



API 650 and API 653 ADVANCED STORAGE TANK DESIGN MAINTENANCE AND INSPECTION

Duration
5 days with or without evening sessions.

Course overview

The course is suitable for storage tank engineers, inspectors, and operators involved with storage tank design/fabrication/erection/modifications/ maintenance and operation

Purpose

To present various common storage facilities for liquid and gaseous hydrocarbons and explain their configuration, tank farm requirements, design, operation and maintenance aspects. Course lecturing will be by means of presentations material, classical discussions, group exercises, and case studies.

Course Highlights

- Review of codes requirements, structural design, materials, fabrication, and erection for new storage tanks
- Tank Shell Design (1-foot method, Variable design point method)
- Tank Roof Design
- Tank bottom layout design
- Tank material selection
- Tank internal structural members design
- Shell opening and Nozzle design
- Wind and Seismic loading analysis
- Tank foundation design
- Elevated temperature tanks design
- Internal external floating roof
- Tanks with internal pressure
- Tank construction, welding qualification and procedure
- Inspection of Storage Tanks, NDE tests
- Corrosion evaluation and tank life prediction calculation
- Tank shell, roof, bottom, and foundation evaluation
- Introduction to Brittle Fracture Mechanics
- Tank repair and alteration
- Pre and post weld heat treatment
- Dismantling and reconstruction
- Tank settlement criteria, measurement, and evaluation
- Tank lifting methods and stress induced on tank shell, roof and corner welds
- Tank ventilation requirements API 2000
- Tank maintenance and repair management (Tank program-data sheet)
- Old riveted tank design to API 12 A, maintenance-repair
- Tank operations level set up API 2350
- Introduction to API 580-581 Risk based Inspection Planning
- Introduction to API 571 damage mechanism
- Introduction to Fit-For-Service API 579
- Introduction to Finite Element Modelling of storage tanks
- Tank stress evaluation

Objectives

By the end of the course, the participants will be able to:

- Distinguish function of structural parts of and fittings to conventional storage tanks,
- Explain design and operational aspects of storage tanks
- Set up inspection and maintenance programmes/schedules,
- Differentiate maintenance methods (condition/repair),
- Define the maintenance scope,
- How to read Inspection Reports properly

Subjects

To provide the participants with the knowledge about – but not limited to:

Types of conventional storage tanks

Fixed and floating roof tanks, tank selection re product classification, including cost awareness for new structures.

Design aspects

Design codes (API650, BS 2654/EN 14015) and company standards, venting requirements, special design, relevant fixed and floating roof specific components, tank shell design and tank foundations.

Operational Aspects

Blending, tank mixers, operational windows (such as pump rates, product temperature, pressure, TVP/RVP, etc), floating roof movements, roof drains and roof seals. Emission calculations for fixed and floating roof tanks.

Tank maintenance, Inspection and Engineering

Storage tank inspection procedure, API653, EEMUA159, record system, on- and off-stream inspections, assessment of the inspection finding against the relevant codes/criteria and the translation into a cost-effective maintenance scope. Introduction in Risk Based Inspection (RBI) related to preventive maintenance.

Maintenance work

Common maintenance work and methods re tank structure, tank fittings and tank foundation, new and maintenance coating, including tank jacking based on international and company standards (API/EEMUA).

Safety aspects

Fire Safety requirements, maintenance of fire fighting equipment, International safety codes (NFPA), layout considerations, tank entrance (permits).

Competence Addressed

- Develop pro active Tank maintenance activities using tank RRM
- Develop Tank inspection plans and intervals
- Design, codes and operation of Tanks
- Safety aspects and dominant failure modes

Notes to Participants

This course can also be presented on site. The course content and lecture can also be “tailor made” to ensure that the most relevant subjects per site will be addressed in an adequate way and the technical level is adjusted to suite the competence of the participants.