API 653 Tank Inspection

Internal and External Tank Integrity Inspections

“Detect, Correct, Monitor, Maintain”

API 653 Tank Inspection Overview

- Purpose: Standard for inspection, repair, alteration, and reconstruction of aboveground storage tanks.
- Issued by: American Petroleum Institute (API)
- Applies to: Welded carbon and low alloy steel aboveground storage tanks built to API 650 or API 12C.

Objectives of API 653 Inspections

- Ensure tank integrity and safety.
- Prevent environmental contamination.
- Extend tank service life.
- Comply with industry and regulatory requirements.

Inspector Qualifications

- API 653 Certified Inspector.
- Knowledge of API 650, API 651, API 652.
- Familiarity with NDE methods (UT, MT, PT, RT, VT).
- Field experience with tank construction and maintenance.

Types of Inspections

- Baseline Inspections – Prior to putting the asset in service
- External Visual Inspection – Every 5 years.
- Internal Inspection – Every 10 years (or per corrosion rate)
- In-Service Inspection – Continuous monitoring while the tank is in operation. (Service dependent)

External Inspection Scope

- Check for coating condition, leaks, settlement, and shell distortion.
- Inspect nozzles, manways, and roof structures.
- Evaluate foundation and ground settlement.

Internal Inspection Scope

- Assess corrosion, pitting, and weld conditions.
  - *Coating assessment if applicable*
- Measure floor plate thickness.
- Inspect annular plates and shell-to-bottom welds.
- Review floating roof seals and internals.

NDE Methods Commonly Used

- Ultrasonic Testing (UT): Thickness measurement.
- Magnetic Particle (MT): Detect surface cracks.
- Dye Penetrant (PT): Non-magnetic material inspection.
- Radiographic Testing (RT): Weld defect detection.
- Visual Testing (VT): Overall condition assessment.
- Magnetic Flux Leakage (MFL): Floor Corrosion Assessment.

Corrosion Evaluation and Calculations

- Corrosion Rate (CR): (Initial Thickness - Current Thickness) / Years in Service.
- Minimum Allowable Thickness (tmin): Based on design requirements.
- Remaining Life: (Current Thickness - tmin) / CR.

Repair and Alteration Criteria

- Repairs must meet API 653 Section 9.
- Welding procedures must comply with API 650.
- Alterations require updated drawings and re-rating if design changes occur.

Documentation and Reporting

- Inspection reports must include:
  - Tank identification and dimensions.
  - Inspection type and date.
  - Findings, thickness readings, and corrosion rates.
  - Recommended actions and next inspection schedule.
  - Miscellaneous owner-user specific information

Safety Considerations

- Confined space entry procedures.
- Hot work permits and fire safety.
- Environmental protection measures.
- PPE and hazard communication.

Conclusion

- Regular API 653 inspections ensure compliance, safety, and asset reliability.
- Data-driven maintenance planning improves operational efficiency.
- Maintain proper documentation for audits and long-term recordkeeping.