



Mechanical Engineering

Valve Technology Selection, Installation, Upgrading, Inspection and Troubleshooting

Course Introduction

All piping systems are fitted with valves for controlling purposes or safety requirements. Understanding the function of each valve type will have an important reflection on the process quality, equipment and plant reliability, and the economics of the whole activity.

The aim of this course is to provide delegates with a detailed overview of the operating performance of valves commonly employed in power plants and the manner in which they are chosen to provide the optimum configuration. This course will concentrate on the fundamental aspects, troubleshooting and diagnoses of valves and will address the operating problems which are often experienced by plant personnel. The pressure classes, codes and standards will be covered in the course. The course will cover valve installation, testing, maintenance and troubleshooting. Delegates will be able to acquire the practical knowledge to enable them not only to choose the correct valve for a particular application but also to be in position to resolve the common operating problems associated with this topic.

Target Audience

- Mechanical Engineers specializing in Fluid Mechanics
- Valve Technicians and Maintenance Engineers
- Project Managers and Engineers involved in Plant Construction
- Maintenance Supervisors and Technicians in Industrial Facilities
- Procurement Specialists and Purchasing Managers in the Oil & Gas Industry
- Safety and Compliance Officers overseeing Valve Systems
- Engineers and Technicians in the Petrochemical, Power Generation, and Manufacturing Sectors

Learning Objectives

- Main usage of valves in power plants
- An understanding of different parameters affecting the operation of valves.
- The ability to select the right valve for the particular application.
- An understanding of the problems associated with valves like flashing, slamming and water hammer.
- The ability to perform troubleshooting of systems involving valves.
- Diagnose and repair valve failures.
- Describe the proper procedures for valve disassembly, cleaning, and inspection.
- Testing and inspection of valves according to international standards.

Course Outline

• 01 DAY ONE

Basics of the Valves

- An overview
- Types of valves
- Why valves?
- Definition and nomenclature
- Classification of valves
- According to function
- According to application
- According to motion
- According to port size
- Valve selecting criteria
- Identifications of valve size and pressure classes
- Understanding the basics of pressure, temperature ratings
- The materials of valve seats
- Metal seats and soft seats
- Valve gaskets according to pressure class and application
- Valve stem seals and different types of packing
- Valve characteristics and pressure drop

- Flow through valves

Basic parts and function of each part of the following valves:

- Gate valve
- Ball valve
- Globe valve
- Piston valve
- Check valve
- Butterfly valve
- Plug valves
- Needle valves
- Diaphragm valve
- Valve material selection and standards

• 02 DAY TWO

Manual Valves

- Functions of manual valves
- Methods of regulation
- Valve types:
- Stopping/starting valves
- Control valves
- Valve end connections
- Valves rating
- Valves seating

Types of manual valves

- Gate valves
- Plug valves
- Ball valves
- Butterfly valves
- Pinch valves
- Diaphragm valves

Check Valves

- Applications
- Types of check valves
- Lift check valves
- Swing check valves
- Tilting-disc check valves
- Diaphragm check valves
- Check valves operation
- Selection of check valves

• 03 DAY THREE

Sealing performance

- Leakage criterion
- Valve stem seals

Safety and Relief Valves

- Types of safety and relief valves.
- Valves design
- Spring-loaded pressure relief valves
- Balanced relief valves
- Pilot operated PRV
- Valves characteristics
- Design pressure
- Superimposed back pressure (degree of fluctuation)
- Built-up back pressure during operation
- Valve Installation
- Valves Sizing and selection
- Calculation of relieving area
- Constant backpressure

- Variable Backpressure
- Capacity Requirement for External Fire
- Automatically operated valves
- Direct-acting & piloted pressure relief valves
- Modulating, full-lift, and ordinary pressure relief valves
- Operation of direct-acting pressure relief valves
- Relief valves problems

Rupture Discs

- Applications of rupture discs
- Rupture discs vs. pressure relief valves
- Rupture discs in gases and liquid service
- Temperature and bursting pressure relationship
- Types of rupture discs.

• 04 DAY FOUR

Valves Problems

- High pressure drop
- Pressure recovery characteristics

Cavitations in valves

- Incipient and choked cavitations
- Flow curve cavitations index
- Cavitations-elimination devices

Flashing versus cavitations

- Flow choking
 - High velocities
 - Water hammer
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- What causes water hammer
 - Water Hammer Calculations
 - Solutions for water hammer

Surge Protection

- Check valve slamming
- Noise problems

• 05 DAY FIVE

Valves Maintenance, Operation and Installations

- Valve operation procedure
- Valve maintenance and repair
- Valve packing, seals and seats maintenance
- Assembly and disassembly of valves
- Valve testing procedure according to international standards
- Valve installation procedure
- What causes of valve failures
- How to protect the valve from wear and corrosion
- Case studies for different types of valves failure and how to avoid the re-occurrence of failure.

Confirmed Sessions

FROM	TO	DURATION	FEEES	LOCATION
June 23, 2025	June 27, 2025	5 days	4950.00 \$	England - London
Sept. 1, 2025	Sept. 5, 2025	5 days	4250.00 \$	UAE - Abu Dhabi
Oct. 6, 2025	Oct. 10, 2025	5 days	4250.00 \$	UAE - Dubai