



FE034: The Layout Of Piping Systems & Process Equipment





Training Description:

This course comprises two sections. The first examines the design requirements for process plant piping systems. The second section examines the maintenance requirements for these systems. In each case, the course goes beyond merely repeating the material contained in the governing standards. It discusses practical applications and typical procedures. The course also contains sample problems that are put together with written exercises for you to complete.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Understand the total structural integrity of process plant piping systems throughout their useful life
- ✓ Discover how the ASME B31.3 code has been correctly and incorrectly applied
- ✓ Ensure the total structural integrity of process plant piping systems throughout their useful life
- ✓ Discuss and apply the design requirements of the ASME B 31.3 Code
- ✓ Achieve higher levels of maintenance excellence in refineries and other process plants
- ✓ Examine and apply the maintenance and inspection requirements of API 570 to process plant piping systems
- ✓ Perform engineering audits of designs and procedures

Training Designed for:

This course is intended for all Engineers, Chief Engineers, Maintenance Engineers, Plant Engineers, Facilities Engineers, Mechanical Engineers, Inspection Engineers, Process Engineers, Design Engineers, Planning Engineers, Operations Engineers, Corrosion Engineers, Structural Engineers, Reliability Engineers & Integrity Engineers.

Training Program:

DAY ONE:

- ❖ PRE-TEST
- ❖ Introduction
- ❖ Overview of Piping Codes
 - Process plant piping and ASME B 31.3
 - Liquid transportation piping & ASME B 31.4
 - Gas transmission piping & ASME B 31.8
 - General comparison of ASME B 31.3, B 31.4 & B 31.8
- ❖ Pipe Manufacturing Processes & Material Selection
 - Introduction
 - Pipe manufacturing processes
 - Applicable standards for pipe and piping system components
 - Material selection considerations





- Piping specification
- ❖ **Pressure Design of Pipe & Piping System Components**
 - Introduction
 - Straight Pipe
 - Curved sections
 - Branch connections
 - Pressure ratings of pipe fittings

DAY TWO:

- ❖ **Flanges, Gaskets & Bolting**
 - Introduction
 - Flange types
 - Flange standards & ratings
 - Gaskets
 - Bolting
- ❖ **Piping System Layout, Supports & Restraints**
 - Introduction
 - General system layout considerations
 - Layout considerations for specific piping systems
 - Support & restraint considerations
 - Types of pipe support
 - Estimating maximum permitted support span
 - Estimating loads at supports
 - Types of pipe restraints
- ❖ **Piping Flexibility**
 - Introduction
 - Fundamentals
 - Flexibility analysis
 - Identifying lines with adequate flexibility
 - Simplified flexibility analysis methods
 - Computerized piping flexibility analysis
 - Special considerations for specific piping systems

DAY THREE:

- ❖ **Valve Selection**
 - Introduction
 - Valve functions & applications
 - Valve types
 - Valve stem packing
 - Valve selection procedure
 - Valve inspection & testing
- ❖ **Piping Fabrication, Erection, Examination & Testing**
 - Fabrication
 - Erection
 - Examination





- Testing
- ❖ **Piping Vibration**
 - Introduction
 - Basic concepts
 - Fatigue stress and other failure consideration
 - Types of vibration analysis
 - Common causes of piping vibration
 - Vibration measurement
 - Screening vibration problems
 - Vibration control
 - Overall design considerations

DAY FOUR:

- ❖ **Piping Maintenance**
- ❖ **Piping Materials & Modes of Failure**
 - Material considerations
 - Corrosion rate & remaining life calculations
 - Cracking mechanisms in piping
 - Piping deterioration
- ❖ **Piping Inspection & Evaluation**
 - API 570 requirements
 - Piping inspection planning and data analysis
 - Inspection techniques for piping & components
 - Piping retirements
- ❖ **Piping System Repair, Alteration, Re-rating & Pressure Testing**
 - Valve repair and maintenance
 - API 570 piping repair, alterations, re-rating & testing requirements
 - Piping system repair
 - Piping system alterations & re-rating
 - Pressure testing after repairs or alterations

DAY FIVE:

- ❖ **Flange Joint Assembly & Bolt-up Procedures**
 - Introduction
 - Establishing flange joint categories
 - Identifying and listing flange joints in critical services
 - Determining required bolt tightening methods
 - Developing flange joint assembly and bolt up procedures
 - Procedure qualification
 - Hot bolting
 - Additional leakage control procedures
- ❖ **Guide for Hot Tapping (Pressure Tapping)**
 - Necessary conditions for performing a hot tap
 - Hot tap design considerations
 - Selecting the hot tap site





- Installation
- Inspection
- Pressure tests before cutting pipe
- Hot tap operations
- Special safety considerations
- Hot tap machines
- ❖ **Course Enhancements**
 - Design procedure for designing welded full encirclement repairs with end plates
 - Design procedure for a welded full encirclement sleeve
 - Design procedure for a fillet welded lap patch
 - Design procedure for a welded partial leak containment box
- ❖ **Course Conclusion**
- ❖ **POST-TEST and EVALUATION**

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request”.

Please note that the above topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant’s manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.



Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:

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Training & Career Development Department

