



MAESTRO
CONSULTANTS

CONTROL & SAFETY RELIEF VALVES

COURSE OUTLINE 2020

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TRAINING TITLE

CONTROL & SAFETY RELIEF VALVES

VENUE

Dubai, UAE

DURATION

5 Days

DATES

02 - 06 February 2020

PRICE

US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet daily.

TRAINING INTRODUCTION

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 application needs 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 overpressurization. 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 affect directly the valve itself and other 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 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

TRAINING AUDIENCE

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.

COURSE OUTLINE

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

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

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:

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

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

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

TRAINING CERTIFICATE

MAESTRO CONSULTANTS Certificate of Completion for delegates who attend and complete the training course

METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of “real life” issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.