Introduction To ASME Process Piping Code

Introduction:

This course provides an overview and covers the main topics for process piping requirements according to the B31.3 Process Piping Code: design and fabrication of piping components or piping flexibility analysis process, including practice application of simplified methods and illustration of computer analysis methods. The Code provides requirements for the design, fabrication, examination and testing of metallic piping systems designed for the wide variety of fluid services used in the process industries. Selection of materials, pipe, valves and fittings will be discussed. The candidates will be able to understand the pressure and thermal stress design requirements of ASME B31.3 Code and go beyond the literary words of the Code by explaining the intent of the Code paragraphs and related Code interpretations, where even a close study of the Code on its own may not produce a clear conclusion. This is accomplished with numerous real life practical examples, including many photos of actual plant piping and pipeline situations in many different locations worldwide. These photos enrich the practical approach taken to explain the Code with real life engineering experiences.

Who Should Attend?

Personnel involved with purchase, design, fabrication, or inspection of pressure vessels, welding supervisors, welding engineers, welding instructors, QA/QC personnel, inspectors and personnel involved with WPS, PQR, and WPQs, personnel for design, calculation, and fabrication of pressure equipment who need to understand the welding requirements, repair and maintenance personnel requiring background on Code compliance, inspectors whose responsibility is to insure the design safety of piping systems from a piping Code point of view

Course Objectives:

By the end of this course delegates will be able to:

- Explain how to apply Code rules to common design and fabrication situations
- Identify pipe stress calculations for various loading situations
- Describe inspection and testing requirements
- Describe the structure and proper use of Section IX
- Identify welding requirements
- Explain how to create a PQR, WPS, and WPQ
- Develop the required skills to review welding documents
- Use design calculations for various loading situations
- Identify Inspection and testing requirements

Course Outline:

Overview ASME, Construction Codes, Piping Codes

- Overview, Scope and Content B31.3
- Classification
- Standard
- Material
- Introduction
- Piping Code history and basic philosophy

- Piping Code organization

Definitions

- Principal axis and stress, Failure theories
- Stress categories, Definition and basis for allowable stress

Piping Design Criteria

- Design conditions
- Design loads (pressure, weight, thermal, seismic, wind, vibration, hydraulic, anchor movement)
- Failure modes, Primary and secondary stress categories
- Load categorization, Allowable stresses

Pressure Design of Piping Components

- Elbows and bends, Branch connections
- Extruded outlet header, Wye pattern fittings
- Closures, Flanges, Blind flanges, Blanks, Expansion joints

Pressure Design

- Pipe wall thickness calculation for internal and external pressure
- Branch connection area replacement
- Bend-wall thinning variation from normal conditions
- Pressure-temperature ratings

Pipe Flexibility Analysis

- Allowable and displacement stresses
- Flexibility, Bending stress, Torsional stress
- Fatigue, Stress intensification
- Combined loads, Cold spring, Simplified analysis methods

Pipe Support Design

- Support types, Assumptions, Load combinations
- Variable spring supports, Lugs and attachments

Piping Types

- System piping, Pressure relief piping, Hazardous material piping

Leak Testing

- Required leak testing, Hydrostatic
- Pneumatic, Alternative leak test, Initial service

Piping Flexibility Analysis

Fabrication, Assembly and Erection

Inspection, Examination and Testing