
Rotating Equipment Pumps and Valves: Selection, Sealing and Reliability Training Course

2 – 6 August 2027
Tokyo





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Programme Summary

Pumps and valves selection, sealing and reliability is the subject of this one-week training course for engineers, maintenance managers and operations leaders, ending in a duty and reliability dossier for one pump and valve system. Many plants buy rotating equipment on price and learn its limits through seal leaks and cavitation. The programme moves from hydraulic principles, through diagnosis of failures, to design of selection, sealing and testing decisions, then applies them to one system. Mars Training Centre UK delivers this pumps and valves reliability programme for mixed-organisation cohorts.

The Business Case

Unplanned stoppages on pumps and valves interrupt production, raise maintenance spend and create leak and safety exposure. Equipment bought against the wrong duty point, fluid or seal arrangement tends to repeat the same failure every few months. Teams that specify from the real duty, protect seals and record failure causes remove repeat faults and plan interventions.

- Equipment Availability: Improves as duty points, materials and operating ranges are matched to the service.
- Maintenance Cost: Falls as repeat failures are traced to causes and removed.
- Leakage and Safety Exposure: Reduces as seals and valve shut-off are specified and tested.

Principles and Evidence Base

- API 610: It guides the centrifugal pump specification review in Session 3.
- ISO 5199: It frames the technical data sheet check for centrifugal pumps in Session 3.
- API 6D: It shapes the pipeline valve requirements review in Session 4.
- API 598: It sets the valve leakage testing acceptance table built in Session 4.

Intended Participants

- Rotating equipment engineers who specify or replace pumps and valves.
- Maintenance managers who answer for repeat failures.
- Operations leaders who run systems where pumps and valves set throughput.
- Reliability engineers who investigate seal, bearing and valve faults.
- Procurement engineers who review vendor data sheets.

Typical sectors include oil and gas, power generation, water utilities and chemical processing.



Learning Outcomes

1. Participants will be able to construct a pump and system curve and locate the operating point against the best efficiency range.
2. Participants will be able to diagnose cavitation, recirculation, seal leakage and valve passing from symptoms and trend data.
3. Participants will be able to evaluate a centrifugal pump specification against a data sheet and the duty it must meet.
4. Participants will be able to select a mechanical seal arrangement and flush plan for a stated fluid and temperature.
5. Participants will be able to justify valve type, trim and valve leakage testing requirements for isolation and control duties.
6. Participants will be able to prioritise maintenance actions and present a duty and reliability dossier for one system.

Programme Structure

Day 1: Pump and Valve Hydraulics and Duty Definition

How is the duty of a pump and valve system defined?

- System Curve and Pump Curve Plot
- Best Efficiency Point Operating Window
- Net Positive Suction Head Margin Check
- Fluid Property and Duty Data Sheet
- Affinity Law Speed Change Table

Day 2: Diagnosing Pump and Valve Failures

Why do pumps and valves fail, and how is the cause shown?

- Cavitation and Recirculation Symptom Guide
- Vibration and Bearing Temperature Trend Review
- Seal Leak Pattern Inspection Sheet
- Valve Passing and Erosion Check
- Failure Mode and Effects Table

Day 3: Selecting Pumps and Sealing Arrangements

Which pump type, materials and seal suit the service?

- Centrifugal and Positive Displacement Selection Chart
- API 610 Specification Review
- ISO 5199 Data Sheet Check
- Mechanical Seal Arrangement and Flush Plan Chart
- Materials and Construction Matrix



Day 4: Selecting and Testing Valves

Which valve type and trim suit isolation, regulation and non-return duties?

- Gate, Globe, Ball and Butterfly Selection Matrix
- Check Valve Sizing Review
- Control Valve Flow Coefficient Calculation
- API 6D Requirements Review
- API 598 Leakage Test Acceptance Table

Day 5: Applying Selection and Reliability to One System

Does the selection and reliability plan hold when tested on one system?

- Applying the Session 1 Duty Data Sheet to One System
- Testing the Session 3 Pump Selection Against the Operating Range
- Checking the Session 4 Valve Choices Against Duty and Leakage Limits
- Matching the Session 2 Failure Findings to a Maintenance Plan
- Completing the Duty and Reliability Dossier

Methodology

The programme uses a data workshop method built on anonymised pump curves, data sheets and vibration records from oil and gas, power and water systems. Participants work in small groups on one system and receive feedback on each work product, including pump cavitation diagnosis.

- Suggested activity: Locating the operating point on a pump curve after a throttling change.
- Suggested activity: Reading a failed mechanical seal and naming the likely cause.
- Suggested activity: Choosing between a ball valve and a globe valve for one duty.

Capstone Output

Each participant completes a duty and reliability dossier for one pump and valve system. It holds a duty data sheet, a pump curve plot, a failure diagnosis table and a maintenance priority list. The dossier is used at work to brief managers and challenge vendor proposals.

Frequently Asked Questions

Is pumps and valves selection suitable for engineers new to rotating equipment?

Yes. Pumps and valves selection is taught from first principles and assumes a technical background, not earlier specialist experience.



Which standards does pumps and valves reliability rest on in this programme?

Pumps and valves reliability here rests on API 610, ISO 5199, API 6D and API 598, applied to data sheets, selection and leakage testing.

How is the pumps and valves dossier used at work?

You use the dossier to brief managers, challenge vendor proposals and set maintenance priorities.

How does pumps and valves selection differ from a programme on general maintenance planning?

It centres on duty, specification, sealing and failure causes, while maintenance planning centres on scheduling and spares.