



## **Process Piping**

### **Design, Fabrication, Inspection and Maintenance**

#### **Course Overview**

Piping systems convey fluids from one location to another. Piping system includes, pipes, fittings, flanges, gaskets, bolting, valves and pipe supports. Failure of any of these components in the oil and gas industry could result in a major loss and environmental damage. It is therefore very important to adhere to the relevant standards at the design stage, operate, inspect and maintain piping systems as necessary to reduce the risk of unforeseen costs and damages to the environment.

#### **Scope:**

introduce participants to the ASME B31.3 which provides the requirements for the design, fabrication and testing of process piping.

#### **Course objectives**

By the end of the course participants will:

- Get familiar with the various types of valves and fittings used in process piping.
- Be able to prepare and read P&IDs, PFDs and Isometrics.
- Learn the various requirements for designing piping for process equipment such as pump compressors and heat exchangers.
- Carry out flexibility analysis.
- Learn the various maintenance and repair methods.

#### **Who should attend:**

The course is designed for Engineers, Supervisors, technicians and other personnel involved in the design, installation inspection and maintenance of process piping.

#### **Training Methodology:**

The course material will be covered with lectures, presentations, videos, instructor led discussions, exercises and real-life case studies.

#### **Course instructor:** George Loizou

George is a Mechanical Engineer with more than 38 years of experience mainly in the Oil and Gas Industry. George holds an MSc Degree from The Pennsylvania State University. He is a member of SMRP and a Certified Maintenance and Reliability Professional (CMRP). He is also member of the Cyprus Scientific and Technical Chamber, associated member of the Institution of Mechanical Engineers of UK and certified trainer by the Human Resource Development Authority of Cyprus (HRDA). George worked as Head of Mechanical Maintenance at the Cyprus Petroleum Refinery Ltd, Engineering Manager and Terminal Manager at Cyprus Petroleum Storage Company Ltd. He has a wide experience as a trainer, as since 2005 he has been delivering courses and seminars internationally.

#### **Duration:** 5 Days



**Course Outline**

<p><b>Day 1</b> Pre-Test <u>Introduction</u></p> <ul style="list-style-type: none"> <li>• General Definitions</li> <li>• Piping Codes and Standards</li> <li>• ASME 31.3 Scope</li> <li>• The piping development</li> </ul> <p><u>Pipes and Fittings</u></p> <ul style="list-style-type: none"> <li>• Types of pipes and sizes</li> <li>• Fittings</li> <li>• Flange Rating Class</li> <li>• Gaskets</li> <li>• Bolting</li> <li>• Flanged Connections</li> </ul> <p><u>Materials</u></p> <ul style="list-style-type: none"> <li>• Strength of Materials</li> <li>• Bases for design stresses</li> <li>• Temperature limits</li> <li>• Material Selection</li> <li>• Material Certificates</li> </ul> <p><b>Day 2</b> <u>Design</u></p> <ul style="list-style-type: none"> <li>• Design Conditions</li> <li>• Pipe Sizing</li> <li>• Basic Allowable Stress</li> <li>• Required Wall Thickness</li> <li>• Pipe Bends</li> <li>• Reinforcement of Welded Branch Connections</li> <li>• Expansion Loops</li> <li>• Other Loads</li> </ul> <p><u>Valves</u></p> <ul style="list-style-type: none"> <li>• Valve Types and components</li> <li>• Valve Selection</li> <li>• Valve Materials</li> <li>• Valve Maintenance</li> <li>• Pressure Safety Valves</li> </ul>	<p><b>Day 3</b> <u>Layout and support</u></p> <ul style="list-style-type: none"> <li>• Above Ground Piping</li> <li>• Buried Pipes</li> <li>• Pipe Insulation</li> <li>• Pipe Tracks and Trenches</li> <li>• Pipe Spacing</li> <li>• Vents and Drains</li> <li>• Pump Installations</li> <li>• Compressor Installations</li> <li>• Heat Exchanger Installations</li> <li>• Pipe Supports</li> </ul> <p><b>Day 4</b> <u>Piping drawings</u></p> <ul style="list-style-type: none"> <li>• Process Flow Diagrams</li> <li>• Piping and Instrumentation Diagrams</li> <li>• Piping Plans</li> <li>• Isometrics</li> <li>• Line Schedule (List)</li> </ul> <p><u>Fabrication, Installation and Testing</u></p> <ul style="list-style-type: none"> <li>• Welding</li> <li>• Pipe Fitting</li> <li>• Inspection and Non-Destructive Testing</li> <li>• Pressure Testing</li> <li>• Coating</li> </ul> <p><b>Day 5</b> <u>Inspection and Maintenance</u></p> <ul style="list-style-type: none"> <li>• API 570 Inspection Code</li> <li>• Types of Inspection and Practices</li> <li>• Maintenance, Repairs and Alteration</li> </ul> <p>Exercises Final Test</p>
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