



# Maintenance Of Valves & Testing Technology



## Introduction:

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The course is designed for participants to understand the principles of the Types, function, Specification and classification of valves. Then cover the valves maintenance, troubleshooting and repair

This course presents a practical approach to the function, servicing, installation, repair, overhaul, upgrading and modifications of these components.

Valves usually appear to be simple in form and operation, such as those of a manual Off-On Valve, Check Valve, or the Fixed Valve type such as an Orifice, Blind, etc

## Who Should Attend?

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Mechanical Engineers, Under Development Engineers Supervisors and Technicians.

User, distributor, sales engineers or buyer of this equipment will also benefit & understand much of the design & manufacturing principles that dictates faster delivery of safer quality product.

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## Methodology:

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This interactive Training will be highly interactive, with opportunities to advance your opinions and ideas and will include;

- Lectures
- Workshop & Work Presentation
- Case Studies and Practical Exercise
- Videos and General Discussions.

## Certificate:

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**BTS** attendance certificate will be issued to all attendees completing minimum of 80% of the total course duration.

## Course Objectives:

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With this in mind, this course is designed to give both the new and experienced user some insight to problems that valve designers and manufacturing facilities encounter in the real world. The course covers

- Types of Valves.
- Valve materials.
- Valve components.
- Valve testing and inspection.
- Valve failure.
- Safety valve component and design.
- Practical training valve maintenance
- Case studies. and troubleshooting
- Group Discussions.
- Course summary and evaluation

## Course Outline:

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### Day 1- Basics of the Valve Technology

#### Valves Technology

- Types of Valves
- Valves characteristics
- Sealing performance
  - ❖ Leakage Criterion
  - ❖ Leakage Classifications
  - ❖ Sealing Mechanisms
  - ❖ Valve stem seals
- Flow characteristics
  - ❖ Flow through valves
  - ❖ Valve flow characteristics

### Day 2 - Manual versus Automatic Valves

#### 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
- Chuck valve

## 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

## Day 3 - Relief and Safety Valves: Function and Operation

### Relief and Safety Valves

- Relief Valves Types
  - ❖ Pressure-relieving devices

❖ Automatically operated valves

- Direct-acting & piloted pressure relief valves
- Modulating, full-lift, and ordinary pressure relief valves
- Valve Loading
- Safety Valves
- Operation of Direct-acting pressure relief valves
- Blowdown
- Relief valves problems

## Rupture Valves

- Applications of Rupture Discs
- Rupture discs vs. Pressure relief valves
- Rupture discs in gases and liquid service
- Temperature and bursting pressure relationship
- Pressure tolerances
- Design and performance of *ductile metal* rupture discs
- Types of Rupture discs:
  - ❖ Prebulged rupture discs
  - ❖ Reverse buckling discs
  - ❖ Vent panels
  - ❖ Graphite rupture discs
  - ❖ Double disc assemblies
- Rupture disc and pressure relief valve combinations
- Selection of rupture discs
- Operation of Rupture Discs

## Day 4 - Valves Troubleshooting

### Valves Problems, and Troubleshooting

- High Pressure Drop
  - ❖ Pressure Recovery Characteristics
- Cavitation in Valves
  - ❖ Incipient and choked cavitation
  - ❖ Flow curve cavitation index
  - ❖ Cavitation-elimination devices
- Flashing versus Cavitation
- Flow Choking
- High Velocities
- Water Hammer
  - ❖ What causes water hammer?
  - ❖ Water Hammer Calculations
  - ❖ Solutions for water hammer
- Surge Protection
- Check valve slamming
- Noise problems
- Clean air standards
- Life loading
- Packing for fugitive-emission control
- Troubleshooting the Control Valves

## Day 5

## Valve Testing & Repair Facilities

- Hydrostatic testing
- Gas testing
- Low Temperature (cryogenic) and Fugitive Emission testing
- Testing of engineering materials and Metallurgical investigations.
- On-line test
- Non-destructive examination by radiography,
- ultrasonic, magnetic particle and liquid penetrant.

## Area of Testing:

- Mechanical
- Electrical
- Environmental
- Fire
- Dimensional Measurement
- Materials
- Noise and vibration.