TETRA TECH RPS ENERGY | TRAINING

N630: Advanced ASME B31.3 Process Piping Code

Instructor(s): Don Frikken

Format and Duration
Classroom - 2 Days

Summary

This two-day course will cover advanced topics related to the ASME B31.3 Process Piping Code. The sessions emphasize the piping flexibility analysis process, including practice application of simplified methods and illustration of computer analysis methods. This course also covers requirements for nonmetallic, Category M fluid service and high pressure piping, as well as in-service inspection to API 570 and a comparison to ASME B31.1 Power Piping requirements. Participants are requested to bring a calculator to the course, and are encouraged to bring a copy of the code (not included in course fees).

Learning Outcomes

Participants will learn to

1. Develop and understanding of how to perform a piping flexibility analysis.
2. Create acceptable arrangements for piping systems with expansion joints.
3. Develop an understanding of special considerations for nonmetallic, lethal service, high pressure, high purity and underground piping.
4. Formulate inspection plans for piping that has been placed in service.

Training Method

Two classroom days providing 1.4 CEU (Continuing Education Credits) or 14 PDH (Professional Development Hours)

Who Should Attend

Engineers, senior designers, maintenance and manufacturing personnel who work in depth with process piping (e.g., in the chemical, petroleum, plastic processing, pulp and paper, and bioprocessing fields) will find it a time-saving means to broaden and update their knowledge of piping.

Course Content

Day One

1. Materials
    a. Strength of Materials
    b. Bases for Design Stresses

2. Introduction to Flexibility Analysis
    a. What are we trying to achieve?
    b. Sustained loads, Displacement Loads
    c. Reaction Design Criteria
    d. Flexibility Analysis Example
    e. Stress Intensification

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3. Layout and Support
   a. Support Spacing, Support Locations
   b. Support Elements
   c. The Sustained Load Analysis
   d. Fixing Problems

4. Flexibility
   a. Friction
   b. Elbow Flexibility
   c. Thermal Expansion
   d. Spring Hangers
   e. The Displacement Load Analysis
   f. Elastic follow-up
   g. Fixing Problems

5. Reactions
   a. Fabricated Equipment
   b. Rotating Equipment
   c. Supports
   d. Flanged Joints
   e. Cold Spring

6. Flexibility Analysis
   a. When to Perform a Detailed Analysis
   b. Computer Program Attributes
   c. Considerations

Day Two

1. Designing with Expansion Joints
   a. Types of Expansion Joints
   b. Pressure Thrust
   c. Installation of Expansion Joints, Metal Bellows Expansion Joints
   d. Other considerations

2. Non-metallic Piping Systems
   a. Thermoplastics
   b. Reinforced thermosetting resins
   c. Concrete and glass
   d. Piping lined with non-metals
   e. Limitations

3. Category M Fluid Service
   a. Design, Fabrication

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b. Examination and Testing
c. Typical Owner Added Requirements

4. High Pressure Piping
   a. Materials, Pressure Design
   b. Limitations, Flexibility Analysis
   c. Fabrication
   d. Examination and Testing
   e. Overpressure Protection

5. High Purity Piping
   f. Fabrication and Installation
   g. Examination and Testing
   h. Category M Fluid Service

6. In-service Piping - Inspection, Repair, Alteration and Rerating
   i. API 570 Piping Inspection Code
   j. What to Inspect
   k. Types of Inspection, Inspection Practices
   l. Frequency and Extent of Inspection
   m. Remaining Life Calculation
   n. Repairs and Alterations
   o. Rerating

7. What's Different in B31.1
   a. Scopes
   b. Organization of the Codes
   c. Bases for Allowable Stresses
   d. Piping Component Standards
   e. Fluid Service Requirements, Material Requirements
   f. Pressure Design and Flexibility Analysis
   g. Fabrication and Installation

8. Underground Piping
   h. Steel Piping
   i. Ductile Iron Piping
   j. Non-metallic Piping