

## “Pressure Vessel (Design & Inspection)”

### Training program (English Material)

**Course Length:** 16 Hours @ 4days

#### Course Objective

Upon completion of this course, attendees will be able to evaluate the mechanical design of pressure vessels in accordance with the ASME Code Section VIII. They will also be able to develop a pressure vessel inspection program based on API 510 and other industry practices, and then apply these requirements to typical pressure vessel maintenance situations.

#### Who Should Attend?

- Individuals who are responsible for evaluating the design of pressure vessels in accordance with the ASME Code Section VIII.
- Individuals who are responsible for evaluating the mechanical integrity of in-service pressure vessels in process plant applications.

#### Course outline:

##### Stresses in pressure vessels

- Design Philosophy
- Stress Analysis
- Stress/Failure Theories
- Failures in Pressure Vessels and Loadings.

##### General design

- General Vessel Formulas
- External Pressure Design
- Calculate MAP, MAWP and Test Pressures
- Stresses in Heads Due to Internal Pressure
- Design of Intermediate Heads
- Design of Toriconical Transitions
- Design of Flanges
- Design of Spherically Dished Covers
- Design of Blind Flanges with Openings
- Bolt Torque Required for Sealing Flanges
- Design of Flat Heads
- Reinforcement for Studding Outlets

- Design of Internal Support Beds
- Nozzle Reinforcement.
- Pressure Vessel

#### Design of vessel supports

- Support Structures
- Wind Design per ASCE
- Wind Design per UBC-97
- Seismic Design for Vessels
- Seismic Design-Vessel on Unbraced Legs
- Seismic Design-Vessel on Braced Legs
- Seismic Design-Vessel on Rings
- Seismic Design-Vessel on Lugs
- Seismic Design-Vessel on Skirt
- Design of Horizontal Vessel on Saddles
- Design of Saddle Supports for Large Vessels

#### Special designs

- Design of Large-Diameter Nozzle Openings
- Design of Cone-Cylinder Intersections
- Stresses at Circumferential Ring Stiffeners
- Tower Deflection
- Design of Ring Girders
- Design of Baffles
- Design of Vessels with Refractory Linings

#### Local loads

Stresses in Circular Rings

Design of Partial Ring Stiffeners

Attachment Parameters

Stresses in Cylindrical Shells from External Local Loads

Stresses in Spherical Shells from External Local Loads

#### Transportation and erection of pressure vessels

- Transportation of Pressure Vessels,
- Erection of Pressure Vessels
- Lifting Attachments and Terminology
- Lifting Loads and Forces
- Design of Tail Beams, Lugs, and Base Ring Details
- Design of Top Head and Cone Lifting Lugs
- Design of Flange Lugs

#### Inspection and Testing of Pressure Vessels

## Inspection and Testing Requirements

### Pressure Vessel Inspection Practices

- Causes of Vessel Deterioration
- Inspection Intervals
- Corrosion Rate Determination

### Evaluating Corroded Pressure Vessels for Continued Operation

- Determining Minimum Actual Thickness
- Acceptability of Corroded Area

### Brittle Fracture Assessment

- Fracture Toughness Determination
- Brittle Fracture Evaluation of Existing Equipment

### Hydrotest Requirements