

Course No. 1834

API 510 Comprehensive Training on Pressure Vessel Inspection Standards

**DOWNSTREAM OPERATIONS, REFINING, PETROCHEMICALS &
INDUSTRIAL OPERATIONS
OIL & GAS**

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The API 510 Comprehensive Training on Pressure Vessel Inspection Standards provides an intensive and practical framework for pressure vessel inspection, assessment, repair, alteration, and integrity management in accordance with the principles and requirements of the API 510 Pressure Vessel Inspection Code. The course is designed to strengthen participants' technical understanding of inspection practices and their ability to make informed integrity and inspection decisions throughout the operating life of pressure vessels.

Participants will examine the fundamental requirements associated with pressure vessel inspection programs, including inspection planning, inspection intervals, damage mechanisms, thickness measurements, corrosion assessment, fitness-for-service considerations, and evaluation of inspection findings. The course emphasizes the relationship between inspection activities, vessel integrity, operating conditions, risk, and safe continued service.

The program also addresses common pressure vessel degradation mechanisms such as general corrosion, localized corrosion, erosion, cracking, fatigue, brittle fracture, and damage associated with process conditions. Participants will explore methods for evaluating inspection data, determining remaining thickness, assessing corrosion rates, estimating remaining life, and identifying conditions that may require repair, alteration, further examination, or engineering evaluation.

Through practical calculations, inspection scenarios, case studies, and technical workshops, participants will develop the ability to interpret pressure vessel inspection requirements and apply structured approaches to integrity assessment. The course is particularly relevant to organizations operating refineries, petrochemical facilities, oil and gas plants, chemical processing units, power facilities, and other industrial environments where pressure vessel integrity is critical.

Objectives

- By the end of the course, participants will be able to:
- Explain the purpose, scope, structure, and key requirements of API 510 for pressure vessel inspection.
- Develop effective pressure vessel inspection strategies based on service conditions, damage mechanisms, and inspection history.

- Evaluate pressure vessel inspection data and identify significant integrity concerns.
- Apply appropriate approaches to thickness measurement, corrosion rate calculation, and remaining life assessment.
- Assess common pressure vessel damage mechanisms and their potential effects on mechanical integrity.
- Evaluate inspection intervals and establish appropriate inspection priorities.
- Interpret pressure vessel inspection findings and determine appropriate follow-up actions.
- Understand the principles governing pressure vessel repair, alteration, rerating, and continued service.
- Apply fitness-for-service concepts when evaluating damaged or degraded pressure vessels.
- Strengthen inspection documentation, reporting, quality control, and technical decision-making.
- Integrate risk-based considerations into pressure vessel inspection planning and integrity management.
- Improve coordination between inspection, engineering, maintenance, operations, and safety functions.

Who Should Attend

This course is designed for pressure vessel inspectors, mechanical engineers, inspection engineers, integrity engineers, maintenance engineers, reliability engineers, corrosion engineers, quality professionals, and technical specialists responsible for pressure equipment inspection and mechanical integrity.

It is also highly relevant to maintenance and inspection managers, plant engineers, operations personnel, engineering consultants, technical supervisors, asset integrity professionals, and HSE professionals involved in pressure vessel reliability, inspection planning, repair, and compliance.

The program is particularly suitable for professionals working in oil and gas, refineries, petrochemical plants, chemical processing, power generation, and other process industries where pressure vessels and pressurized equipment form a critical part of plant operations.

Learning Outcomes

- Upon successful completion of the course, participants will be able to:
- Explain the fundamental requirements and application of API 510 in pressure vessel inspection.
- Develop structured inspection plans based on vessel design, service conditions, history, and degradation risks.
- Identify and evaluate common pressure vessel damage mechanisms.
- Interpret thickness measurement results and calculate corrosion rates.
- Estimate minimum required thickness and remaining service life using appropriate engineering principles.
- Evaluate inspection findings and determine whether additional examination or engineering assessment is required.
- Understand requirements and considerations for pressure vessel repair, alteration, and rerating.
- Apply fitness-for-service principles when assessing damaged or deteriorated pressure vessels.
- Evaluate inspection intervals and prioritize inspection activities according to vessel condition and risk.
- Prepare technically sound inspection records, reports, and recommendations.
- Strengthen communication between inspection, engineering, maintenance, operations, and management teams.
- Apply API 510 principles to practical pressure vessel integrity scenarios.
- Make informed recommendations regarding continued service, repair, monitoring, or further evaluation.

Course Outline

DAY 01

API 510 Fundamentals & Pressure Vessel Inspection Framework

- Scope, purpose, structure, terminology, and fundamental requirements of API 510
- Pressure vessel design concepts, materials, construction records, and inspection history
- Responsibilities of inspectors, engineers, owners, operators, and other stakeholders
- Inspection planning, inspection types, intervals, and documentation requirements

DAY 01 — CONTINUED

PRACTICAL APPLICATION

Develop an inspection strategy for an operating pressure vessel

DAY 02**Pressure Vessel Inspection & Damage Mechanisms**

- Visual inspection and condition assessment techniques
- Thickness measurement methods and interpretation of inspection data
- Corrosion, erosion, localized corrosion, pitting, and other degradation mechanisms
- Cracking, fatigue, brittle fracture, hydrogen-related damage, and process-related deterioration

PRACTICAL APPLICATION

Evaluate inspection findings and identify applicable damage mechanisms

DAY 03**Corrosion Assessment, Remaining Thickness & Remaining Life**

- Corrosion rate calculation and interpretation
- Determining minimum required thickness and evaluating vessel wall condition
- Remaining life assessment and inspection interval considerations
- Evaluating inspection trends, measurement uncertainty, and localized damage

PRACTICAL APPLICATION

Calculate corrosion rates, remaining thickness, and estimated remaining life

DAY 04**Pressure Vessel Repair, Alteration & Fitness-for-Service**

- Principles of pressure vessel repair and alteration
- Welding considerations, repair procedures, and inspection requirements
- Rerating, pressure testing, and evaluation of modified operating conditions

DAY 04 — CONTINUED

- Fitness-for-service concepts for damaged, degraded, or out-of-tolerance equipment

PRACTICAL APPLICATION

Evaluate a damaged pressure vessel and determine appropriate repair or continued-service actions

DAY 05

Integrity Management, Risk-Based Inspection & Final Assessment

- Integrating API 510 inspection requirements with asset integrity management
- Risk-based inspection concepts and prioritization of pressure vessel inspection activities
- Inspection reporting, documentation, quality assurance, and technical review
- Coordinating inspection, maintenance, engineering, operations, and safety decisions

FINAL WORKSHOP

Complete a comprehensive pressure vessel inspection case covering inspection planning, damage assessment, thickness evaluation, remaining life, repair considerations, and final integrity recommendation

Register or Request More Information

Course page: <https://quest-training.com/courses/api-510-comprehensive-training-on-pressure-vessel-inspection-standards>

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