomic Energy Act declared that atomic energy may be used for free competition in private enterprise
- 1956 - Committee established for ASME Pressure Vessel Code for Nuclear Age
- 1963 - Proposed Section III (Nuclear Power) of ASME Boiler and Pressure Vessel Committee
- 1968 - Proposed Performance Test Code for Nuclear Reactor Fuel

## **Code Requirement History**

- 1970 – Atomic Energy Commission (AEC) & Industry develop draft standard for Inservice Testing (IST) of pumps and valves
- 1971 – ASME approved draft standard to be included in ASME Code Section XI as subsection IWP for pumps and IWV for valves
- 1971 – ASME Code Section XI “Rules For Inservice Inspection of Nuclear Reactor Coolant Systems” included by reference into 10 CFR 50.55a
- 1973 – ASME approved IWP & IWV final standard and published in 1973 Summer Addenda of ASME Code Section XI – Check Valves shall be exercised at least once every 3 months

## **Code Requirement History**

- 1974 – ASME Section XI changed title from “Rules For Inservice Inspection of Nuclear Reactor Coolant Systems” to “Rules For Inservice Inspection of Nuclear Power Plant Components”
- 1975 – ASME Operation and Maintenance of Nuclear Power Plants (O&M) committee was formed and took over the review and update of IST of pumps and valves
- 1976 – Testing intervals prior to 1976 were monthly for pumps. Test data showed pump degradation was being accelerated. ASME proposed quarterly testing of pumps.



## **Code Requirement History**

- 1977 – 1974 Edition of ASME Code Section XI was incorporated by reference into 10 CFR 50.55a with implementation requirements:
  - For construction permits (CP) issued prior to 1971 required components meet IST requirements to the extent practical
  - For CPs issued between 1971 to 1974 required that the plant be designed and provided with access to perform Section XI IST requirements in effect 6 months prior to CP issuance
  - For CPs issued after 1974 required that the plant be designed to implement all applicable Section XI IST requirements at the time when the CP was issued
  - IST Program must be updated every 40 months
  - Relief and Alternative Requests allowed

## **Code Requirement History**

- 1979 – NRC concurred with the proposed quarterly test interval as specified in 1979 Winter Addenda to the ASME OM Code
- 1979 – ASME Code Section XI subgroup on pumps and valves were transferred to O&M committee
- 1980 – NRC revised 40 month IST program update to 10 years
- 1984 – A new working group under O&M committee was established to develop and review pump and valve standards

## **Code Requirement History**

- 1987 – ASME/ANSI OM-1987 added testing standards for relief valves, performance testing of cooling systems, vibration testing of piping, snubbers, inservice monitoring of core barrel axial preload
- 1988 – ASME/ANSI Oma-1988 added pumps and valves published as OM Part 6 for pumps and Part 10 for valves
- 1989 – Pump and Valve requirements were deleted from Section XI and moved to ASME/ANSI Oma-1988 Addenda
- 1989 – GL-89-04 “Guidance on Developing Acceptable Inservice Testing Programs” issued due to identified deficiencies and weaknesses in Code testing, Tech Specs, and acceptable alternatives

## **Code Requirement History**

- 1989 – GL 89-04 noted that for full flow testing of Check Valves it may be possible to qualify other techniques to confirm that the valve is exercised to the position required to perform its safety function.
- 1990 – ASME/ANSI OM-1987 & OMA-1988 standards were incorporated into stand alone document ASME OM Code 1990 Edition. Part 6 and Part 10 were incorporated as subsections ISTB and ISTC. Snubbers incorporated as ISTD & relief valve testing incorporated in Appendix I
- 1993 – ASME/ANSI OM-1987 incorporated by reference in 10 CFR 50.55a. 10 CFR 50.55a(f) specifically written for IST of pumps and valves

## **Code Requirement History**

- 1994 – ASME Omc-1994 Addenda adds definition of non-intrusive testing. The Owner has the responsibility that the application, method, and capability of each non-intrusive technique is qualified.
- 1995 – GL 89-04 Supplement 1 issued to notify licensees of NUREG-1482 “Guidelines for Inservice Testing Programs at Nuclear Power Plants”. This document describes historical and current perspectives on the regulatory requirements for inservice testing of pumps and valves.
- 1995 – NRC Inspection Procedure 73756 “Inservice Testing of Pumps and Valves” issued. Public work shop held 7/18/1997 addressing Check Valve testing questions.

## **Code Requirement History**

- 1995 – NRC completed its review of the baseline IST programs for all operating plants
- 1996 – ASME OM Code OMA 1996 Addenda added the following change for check valves:
  - Added bi-directional testing
  - Added Mandatory Appendix II “Check Valve Condition Monitoring Program”

## Code Requirement History

- 2000 – ASME OM Code 1995 Edition/1996 Addenda incorporated by reference 10 CFR 50.55a with limitations:
  - Valve open and close functions must be demonstrated when flow testing or other methods are used (non-intrusive, disassembly and inspect)
  - Initial interval for tests may not exceed 2 fuel cycles or 3 years, whichever is longer, and any extension of this interval may not exceed one fuel cycle per extension with the maximum interval not to exceed ten years; trending and evaluation of existing data must be used to reduce or extend the time interval between tests
  - If Appendix II is discontinued, applicable provisions of subsection ISTC of the OM Code requirements must be re-implemented

## Code Requirement History

- 2000 – IN 2000-21 “Detached Check Valve Disk Not Detected by Use of Acoustic and Magnetic Non-Intrusive Test Techniques” was issued. This information notice emphasized the following:
  - Non-Intrusive Techniques (NIT) used to verify check valve open and close capability must be qualified
  - A “Qualified” NIT method is a technique that has been successfully and reliably demonstrated for the examination method and for the specific valve application
  - NIT techniques are considered as “other positive means” for verification of a valve open and close capability



## **Summary of Code Requirement - Check Valves**

- ISTC-3510 – Exercising Test Frequency
- ISTC-3520 – Exercising Requirements
- ISTC-3530 – Obturator Movement
- ISTC-3550 – Valves in Regular Use
- ISTC-3600 – Leak Testing Requirements
- ISTC-3700 – Position Verification Testing
- ISTC-5221 – Specific Testing Requirements - Check Valves
- ISTC-5222 – Condition Monitoring – alternative to the testing requirements of ISTC-3510, ISTC-3520, ISTC-3530, ISTC-3550, and ISTC-5221. All other requirements in ISTC apply.

# QUESTIONS?

**Future Questions**

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