

API 510

Preparation Course for PRESSURE VESSEL INSPECTOR Certification

COURSE OBJECTIVE

The main emphasis of this program is to provide a **comprehensive understanding of the design, inspection and maintenance of pressure vessels based on API 510 standards**. Pressure vessel is one of the critical production assets in process industry. How to adopt code rules for your plant's pressure vessels and various service conditions will be illustrated with numerous case studies. Important codes will be reviewed and discussed so as to address the difficulties and ambiguities you might have encountered during working.

BENEFITS OF ATTENDING THIS COURSE

- 1** Knowledge of **API publications and other international standards** which include:
 - **API 510**, Pressure Vessel Inspection Code
 - **API RP 572**, Inspection Practices for Pressure Vessels
 - **API RP 576**, Inspection of Pressure-relieving Devices
 - **API RP 577**, Welding Inspection and Metallurgy
 - **API RP 571**, Damage Mechanisms (related to Pressure Vessel)
 - **ASME Sect 8 Div. 1**, Rules for Constructing Pressure Vessels
 - **ASME Sect 5**, Non-Destructive Examination
 - **ASME Sect 9**, Welding Qualifications
- 2** Knowledge and expertise that are required for **maintenance, rating, inspection, repair and alteration of in-service pressure vessel**
- 3** Information of **API Individual Certification Program** and **API 510 Inspector certification process**.
- 4** The **trainer is a practitioner** with in-depth knowledge and experience about the industry that will benefit participants to learn about **knowledge applications in real work**.



THE COURSE IS DESIGNED FOR

Engineers, Supervisors, Managers and personnel in **Pressure Vessel, QA/QC, Engineering Design, Mechanical, Operation and Maintenance**. This course will also be beneficial to Inspectors / Engineers who are preparing themselves for the API 510 certification examination.

COURSE METHODOLOGY

The course will use various tools such as **Group Discussion, Case Studies, Practical Exercise, Video**, and **Quiz** to reinforce the understanding.

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COURSE CONTENT

DAY 1

- Introduction, Publications, Course Outline & Body of Knowledge
- ASME section VIII, Division 1
 - Scope and organization of the code
 - Design minimum requirements and definitions
 - Compensation of pressure due to static head
 - Requires thickness of shell and heads due to internal pressure
 - Determination of joint efficiencies
 - Required thickness off shell due to external pressure

DAY 2

- ASME Section VIII, Division 1 (Cont'd)
 - Nozzle reinforcements and its limits
 - Permissible out-of-roundness
 - Impact testing requirements and exemptions
 - Heat treatment requirements
 - Marking and reports
- ASME Section 5
 - Article 1, General Requirement
 - Article 2, Radiographic Examination
 - Article 6, Liquid Penetrant Examination
 - Article 7, Magnetic Particle Examination
 - Article 23, Section SE-797, Ultrasonic Standards
 - Marking and record keeping

DAY 3

- API 510, Pressure Vessel Inspection Code
 - Scope Organization and definition based on the Code
 - Inspection, examination and pressure testing practices
 - Determination of Inspection/ interval / frequency and extent of inspection
 - Corrosion rate and remaining life calculations
 - IMAWP determination
 - Fitness for service evaluations
 - Reporting and records
 - Repairs and alterations
 - Rerating
- API 572, Inspection Practices of Pressure Vessel
 - Types of pressure vessels
 - Reasons for inspection
 - Inspection planning
 - Inspection methods and limitations
 - Records and reporting

DAY 4

- API RP 576, Inspection of Pressure-Relieving Devices
 - Scope, terms and definitions
 - Types of Pressure-Relieving Devices
 - Causes of improper performance
 - Inspection and testing
 - Records and reports
- API RP 571, Damage Mechanisms (related to pressure vessels in general)
 - Temper Embrittlement
 - Brittle Fracture
 - Thermal Fatigue
 - Erosion/erosion control
 - Mechanical Fatigue
 - Atmospheric Corrosion
 - Corrosion Under Insulation (CUI)
 - Cooling Water Corrosion
 - Caustic Corrosion
 - Sulfidation
 - Chloride Stress Corrosion Cracking (Cl-SCC)
 - Corrosion Fatigue
 - Caustic Stress Corrosion Cracking (Caustic Embrittlement)
 - Hydrochloric Acid (HCl) Corrosion
 - Amine Stress Corrosion Cracking
 - Wet H2S Damage (Blistering/HIC/SOHIC/SCC)
 - High Temperature Hydrogen Attack (HTHA)
- ASME Section 9
 - Article 1, Welding General Requirements
 - Article 2, Welding Procedure Qualifications
 - Article 3, Welding Performance Qualifications
 - Article 4, Welding Data

DAY 5

- API RP 577, Welding Inspection and Metallurgy
 - Definitions
 - Welding inspection, processes, procedure, materials
 - Welder qualifications
 - Non-destructive examination
 - Metallurgy
 - Refinery and Petrochemical Plant Welding Issues
- API 510 Practice examination, Open and Closed Book

Exercises :

A number of short exercises will be used to reinforce key topics

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COURSE FACILITATOR

ABOUT THE FACILITATOR

B.L. HO is an **active consultant and professional in Singapore**. He has more than **18 years of experience** in the international oil and gas (onshore and offshore), marine, shipbuilding and repair industries providing engineering consultancy, asset integrity, materials/corrosion expertise, welding and failure investigations. He had previously held positions as Principal Consultant with DNV, and as Corrosion/Inspection Manager in Shell Seraya Singapore. He also had stationed in Vietnam where he provides and set-up asset integrity management services and systems for BP and Petrovietnam's offshore and onshore facilities.

ACADEMIC QUALIFICATION

- **Master of Science** National University of Singapore, Materials Science & Engineering, 2001
- **Bachelor of Engineering with Honours**, Nanyang Technological University, Mechanical Engineering, 1995

PROFESSIONAL EXPERIENCE

- Asset Integrity & Risk Management Services (AIMS)
- Plant Maintenance and Engineering
- Materials Selection
- Risk-based Inspection (RBI)
- Failure Analysis
- Six Sigma (Green Belt)
- Metallurgy and Chemical Analysis
- Corrosion Assessment, Protection & Material Selection
- Condition Assessment Of Structures & Components
- Welding Consultancy/Inspection/Witnessing
- Non-destructive Testing (MT,PT,UT,RT & ET)
- Fiberscopic Inspection
- Calibration & Mechanical Testing

FIELD EXPERIENCE

Oil & Gas (offshore and onshore), Chemical & Petrochemical, Refineries, Marine, Shipbuilding & Repair, Automobile and Aerospace.

PROFESSIONAL ATTAINMENT

- API 653 Aboveground Storage Tank Inspector Certification (Cert No. 31253)
- API 570 Piping Inspection Certification Program (Cert No. 24410)
- API 510 Pressure Vessel Inspection Certification Program (Cert No. 29563)
- Risk Based Inspection (RBI)
- AWS Certification of Welding Inspectors
- ASNT Level II for MT
- ASNT Level II for PT
- Quality Assurance Level III
- Pipeline Integrity Management Course (DNV)
- Modern Energy Technology (Offshore and Onshore)
- Project Management 1
- Project Management 2
- L281 Storage Tank Maintenance and Inspection
- M123 Safety in Process Design Course
- Hazards & Effects Management Process - Layer of Protection Analysis (HEMP-LOPA)
- Asset Dependability Green Belt Training
- Corrosion Control by Protective Paint
- Assessment of acceptability of flaws by Fracture Mechanics

TEACHING EXPERIENCE

- **Lecturer for API 510, API 570 and API 653** international courses for Petronas, Chevron Indonesia, Shell, BP and Sinopec.
- **RBI Trainer** for public training for Singapore plants such as Celanese, Lonza, PCS, SRC, and for NCSP (Vietnam), Dung Quat Refinery (Vietnam), PIC (Oman), KOC (Kuwait), Malaysia, Indonesia, Philippines and China .
- Lecturer for courses held between year 1999 to 2004. Courses included **Principles of Failure Analysis, Stainless Steels, Corrosion Causes & Prevention, Heat Treatment of Steels, Mechanical Testing of Metals, Principles of Metallography and Thermal Spray Technology**.