



AMERICAN GLOBAL INSTITUTE
FOR PRIVATE TRAINING



External Training Course

Practical Control Valve Maintenance & Testing

From 07 Dec. To 11 Dec. 2025

From 11 Jan. To 15 Jan. 2026

From 01 Feb. To 05 Feb. 2026

**Novotel Suites Riyadh Centre Hotel
Riyadh, KSA**

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External Training Course:

Practical Control Valve Maintenance & Testing

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Fees: 1750 KD

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Course Overview

This comprehensive and practical 5-day course provides participants with the essential knowledge and skills required to maintain, inspect, and test control valves effectively. The program blends theoretical understanding with hands-on experience, enabling participants to identify valve components, perform preventive and corrective maintenance, and apply testing and calibration procedures with confidence. Through real-world case studies and interactive learning, participants will develop the competencies needed to ensure safe, reliable, and efficient control valve operations across various process industries.

Course Objectives

By the end of this course, participants will be able to:

- Understand the functions, classifications, and principles of control valves.
- Identify major valve types, components, and accessories.
- Perform preventive and corrective maintenance safely and effectively.
- Apply proper procedures for valve testing, calibration, and inspection.
- Diagnose common valve failures and performance issues.
- Utilize modern diagnostic and predictive maintenance tools.
- Interpret test results and technical documentation accurately.
- Implement valve reliability and performance optimization strategies.
- Improve system efficiency and plant safety through effective valve management.

Target Audience

This course is intended for:

- Maintenance engineers and technicians.
- Instrumentation and control technicians.
- Process and operations personnel.
- Mechanical engineers and supervisors.
- Reliability and asset integrity engineers.
- Anyone responsible for valve maintenance, inspection, or troubleshooting.

Training Methodology

The course is delivered through a combination of:

- Illustrated technical presentations with real-life examples.
- Hands-on demonstrations and component handling.
- Practical testing and calibration workshops.
- Group discussions and troubleshooting sessions.
- Multimedia tools (videos, animations, valve simulation).
- Case studies drawn from oil, gas, and industrial environments.

Organisational Impact

After completing this course, organizations will be able to:

- Improve valve reliability and reduce downtime incidents.
- Extend valve life and minimize replacement costs.
- Enhance plant safety, compliance, and operational stability.
- Strengthen workforce competence and technical autonomy.
- Establish effective preventive and predictive maintenance programs.
- Optimize control system performance and process efficiency.

Personal Impact

Participants will gain the ability to:

- Confidently perform valve inspection, maintenance, and testing tasks.
- Identify valve issues and determine appropriate corrective actions.
- Apply international standards and best practices in valve servicing.
- Improve technical decision-making and diagnostic skills.
- Enhance professional credibility in the maintenance and operations field.
- Contribute effectively to team-based maintenance programs.

Course Content

Day 1 – Introduction to Control Valves

- Overview of control valves in process industries.
- Role of control valves in pressure, flow, temperature, and level control.
- Classification and types: globe, ball, butterfly, diaphragm, plug valves.
- Basic components and construction materials.
- Flow characteristics: linear, equal percentage, quick-opening.
- Valve sizing principles and Cv calculation overview.
- Control signal response and valve behavior under load.
- Introduction to valve standards (API, ASME, ISA, ISO).
- Common valve selection criteria and operating conditions.
- Typical valve problems in industrial systems.

Day 2 – Control Valve Components and Accessories

- Detailed study of actuator types: pneumatic, electric, and hydraulic.
- Actuator mechanisms: diaphragm, piston, spring-return, and rotary motion.
- Valve positioners: functions, calibration, and tuning procedures.
- Air supply systems, tubing, and fittings.
- Valve trims, plugs, seats, cages, and stem designs.
- Bonnet assemblies, packing, and sealing systems.
- Materials compatibility and corrosion prevention.
- Accessories: solenoid valves, limit switches, feedback units, I/P converters.
- Fail-safe concepts (fail-open, fail-close, fail-in-place).

Day 3 – Maintenance Procedures

- Maintenance planning and scheduling principles.
- Preventive vs. corrective maintenance – key differences and applications.
- Visual inspection and condition assessment techniques.
- Step-by-step valve disassembly and cleaning process.
- Packing, gasket, and seal replacement methods.
- Lubrication procedures and tools used in valve servicing.
- Reassembly guidelines and torque application standards.
- Functional testing after maintenance and leak checks.
- Documentation of maintenance activities and service reports.

Day 4 – Testing and Calibration

- Overview of valve testing standards (API 598, ISA S75.19, ISO 5208).
- Factory acceptance tests (FAT) and site acceptance tests (SAT).
- Bench testing and stroke testing procedures.
- Seat leakage, hydrostatic, and pneumatic pressure testing.
- Calibration of positioners and actuators using test panels.
- Interpretation of calibration graphs and performance curves.
- Diagnostic tools: portable testers, flow simulators, and software applications.
- Identifying hysteresis, deadband, and linearity issues.
- Safety procedures during high-pressure testing operations.

Day 5 – Troubleshooting and Performance Optimization

- Common operational faults: sticking, hunting, oscillation, leakage, vibration.
- Root cause analysis methods for valve malfunctions.
- Field troubleshooting techniques and step-by-step corrective actions.
- Predictive maintenance using vibration, acoustic, and thermographic monitoring.
- Improving valve loop stability and response time.
- Performance optimization through regular calibration and monitoring.
- Advanced reliability strategies and maintenance intervals.
- Case studies: valve performance improvement in refineries and plants.
- Final workshop: diagnostic problem-solving and performance analysis.

Course Agenda:

(1st Day) Agenda

8.30	9.00	Opening Remarks (30 Min.).
9.00	11.30	<u>Discuss Course Major Points:</u> • Introduction to Control Valves. • Control Valve Components and Accessories. • Maintenance Procedures. • Testing and Calibration. • Troubleshooting and Performance Optimization.
11.30	12.00	Coffee Break
12.00	14.00	<u>Introduction to Control Valves</u> • Overview of control valves in process industries. • Role of control valves in pressure, flow, temperature, and level control. • Classification and types: globe, ball, butterfly, diaphragm, plug valves. • Basic components and construction materials. • Flow characteristics: linear, equal percentage, quick-opening. • Valve sizing principles and Cv calculation overview. • Control signal response and valve behavior under load. • Introduction to valve standards (API, ASME, ISA, ISO). • Common valve selection criteria and operating conditions. • Typical valve problems in industrial systems.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(2nd Day) Agenda

9.00	11.30	<u>Control Valve Components and Accessories:</u> • Detailed study of actuator types: pneumatic, electric, and hydraulic. • Actuator mechanisms: diaphragm, piston, spring-return, and rotary motion. • Valve positioners: functions, calibration, and tuning procedures. • Air supply systems, tubing, and fittings. • Valve trims, plugs, seats, cages, and stem designs.
11.30	12.00	Coffee Break
12.00	14.00	<u>Control Valve Components and Accessories:</u> • Bonnet assemblies, packing, and sealing systems. • Materials compatibility and corrosion prevention. • Accessories: solenoid valves, limit switches, feedback units, I/P converters. • Fail-safe concepts (fail-open, fail-close, fail-in-place).
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(3rd Day) Agenda

9.00	11.30	<u>Maintenance Procedures:</u> • Maintenance planning and scheduling principles. • Preventive vs. corrective maintenance – key differences and applications. • Visual inspection and condition assessment techniques. • Step-by-step valve disassembly and cleaning process. • Packing, gasket, and seal replacement methods.
11.30	12.00	Coffee Break
12.00	14.00	<u>Maintenance Procedures:</u> • Lubrication procedures and tools used in valve servicing. • Reassembly guidelines and torque application standards. • Functional testing after maintenance and leak checks. • Documentation of maintenance activities and service reports.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(4th Day) Agenda

9.00	11.30	<u>Testing and Calibration:</u> • Overview of valve testing standards (API 598, ISA S75.19, ISO 5208). • Factory acceptance tests (FAT) and site acceptance tests (SAT). • Bench testing and stroke testing procedures. • Seat leakage, hydrostatic, and pneumatic pressure testing. • Calibration of positioners and actuators using test panels.
11.30	12.00	Coffee Break
12.00	14.00	<u>Testing and Calibration:</u> • Interpretation of calibration graphs and performance curves. • Diagnostic tools: portable testers, flow simulators, and software applications. • Identifying hysteresis, deadband, and linearity issues. • Safety procedures during high-pressure testing operations
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(5th Day) Agenda

9.00	11.30	<u>Troubleshooting and Performance Optimization:</u> • Common operational faults: sticking, hunting, oscillation, leakage, vibration. • Root cause analysis methods for valve malfunctions. • Field troubleshooting techniques and step-by-step corrective actions. • Predictive maintenance using vibration, acoustic, and thermographic monitoring. • Improving valve loop stability and response time.
11.30	12.00	Coffee Break
12.00	14.00	<u>Troubleshooting and Performance Optimization:</u> • Performance optimization through regular calibration and monitoring. • Advanced reliability strategies and maintenance intervals. • Case studies: valve performance improvement in refineries and plants. • Final workshop: diagnostic problem-solving and performance analysis.
14.00	14.30	Questions, Discussion & Conclusion Training Course.
14.30		Buffet Lunch