Advanced Storage Tank Integrity and API 653 Inspection

1 – 12 March 2027
Barcelona (Spain)

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Advanced Storage Tank Integrity and API 653 Inspection is a two-week course for integrity engineers, inspectors and maintenance planners who decide whether an aboveground tank stays in service, needs repair or must be altered. You work through API 650 design basis, API 653 shell and bottom evaluation and risk-based intervals, and you leave with your own Tank Integrity Review File. The course is delivered by Mercury Training Center.

About This Course

Tanks reach their inspection date with thin shell courses, pitted floors and settled foundations, and someone has to sign whether they run, get repaired or come out of service. You should already read inspection reports or plan tank maintenance. You practice on thickness data, settlement surveys and repair scenarios.

Who It Is For

- Engineers who own the integrity status and next inspection date of tank farms.
- Inspectors who collect thickness, floor scan and settlement data and report findings.
- Maintenance planners who scope repairs, coatings and outage work packages.
- Operations leads who set fill heights, overfill safeguards and return-to-service conditions.
- Project staff who manage tank upgrades, contractors and handover.

This course is not for operators who need daily tank operating and safety routines, who are better served by a shorter operations and maintenance course. It also does not suit designers of new tanks, who need a design and fabrication course built around a single construction standard.

Competencies You Will Build

- Shell Evaluation: you calculate minimum thickness and safe fill height for a corroded shell course.
- Bottom Assessment: you judge floor and annular plate remaining life from scan data.
- Settlement Judgment: you decide whether measured settlement is acceptable or needs correction.
- Repair Decisions: you choose between patch, insert, floor replacement and alteration, and set the testing that follows.
- Interval Setting: you set the next internal and external inspection dates from corrosion rates and risk.
- Integrity Reporting: you write a clear run, repair or retire recommendation that managers can act on.

What You Will Be Able to Do

By the end of the course you will be able to:

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- Given ultrasonic readings from a corroded shell course, compute the retirement thickness and the maximum allowable fill height.
- From a magnetic flux floor scan, estimate the bottom's remaining life and decide whether the next interval can be extended.
- Using an edge and differential settlement survey, judge whether the tank may return to service.
- Given an alteration request such as a new nozzle or roof change, identify the hydrotest and examination it triggers.
- From a tank inventory with damage mechanisms, rank tanks by risk and draft an inspection schedule.
- Using a sample incident record, link the failure to missed inspection or operating limits.

Course Content

Day 1: Tank Types and Design Basis

- API 650 Design Basis for Atmospheric Welded Tanks
- Fixed Roof, Floating Roof and Low-Pressure Tank Configurations
- Shell, Roof and Foundation Load Paths Including Wind and Seismic
- Material Selection and Brittle Fracture Screening
- Floating Roof Seals and Emission Control Features

Day 2: Damage Mechanisms in Tank Service

- API 571 Damage Mechanisms Relevant to Tanks
- Soil-Side and Product-Side Floor Corrosion
- Shell Corrosion at the Liquid Line and Weld Seams
- Microbiological and Water-Bottom Corrosion in Crude Storage
- Roof Deck, Pontoon and Seal Deterioration

Day 3: API 653 Inspection Scope

- API 653 Scope, Owner Responsibilities and Inspector Role
- Routine In-Service Checks Versus Formal External Inspection
- Internal Inspection Planning and Cleaning Preparation
- Confined Space Entry, Gas Testing and Permit-to-Work for Internal Work
- Inspection Checklists and Record Formats

Day 4: Shell Evaluation

- Thickness Survey Grids and Ultrasonic Data Collection
- Minimum Required Shell Thickness Calculation
- Maximum Allowable Fill Height for Corroded Courses
- Locally Thin Areas and Pitting Acceptance
- Shell Distortion, Dents and Weld Defect Evaluation

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Day 5: Bottom and Foundation Evaluation

- Magnetic Flux Leakage Floor Scanning and Verification
- Minimum Bottom Thickness and Remaining Life Calculation
- Annular Plate and Critical Zone Requirements
- Edge, Planar and Differential Settlement Surveys
- Foundation Defects, Ring Walls and Drainage

Day 6: Corrosion Protection and Leak Prevention

- API RP 651 Cathodic Protection for Tank Bottoms
- API RP 652 Internal Linings for Tank Floors
- External Coating Systems and Insulation Damage
- Release Prevention Barriers and Leak Detection Methods
- Secondary Containment, Sludge Handling and VOC Control

Day 7: Repair, Alteration and Reconstruction

- Repair Versus Alteration Classification Under API 653
- Shell Patches, Insert Plates and Nozzle Additions
- Floor Replacement and Annular Plate Repair
- Hydrostatic Test Requirements and Exemptions
- Weld Examination, Hold Points and Contractor Oversight

Day 8: Risk-Based Inspection and Intervals

- API RP 580 Risk-Based Inspection Principles for Tank Farms
- Corrosion Rate Calculation and Next Inspection Date
- Probability and Consequence Ranking of Tanks
- Deferral Requests and Their Risk Evaluation
- Outage Planning and Shutdown Sequencing

Day 9: Operating Limits and Emergency Readiness

- Overfill Prevention Using API 2350 Safeguards
- SCADA Level, Alarm and Monitoring Data for Integrity
- Tank Fire and Leak Response Planning With Drills
- Incident Investigation and Lessons Learned
- Integrity KPIs, Data Records and Long-Term Asset Planning

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Day 10: Integrity Review Practice on Your Tanks

- Exercise: Shell Fill-Height Recalculation From Survey Data
- Exercise: Floor Scan Review and Interval Decision
- Exercise: Repair Scope and Hydrotest Decision for an Alteration
- Presenting a Run, Repair or Retire Recommendation to Management
- Completing Your Tank Integrity Review File

Case Studies and Exercises

The following are suggested activities.

- Case study: A refinery crude tank shows heavy soil-side floor loss during an outage; you decide between floor replacement and a shorter interval.
- Case study: At a petroleum products marketing terminal, a floating roof tank has edge settlement after heavy rain; you judge return to service.
- Exercise: For a power plant fuel oil tank, you calculate a reduced fill height and set the operating limit.
- Exercise: For a petrochemical tank farm, you rank tanks by risk and draft the inspection schedule.

What You Take Back

You return with your Tank Integrity Review File, built on a tank from your own site. In your first month back you use it to check open inspection findings, confirm fill heights and next dates, and brief planners on the repairs and outages that follow.

- Shell and bottom calculation sheets.
- A settlement evaluation record.
- A repair and alteration decision log.
- A risk-ranked inspection schedule.

Quick Answers FAQ

What do I need before Advanced Storage Tank Integrity and API 653 Inspection?

You need experience reading tank inspection reports, planning tank maintenance or supervising tank work. Basic arithmetic for thickness and fill-height calculations is enough; the course walks through each formula with worked examples.

How does advanced tank integrity training differ from a tank operations and maintenance course?

An operations course covers running tanks safely day to day. Integrity training focuses on evaluating shells, floors and foundations, deciding repairs and alterations, and setting inspection intervals from data and risk.

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How often must an aboveground storage tank be inspected under API 653?

Intervals depend on corrosion rate and remaining life. API 653 sets maximum intervals for external and internal inspection, and allows the internal interval to be set by risk-based inspection when the assessment supports it.

What do I take back from API 653 tank integrity training?

You take back a Tank Integrity Review File for one of your own tanks, with shell and bottom calculations, a settlement record, a repair decision log and a risk-ranked schedule.

For Your Manager

After this course the team member can evaluate shell, floor and foundation data against API 653, decide repairs and alterations, and set inspection intervals from corrosion rates and risk. They bring back a Tank Integrity Review File for a site tank, first used to close open findings and plan the next outage.

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