

NRC Staff Presentation

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Topics

1. Flow-Induced Vibration of Piping-Mounted Components
2. Power-Operated Valve Internal Wear
3. Implementation of ASME OM-2-2024 Code
4. ASME OM Code Improvement Topics



1. Flow-Induced Vibration of Piping-Mounted Components

Flow-Induced Vibration of Piping Mounted Components

- Piping mounted components in nuclear power plants can be adversely impacted by flow-induced vibration.
- Power uprates can result in flow-induced vibration caused by higher flow rates in steam and feedwater lines, and in particular acoustic resonance in steam lines.
- ASME OM Code in Part 3 addresses vibration, but focuses on piping rather than individual components.

Flow-Induced Vibration Examples

- NRC Information Notice (IN) 83-70, “Vibration-Induced Valve Failures”
- IN 85-47, “Potential Effect of Line-Induced Vibration on Certain Target Rock Solenoid-Operated Valves”
- IN 2002-26, Supplement 2, “Additional Flow-Induced Vibration Failures after a Recent Power Uprate”
- IN 2005-23, “Vibration-Induced Degradation of Butterfly Valves”
- IN 2006-15, “Vibration-Induced Degradation and Failure of Safety-Related Valves”
- Industry groups have issued reports on flow-induced vibration events.

Flow-Induced Vibration Guidance

- Licensees of operating nuclear power plants might request power uprates in the future.
- Nuclear power plant applicants will need to address potential flow-induced vibration in their license applications.
- ASME guidance for predicting, evaluating, monitoring, and taking action for potential acoustic resonance and vibration in main steam and feedwater and their branch lines could streamline the regulatory review process for power uprates for operating nuclear power plants and applications for new and advanced reactors.



2. Power-Operated Valve Internal Wear

Power-Operated Valve Internal Wear

- Operating experience has shown that power-operated valves (POVs) can experience aging wear of internal components.
- IN 2006-29, “Potential Common Cause Failure of Motor-Operated Valves [MOV] as a Result of Stem Nut Wear.”
- IN 2010-03, “Failures of Motor-Operated Valves Due to Degraded Stem Lubricant”

Power-Operated Valve Internal Wear

- Some licensees are interested in extending the life of their nuclear power plants.
- Aging wear of active mechanical equipment is a potential challenge for licensees extending the life of their nuclear power plants.
- To support nuclear power plant life extensions, licensees need to have confidence that internal wear of POVs can be identified to avoid age-related failures to perform their safety functions.

Guidance for Power-Operated Valve Internal Wear

- ASME OM Code requires exercising, stroke-time testing, and diagnostic testing might not identify internal aging wear of POVs.
- ASME guidance for intrusive and non-intrusive methods to identify internal wear of POVs could support life extensions for nuclear power plants.
- ASME guidance could help avoid future safety-significant issues at nuclear power plants for aging-induced failure of POVs.



3. Implementation of ASME OM-2-2024 Code

Implementation of ASME OM-2-2024 Code

- In October 2024, ASME published the ASME OM-2-2024 Code for IST Programs in water-cooled and non-water-cooled nuclear power plants.
- NRC staff are preparing a new regulatory guide DG-1424 to accept ASME OM-2-2024 Code for IST Programs in non-water-cooled reactors with regulatory positions.
- NRC is preparing to issue DG-1424 for public comment.

OM-2 IST Programs

- New reactor applicants will submit their proposed OM-2 IST Program in the license application for NRC review and approval.
- Applicants may apply risk insights in proposing the scope of their OM-2 IST Program.
- For components with safety functions proposed not to be included in the OM-2 IST Program, the applicant will need to describe the plan to assess the operational readiness of those components.
- NRC staff will evaluate proposed deviations from the OM-2 Code as accepted in DG-1424.
- A license condition will require implementation of the OM-2 IST Program as accepted during the licensing process.



4. ASME OM Code Improvement Topics

ASME OM Code Issues

- Condition monitoring of check valves that can fail systems
- Monitoring and evaluating vibration of pipe-mounted components
- Possible MOV backseating code case

ASME OM Code Clarifications

- ISTA-3120 for 1-year extension of IST Program interval
- ISTB-6300 for systematic error during pump testing
- ISTC-3310 to avoid need for full-stroke test following repair impacting packing load
- ISTC-3570 to avoid conflict with ISTC-5115 corrective action
- I-1320(c)(2) for SRV sample expansion
- I-4110 for steam set-pressure test thermal equilibrium

QUESTIONS?



Acronyms

- AFW: Auxiliary Feedwater
- ASME: American Society of Mechanical Engineers
- CFR: Code of Federal Regulations
- CV: Check Valve
- CVCM: Check Valve Condition Monitoring
- EPRI: Electric Power Research Institute
- FRN: Federal Register Notice
- FSAR: Final Safety Analysis Report
- GL: Generic Letter
- IST: Inservice Testing
- LER: Licensee Event Report
- MOV: Motor-Operated Valve
- M&TE: Measuring and Test Equipment
- NRC: U.S. Nuclear Regulatory Commission
- OM: Operation and Maintenance
- PSIG: Pounds per Square Inch Gage
- PST: Preservice Testing
- RFO: Refueling Outage
- RG: Regulatory Guide