

## **Pressure Control Equipment**

### **Course Price**

£3050

### **Course Description**

This intensive 5-day course provides the essential knowledge for working with Pressure Control Equipment covering all aspects from measurement through to control. It is of a bespoke nature designed for works normally carried out by Well Services Department and concentrates on the type of activities normally carried out in the Field by this department. Industry Standard Instrumentation is described in detail referencing the specific Vendor Data. Essential Safety aspects relating to Pressure Control are covered in detail.

### **Course Objectives**

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

- Define pressure and describe relation of pressure, force and area. Units of pressure and their conversion.
- Describe various types of pressure measuring instruments and transducers with their construction, principle of operation, advantages and disadvantages, errors associated with each instrument and methods to correct the errors.
- Describe the working principle of pressure regulators and pressure switches and explain calibration methods of various pressure instruments
- Explain what is Control loop and function of each component in control loop. Explain the role of controller in control loop.
- Define feedback and explain Open and Close loop with examples.
- Define Process Variable, Measured Variable, Set Point, Deviation/ Error and Output in terms of process controller.
- Define Direct and Reverse action of controller and give some examples of Direct and Reverse acting controllers.
- Understand the use of Control Valve in Closed Loop Control Systems
- Understand the valve type characteristics and applications.
- Be able to explain cavitation and flashing cause /effects and methods to minimize.
- Understand the use of the Flow Coefficient Factor
- Understand the applications for Shutdown / Blowdown and Process Shutdown Valves
- Understand the necessary Safety requirements relating to Pressure Control Systems.

### **Industry Standard Pressure Control Equipment Content**

- Fisher Wizard 4150K and 4160K Pneumatic Controllers and Transmitters

- Fisher Types 95L, 95H, 95HP and 95HT Pressure Reducing Regulators
- FoxBoro Model 43AP Pneumatic Controller
- Fisher model 3582 D-ring control valve positioner
- Fisher Control Valves and Diaphragm Actuators.

## **Who Should Attend**

Well Services Personnel involved with the Planning, Supervision and Field execution of activities relating to Pressure Control Systems. The Course will also give essential knowledge to Safety personnel enabling full participation in Safety risk assessments, Safety Audits and Accident / Incident Investigations for this category of activity.

## **Course Content**

### **Day 1**

- Welcome and introductions
- Alarms, Emergency Exit & Muster
- Course Schedule, overview, outline and objectives

#### **1 Pressure Measurement**

##### **1.1 Introduction of Pressure Measurement Basic**

##### **1.2 Relationship between Pressure & Surface Area**

##### **1.3 Categories of Pressure**

#### **2. Pressure Gauges, Types**

#### **3. Pressure Transmitters**

#### **4. Pressure Recorders**

#### **5. Pressure Test Equipment Types, Traceability, Procedures for use.**

Video: How a Pressure Gauge Works

Video: Barton Chart Recorders – Recorder Charts & Pens

Power Point Presentation: Pressure Measurement

Oral Quiz to assess delegate's level of understanding

**Day 2**

1. Open and Closed Loop explanation and comparisons
2. Process, Measurement, Transmission and Response Lags.
3. Two Step Control explained with examples
4. Proportional Control (P) using calculation examples, charts and offset effect explained.
5. Integral action (I) explained with examples for advantages and disadvantages
6. Derivative action (D) explained.
7. Combination of P+I+D actions explained
8. Cascade, Split, Ratio and Feed Forward control methods explained.

Video: Proportional Gain and Proportional Band

Power Point Presentation: PID Control Loops

Oral Quiz to assess delegate's level of understanding

**Day 3**

1. Pressure Reducing Regulators using Fisher Type 95 vendor data covering
  1. Specifications
  1. Principal of operation, Maintenance
  1. Spare requirements.
2. Fisher Wizard 4150/60 K Pneumatic Controllers and Transmitters vendor data covering
  - 2.1 Specifications
    2. Principal of operation, Maintenance
    2. Control Tuning guidelines for P+I control actions
    2. Spare requirements.
3. FoxBoro Model 43AP Pneumatic Controller
  3. Specifications
- 3.2 Principal of operation, Maintenance
  3. Control Tuning guidelines for P+I control actions
  3. Spare requirements
4. Control Valves
  - 4.1 Types Globe, Slide, Needle, Eccentric, Ball, Butterfly explained.
  - 4.2 Gland Packing requirements.

Videos: How Control Valve Works, Globe, Ball, Gate valves, Fisher Positioner

Power Point Presentation: Control Valve PPt additional

Oral Quiz to assess delegate's level of understanding

#### **Day 4**

##### 1. Control Valves Continued

###### 1. Bonnets

###### 1. Two /Three port valves explained

###### 1. Control Valve Trim

###### 1. Positioners and valve accessories featuring the Fisher 'D Link' Positioners

###### 1. Effects and avoidance of cavitation, flashing

###### 1. Flow Coefficient Factor (Cv) explained

###### 1. Control Valve Testing requirements and procedures

###### 1. Process Shutdown, Blowdown, and Emergency Shutdown Valve explained.

Video: Cavitation Causes and Effects

Oral Quiz to assess delegate's level of understanding

#### **Day 5**

##### 1. Safety aspects relating to Pressure Control

###### 1. Process Safety Aspects

##### 1.2 Pilot operated Pressure Safety Valves

##### 1.3 High Pressure Alarm / Shutdown pressure switches

##### 1.4 Energy Isolation requirements.

##### 1.5 Hazardous Area requirements for the use of Electrical Equipment.

##### 1.6. Permit, Risk Assessment and Tool Box Talks techniques relating to Pressure.

- Review of course objectives to ensure compliance
- Question / answer session
- Written multiple choice test
- Written course feedback

Video: PRV- Pressure Relief Valve

Video: Pressure Switch Operating Principles

PowerPoint Presentation: Energy Isolation – Process

**CPD Unit****Continuing Professional Development****35 HOURS CPD**