

Training Title

CONTROL & SAFETY RELIEF VALVES: SELECTION, OPERATION & TROUBLESHOOTING

Training Duration

5 days

Training Venue and Dates

REF ME070	Control & safety relief valves: Selection, Operation, Troubleshooting	5	01-05 July 2025	\$5,500	Dubai, UAE
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In any of the 5 star hotel. Exact venue will be informed later.

Training Fees

\$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch.

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

TRAINING OVERVIEW

TRAINING INTRODUCTION & DESCRIPTION

Power Plant and other petrochemical industries do deal with different types of valves. 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. Different applications need to select the appropriate valve type of particular flow characteristics. Operation of the valve also affects the system and the process. Understanding the problems associated with valves is essential for diagnosis and troubleshooting and the needed maintenance for the particular type of valves.

Valves can be classified as manual or control valves. When a manual valve is operated via an actuator it becomes a control valve. Valves in general do control the rate of flow in a piping system, the direction of the flow, or act as a relieving device to protect the system from over pressurization. Valves like check valves would prevent the flow from reversing, thus protecting equipment from reverse flow. Such valves operated automatically without need for any type of actuation. Stop and close valves used mainly to isolate a system in situation of maintenance and/or putting the standby equipment in services. The function of a valve is what determines its design. The right selection of a valve in terms of its type and size, and its pressure class is what affect most the stability and reliability of the system. The nature of the fluid, the type of the process, the level of temperature and pressures are parameters affecting the valve selection.

The flow through a valve will experience different effects, like cavitation, flashing, and noise. Water hammer is one of the effects that a check valve may cause. Such phenomenon might lead to different kind of problems, some would directly affect the valve itself and others might upset the process as a whole or result in system erosion or corrosion. Vibration and instrumentation false function could also be a result of faulty valve. Some of these problems can be avoided in the

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stage of selection and sizing of the valve. Others could be eliminated in the process of writing the specifications and through good communications with manufacturer or vendor. Understanding these different types of problems will help troubleshooting the valves and the systems and help curing the problems. Wrong installations could be the reason behind many of valves problem too.

TRAINING OBJECTIVES

- To introduce the participant to different type of Control Valves and Safety Relief Valves.
- To familiarize the participant with the valve characteristics including the valve tightness class and the flow characteristics
- To upgrade the participants understanding of the application, operation and design of different types of valves
- To provide skills, knowledge and understanding of the principles and practices of the related Codes and Standards related to Control Valves and Safety Relief Valves
- To learn the methods for valve selection, specifications and sizing that suit a particular application.
- To learn methods of valve testing, inspection and troubleshooting based on the industrial and manufacturer codes and standards

WHO SHOULD ATTEND

Engineers and Technicians of mechanical, electrical and chemical engineering background will benefit largely from this workshop. Maintenance, Operation, people in workshop and R and D personnel are recommended to attend this course.

TRAINING METHODOLOGY:

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions and motivate everybody to find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of the multiple-choice type will be made available on a daily basis to examine the effectiveness of delivering the course. All presentations are made in excellent colorful power point. Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work& Practical Exercises
- 20% Videos& General Discussions

COURSE OUTLINE

The following topics including the valve technology, valve tightness and flow characteristics, control valves and safety relief valve types, operation and troubleshooting will be covered during the five-day duration of the course.

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Basics of Valve Technology

Ch 1 Valves Technology

Types of Valves

Valves characteristics

Sealing performance

Leakage Criterion

Leakage Classifications

Sealing Mechanisms

Valve stem seals

Flow characteristics

- Flow through valves
- Valve Characterizing Coefficients
- Valve flow characteristics
- Linear & equal %

Control Valves

Ch 2 Control Valves

Functions of manual valves

Methods of regulation

Types of control valves

Gate Valves

Plug Valves

Ball Valves

- Butterfly Valves
- Pinch Valves
- Diaphragm Valves

Ch 3 Control Valves & Actuators

Control Valves Types

Linear Valve Features

Rotary Valve Features

Control Valve Flow Characteristics

Quick Opening Characteristics

Linear & Equal %

Actuation systems

Types of actuators

Pneumatic Piston Actuator

Electric motors

Electro-hydraulic Actuators

Actuator Performance

Valve Positioner

Operation of Positioners

Positioner calibration

Self-Operated Valves

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Ch 4 Check Valves

Applications

Types of Check Valves

- Lift check valves
- Swing check valves
- Tilting-disc check valves
- Diaphragm check valves

Check Valves Operation

Water Hammer

Selection of Check Valves

Ch 5 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

Ch 6 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:

Pre-bulged 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

Ch 7 Valve Sizing & Selection

Valve-sizing criteria for manual valves

Valve-sizing criteria for check valves

Valve-sizing criteria for throttling valves

Incipient and advanced cavitation

Terminal pressure drop ratio

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Percent of Flashing
Pressure Recovery Coefficient
Valve Sizing & Selection Procedure
Selecting a valve type
Different valve characteristics
Examples

Ch 8 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

NOTE:

Pre & Post Tests will be conducted

Case Studies, Group Discussions, Last Day Review, Assessments will be carried out.

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