



**API 510: Pressure Vessel Inspection Code
(API Exam Preparation Training)**

Course Overview

Pressure Vessels may store variety of fluids, which may be Explosive, Corrosive or Toxic in nature. The equipment is also subjected to high pressures and moderate to elevated

temperatures. All these factors may cause corrosion and other damages to the vital static equipment

The API Preparation Courses provide the trainees with the guidelines and methodology of

carrying out in-for pressure vessels. It also provides techniques for assessment of the wear and tear of the equipment as well as degradation and damages caused to the process equipment due to the process conditions.

This API 510 examination preparation course is designed to prepare the trainees to successfully sit for the API-510 exam. Through your concentrated effort, and the data provided in this course, you would have sufficient information to pass the examination.

Most of the classroom study will focus on the ICP Body of Knowledge BOK and effective sheet EKS. The goal, is to obtain a perfect score.

This course will cover the major calculation problems in ASME VIII-1 & API 510 and there will be case study for WPS/PQR/WQT review according to ASME IX (Part QW).

Major Damage mechanisms in API 571 will be illustrated during the class, such as Stress corrosion cracking, brittle fracture, erosion/corrosion etc.

Training Approach

- This training course will combine presentations with instructor-guided interactive discussions between delegates about their interests. Practical exercises, video material and case studies to stimulate these discussions and provide maximum benefit to them that will support the formal presentation sessions.

Course Objectives

This course will enable participants to comply with the requirements of API 510 ICP. This course features a deep overview of the code, including the operations, scope, and criteria to ensure attendees can interpret and apply API 510 effectively. Topics are enhanced by in-class problem solving, directly applying the rules and equations of the API 510 Code for specific design and operating conditions to illustrate correct applications.

By the end of this training course, participants will learn to:

- Calculate Corrosion rates and inspection intervals
- Apply Joint efficiencies
- Evaluate Static head calculations
- Understand the PRD requirements according to API 576.
- Create Calculation of minimum thickness for internal pressure
- Apply Pressure testing procedures and calculations
- Understand Welding procedure qualification and procedure review
- Review ASME V non-destructive testing procedures
- Apply In-service repairs to API 510
- Understand Impact testing requirements
- Apply the repair techniques in ASME PCC-2 (Post construction repairs)
- Find the PWHT requirements using ASME VIII
- Understand Damage mechanisms as per API 571 (510 selection only)

Course Methods

This training course will combine presentations with instructor-guided interactive discussions between participants relating to their individual interests. Practical exercises, video material and case studies aimed at stimulating these discussions and providing maximum benefit to the participants will support the formal presentation sessions. Above all, the course leader will make extensive use of case examples and case studies of issues in which he has been personally involved.

Target Audience

This training course targets all personnel dealing with piping inspection & examination and maintenance teams, especially those working in shutdowns and turnarounds.

This training course will be valuable to professionals, including (but not limited to) the following:

- Pressure Vessel Inspectors & Engineers
- Plant Inspectors
- Engineering Professionals
- Maintenance Inspection Testing Engineers
- Mechanical Engineers
- Corrosion Engineers
- QA/QC Inspectors and Reliability Departments oil & gas (Petrochemical and Refining) operations

Course Outline

DAY ONE: ASME VIII DIVISION I

- Introduction and Review of API 510 Body of Knowledge & Exam Publications Effectively Sheet
- UG-16: General
- Welding Materials (Consumables)
- Welded Joint Category and Service Restrictions
- Joint Efficiencies
- Radiographic Examination of Welded Joints [Full]
- Spot Examinations of Weld Joints
- Minimum design Thickness of Shells Under Internal Pressure
- Formed Heads Pressure under internal pressure
- UG-98: Maximum Allowable Working Pressure
- Hydrostatic, Pneumatic Tests and Test Gauges (UG 99, UG 100 & UG 102)
- UW-40: Procedures for Postweld Heat Treatment
- UCS-56: Requirements for Postweld Heat Treatment
- Charpy Impact Testing Methodology and acceptance criteria
- UCS-66: Impact Testing Exemptions
- UG-84: Charpy Impact Tests Test Specimens
- UG-77: Material Identification Overview
- UW-30: Lowest Permissible Temperatures for Welding
- UW-33: Alignment Tolerance
- UG-126: Pressure Relief Valves
- UG-116: Required Marking and Name Plate

Course Outline

DAY TWO: API 510 INSPECTION CODE

- API 510, Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration
- API-510 Scope & Annex A Code Exemptions
- Terms, Definitions, Acronyms, and Abbreviations
- Owner/User Inspections Organisation
- Inspection, Examination, and Pressure Testing Practices
- Risk-Based Inspection (RBI)
- Types of Inspection and Surveillance for Pressure Vessels
- Condition Monitoring Locations (CMLs)
- Interval/Frequency and Extent of Inspection
- Deferral of Inspection Due Dates
- Inspection Data Evaluation, Analysis, and Recording
- Corrosion Rate Determination
- Remaining Life Calculations
- FFS Analysis of Corroded Regions
- Evaluation of Existing Equipment with Minimal Documentation
- Repairs of Pressure Vessels and Pressure-relieving Devices
- Alterations and Rerating of Pressure Vessels and Pressure-relieving Devices

Course Outline

DAY THREE: ASME BPVC SECTION IX & API 577

- WPS & WPQ & PQR Review
- Essential, Non-essential and supplementary Essential Variables for welding processes
- What are P-numbers, F-number and A-number?
- Welders' essential variables [WQT]
- Alternate F-Numbers and Alternate P-Numbers for procedure and performance qualifications
- API Recommended practice 577
- Requirements for Hot Tapping and In-Service Welding

Course Outline

DAY FOUR: API RP 571, ASME V, AND ASME PCC-2

- Damage Mechanisms Affecting Fixed Equipment in the Refining Industry API 571
- Brittle Fracture
- Erosion/Erosion-Corrosion
- Mechanical Fatigue
- Atmospheric Corrosion
- Corrosion Under Insulation (CUI)
- Cooling Water Corrosion
- Caustic Corrosion
- Sulfidation
- Chloride Stress Corrosion Cracking (Cl-SCC)
- Caustic Stress Corrosion Cracking: Caustic Embrittlement
- Hydrochloric Acid (HCl) Corrosion
- Sour Water Corrosion (Acidic)
- Amine Stress Corrosion Cracking
- Wet H₂S Damage: Blistering, HIC, SOHIC, SCC
- High Temperature Hydrogen Attack (HTHA)
- ASME Section V, Non-destructive Examination, Articles 1, 2, 6, 7 and 23 (Section SE-797 only)
- Applicable NDT Methods of Application, Calibration, and Records
- ASME PCC-2

Course Outline

DAY FIVE: API 576, API 572 & API 578

- API Recommended Practice 576: Inspection of Pressure-Relieving Devices
- Inspection and Replacement of Rupture Disk Devices
- Causes of Improper Performance of Pressure-Relieving Devices
- Inspection and Testing of Pressure Relieving Devices
- API Recommended Practice 572: Inspection of Pressure Vessels
- API Recommended Practice 578: Material verification programs
- Final Practice Exam: Open & Closed Exam Simulator