
Pressure Vessels, Pumps and Process Pipework for Plant Leaders Training Course

1 – 5 March 2027
Tokyo





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Programme Summary

Pressure vessels, pumps and process pipework are the subject of this one-week training course for engineering managers, plant managers and heads of operations, ending in an equipment and pipework decision file for one plant unit. Many plants buy and modify equipment case by case, so design intent and operating limits drift apart. The programme moves from the design basis, through diagnosis of mismatches, to specification and operating choices, and then to application. Mars Training Centre UK delivers this pressure vessels, pumps and process pipework programme for mixed organisations.

The Business Case

Vessels, pumps and pipework carry most of the process risk in a plant unit. When selection, design basis and operating practice are owned by different teams, equipment is run outside its limits and inspection effort is spent in the wrong places. Leaders who can read a design basis and challenge a specification decide purchase and modification work on firmer ground.

- Process Safety Exposure: Falls as pressure limits, relief duties and piping classes are checked against operating practice.
- Equipment Reliability: Improves as pump and valve selection follows the duty actually required.
- Capital and Maintenance Discipline: Strengthens as specifications are reviewed before orders and modifications are placed.

Principles and Evidence Base

- ASME B31.3 Process Piping: It frames the design conditions, piping classes and examination duties reviewed in Sessions 1 and 3.
- ASME Boiler and Pressure Vessel Code Section VIII: It guides the review of pressure vessel design basis and design limits in Sessions 2 and 3.
- API 610 centrifugal pumps: It supports the pump selection and duty-point comparison in Session 3.
- Piping and Instrumentation Diagrams P&ID and HAZOP review: They structure the diagnosis of mismatches in Session 2 and the operating review in Session 4.

Intended Participants

- Engineering managers who approve equipment specifications.
- Plant managers who answer for safe, steady operation of process units.
- Project leaders who deliver equipment and pipework packages.
- Heads of operations who balance output and risk.

Typical functions include refining, chemicals and power operations.



Learning Outcomes

1. Participants will be able to distinguish the roles of vessels, pumps, valves and piping in a process unit.
2. Participants will be able to diagnose mismatches between design basis, operating limits and field practice.
3. Participants will be able to evaluate pump and valve options against the duty required.
4. Participants will be able to construct a specification review for vessels and pipework before purchase.
5. Participants will be able to prioritise operating, inspection and modification actions by risk.
6. Participants will be able to justify an equipment and pipework decision file to senior colleagues.

Programme Structure

Day 1: Pressure Vessels, Pumps and Process Pipework in the Process Unit

How do vessels, pumps and pipework work together in one process unit?

- Process Flow and P&ID Reading
- Equipment Role Map
- Design Basis Document Outline
- Piping Class and Material Overview
- Operating Envelope Sketch

Day 2: Diagnosing Mismatches in Design Basis and Operation

Where do design intent and daily operation part company?

- Design Basis Versus Operating Data Review
- Pressure Limit and Relief Duty Check
- HAZOP Deviation Walk-Through
- Piping Stress and Support Observation Sheet
- Equipment History Gap Log

Day 3: Specifying and Selecting Vessels, Pumps and Pipework

Which specification choices fit the duty at acceptable cost and risk?

- Vessel Design Basis Review Sheet
- Pump Duty-Point and API 610 Comparison
- Valve Type Selection Matrix
- Piping Class Selection Table
- Specification Challenge Checklist



Day 4: Operating, Inspecting and Changing Equipment Safely

How are operation, inspection and change controlled once equipment is installed?

- Start-up Sequence Review
- Inspection Priority Ranking
- Management of Change Screen
- Spares and Lifecycle Cost Sheet
- Operating Review Plan

Day 5: Applying Pressure Vessels, Pumps and Process Pipework to One Plant Unit

Does the decision file hold when tested against every earlier session?

- Applying the Session 1 Equipment Role Map to the Unit
- Testing the Session 2 Mismatch Review on Live Data
- Comparing the Session 3 Options on Cost and Risk
- Rehearsing the Session 4 Change Screen
- Completing the Equipment and Pipework Decision File

Methodology

The programme uses a structured exercise method built on anonymised P&IDs, equipment data sheets and short written cases from refining, chemicals and power. Participants work in groups on one plant unit and receive facilitator and peer feedback on each work product before it enters the equipment and pipework decision file.

- Suggested activity: Tracing a pump duty point against a data sheet and marking departures from design.
- Suggested activity: Ranking pipework lines for inspection by consequence and likelihood.
- Suggested activity: Challenging a vessel specification in a review round.

Capstone Output

Each participant completes an equipment and pipework decision file for one plant unit. It holds an equipment role map, a design basis versus operation review, a pump and valve option table, an inspection priority ranking and a change screen. The file is used at work to brief technical colleagues.



Frequently Asked Questions

Are pressure vessels, pumps and process pipework suitable for managers without an engineering design background?

Yes. Pressure vessels, pumps and process pipework are taught from first principles and assume responsibility for plant or projects, not detailed design experience.

Which standards do pressure vessels, pumps and process pipework rest on in this programme?

The programme draws on ASME B31.3 Process Piping, ASME Boiler and Pressure Vessel Code Section VIII, API 610 for centrifugal pumps, P&ID reading and HAZOP review.

How is the decision file from pressure vessels, pumps and process pipework used at work?

You use the decision file to brief senior colleagues and to support purchase, modification and inspection approvals for the plant unit.

How do pressure vessels, pumps and process pipework differ from a programme on maintenance management?

This subject centres on selecting, specifying and operating equipment correctly, while maintenance management centres on planning and executing upkeep work.