Design & Fabrication Of Piping Systems & Code Requirements

Training Program

Introduction:

Compliance with ANSI/API code requirements for design and construction is needed to assure the safety petroleum refinery and chemical plant piping. The designer, fabricator, supplier, erector, examiner, and inspector's understanding and application of these requirements is essential in producing this desired safety. This course provides a background and ANSI /ASME /API code guidance on design, selection of materials, fabrication, testing and practical methods and trends in piping design and construction. The course will review the basic requirements of the various sections of the ASME B31 Code for Pressure Piping with emphasis on B31.1, Power Piping; B31.3, Chemical Plant and Petroleum Refinery Piping; and the piping portions of ASME Section III, Nuclear Power Plant Components. General topics in the course include pressure design, flow and sizing considerations, flexibility analysis, dead loads, equipment loads, dynamic loads, and sup ports and restraints. Applications of these concepts, including simple hand analysis methods and computer-based analysis methods, will be demonstrated. Examples of the required analysis and sources of further information will be provided. The practical aspects of material selection and fabrication will be considered, including materials for high and low temperature service, cutting, bending, welding processes, heat treatment requirements and nondestructive examination. Code requirements and the practical limitations of each operation will be dis cussed, as well as the economics of material selection and alternate fabrication processes.

Who Should Attend?

Mechanical Engineers, General Supervisors, Consulting Engineers, Design Engineers, Foremen, Supervisors, Technicians, Maintenance Personnel, Engineers of all disciplines, Supervisors, Team Leaders and Professionals in Maintenance, Engineering and Production Managers, Maintenance Personnel, Heads of Maintenance and Operation, Chemical Engineers, Equipment Specialists, Technical Engineers, Operation Engineers, Planning Engineers, Process Engineers, Reliability Specialists, Boiler Plant Construction Managers, Consulting Engineers, Design Engineers, Insurance Company Inspectors, Operation, Maintenance, Inspection and Repair Managers, Supervisors and Engineers, Plant Engineers,

Senior Boiler Plant Operators, Repairers and Installers, Project Engineers and Technologists, Facility Engineers, Consultants, Mechanical Engineers and Technologists, Maintenance and Operation Personnel, Plant/Facility Engineers, Technicians, Maintainers, Operators, Chemical Engineers & Technologists, Process Engineers & Technologists, Project Engineers & Technologists, Technicians & Supervisors who need to be familiar with the fundamentals associated with pumps and pipe systems, Plant & Facilities Operations Personnel Technicians & Supervisors responsible for plants and facilities, Stationary Engineers, Consultants & Contractors, Personnel in the food, chemical, petrochemical, pulp and paper, pharmaceutical, water utility and energy industries will find this course of particular interest, engineers entering the piping design and fabrication; piping engineers requiring background on code compliance, plant owners, piping fabricators and suppliers wishing to extend their knowledge to induce a supplementary understanding of piping design and fabrication and installation

Course Objectives:

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

- A background and ANSI / ASME / API code guidance on design
- Selection of materials, fabrication
- Testing and practical methods and trends in piping design and construction
- The physical phenomena which affect the design of piping systems
- The ASME Code formulas and other methods by which these phenomena can be analyzed to determine resulting stresses
- Evaluation of those stresses relative to ASME Code limitations
- The methods by which piping systems are fabricated, inspected and tested
- The additional requirements which need to be in a fabrication/ installation specification to en sure adequate and proper installation

Course Outline:

Piping Guide for Design and Drafting of Piping Systems

- Piping uses and construction
- Pipe, fittings, flanges, reinforcements: in-line equipment and support equipment

- Valves, pumps, compressors and types of process equipment
- Organization of work: job responsibilities, drawing office equipment and procedures
- Drafting: process and piping drawings, including drawing symbols, showing dimensions, showing instrumentation and bills of material
- Design of piping systems: including arrangement, supporting, insulation, heating, venting and draining of piping, vessels and equipment
- Standards and codes : for piping systems, pipe, pipe supports, flanges, gaskets, fittings, valves, traps, pumps, vessels, heat exchangers, symbols and screw threads
- Abbreviations: for piping drawings and industrial chemicals
- Piping charts & tables
- Pressure-temperature ratings
- Pipe sizing, basic stress quantities, piping flexibility and safety valve sizing
- Pipe sizing and code equations
- Basic stress quantities
- Determination of pipe wall thickness
- Piping flexibility, quick check method, and need for formal stress analysis
- Safety valve sizing

Fabrication

- Manufacturing system & quality control program
- Common welding processes
- Jointing methods
- Filler metals
- Piping isometrics & piping spools
- WPS's & PQR's
- Selection of proper piping material

Codes and Standards

- Chemical plant and petroleum refinery piping (ASME B31.3)

- Welding of pipelines and related facilities (API 1104)
- Welded & seamless wrought-steel pipe (ASME B36.10M)
- Factory-made wrought-steel butt welding fittings (ASME B16.9)
- Pipe flanges and flanged fittings (ASME B16.5)