



API 653:

Tank Inspection, Repair,
Alteration & Reconstruction
Training Course

2 ~ 6 October 2023

Online Training Course

OVERVIEW

This course is designed for individuals who are interested in obtaining the API 653 authorized Atmospheric Tank Inspectors certification as well as for those who require a working knowledge of the intricacies encountered in the working environment.

The course textbook includes notes and summaries on the atmospheric tank inspection standards referenced in the API 653 Body of Knowledge. This comprehensive 40-hour course consists of 8-hour teaching a day in 5 days.

This training course will highlight:

- Overview API 650 Standard Code
- Overview API 653 Standard Code
- Overview API RP 575 and API RP 651 and API RP 652
- Overview ASME V. and ASME IX Standard Codes
- Overview API 571 and API 577
- Questions bank and practice exam

COURSE PRESENTATION

This course will be presented through 5 days and 8 hours per day teaching, the hard and soft copy of course material will be available for all trainees

WHO SHOULD ATTEND

The course highly benefits all persons that are involved in Atmospheric tank inspections and maintenance in all oil, gas, chemicals and petrochemicals plants.

- In-service Storage Tank inspectors
- In-service Storage Tank inspection engineers
- Plant inspectors
- Inspection and corrosion Engineers
- Baseline inspection engineers for new constructed or reconstructed tanks

ORGANIZATIONAL IMPACT

After attending this course you will be competent and be equipped with the knowledge to do inspections and repairs /alterations of atmospheric tanks for your company. You will be issued with the API 653 Certificate of attendance and your company will no longer need a third party inspectors or external repairs .

PERSONAL IMPACT

After attending this course participants will be equipped with the knowledge for them to pass the API 653 exam. They will be capable of doing all their duties according to Cod and standard rules. For persons that has passed the API 653 exam will be API Authorized atmospheric tank inspectors.

Course Objectives

The main goals for this course is How the trainers easily pass to API 653 exam. The second goal is How physically implementing the code and standard rules through plant inspection and maintenance

By the end of this course, participants will learn:

- How to pass the API 653 Exam
- How to perform inspection activities for atmospheric storage tanks and pressure relive valves
- How to assign corrosion rate for all atmospheric tank
- How to assign the next inspection due date for each Storage
- How to calculate the minimum design & required bottom, shell & roof wall thickness
- How to review material impact test requirement
- How to familiarize themselves with associated failure damaged & mechanisms for each tank
- How to distinguish corrosion of above ground steel storage tanks,

- The need for cathodic protection, methods of cathodic protection, corrosion control, design of cathodic protection systems, interference currents and carryout operation and maintenance of cathodic protection systems
- How to assign the NDE test for existing and new pressure vessel
- How to provide atmospheric tank repair and alteration according to code and standard
- How to prepare and review the WPS and PQR for all welding joints
- How to evaluate the existing surface corrosion and pitting
- How to provide atmospheric tank repair and alteration according to code and standard
- How to prepare and review the WPS and PQR for all welding joints
- How to evaluate the existing surface corrosion and pitting

ABOUT THE FACILITATOR



Ganapathy, Balasubramaniam

Mechanical engineer, 30 years experienced in oil & gas industry with leading Indian state owned oil & gas firm HPCL in operations, engineering and management. He has rich experience in static equipment's, managing downstream assets as terminal manager, engineering manager and operations manager. He conducts training programs in mechanical engineering, Design, codes & standards. He is certified by API in storage tanks, risk based inspection & TES, has a diploma in management. He is member of leading oil and gas professional forums of SPE, ASME,

API, ISA and ATD. He is a passionate trainer, associated with leading training and academic institutions, has designed and conducted several training programs for leading oil companies Total, Qatar Petroleum, Kuwait oil co, ADNOC, HMEL, etc. in India, middle east and USA. He is currently engaged with InIPED as an instructor for the static equipment diploma program.

Agenda

Course Outline: Day - 1

07:30 – 08:00 Registration & Coffee

08:00 – 08:15 Welcome & Introduction

08:30 – 09:00 Introduction

09:00 – 09:30 Overview of Course Outline

09:30 – 10:30 Review of API 653 Body of Knowledge

10:00 – 10:15 Coffee Break

10:15 – 12:30 **API 653 - Section 1 – Scope:** Introduction, Compliance with this Standard, Jurisdiction, Safe Working Practices

12:30 – 13:30 Lunch

13:30 – 14:30 **API 653 - Section 2 – Referenced Publications**
API 653 - Section 3 – Definitions

14:30 – 14:45 Coffee Break

14:45 – 16:00 **API 653 - Section 4 - Suitability for Service:** General, Tank Roof Evaluation, Tank Shell Evaluation, Tank Bottom Evaluation, Tank Foundation Evaluation

16:00 – 16:45 **API 653 - Section 5 - Brittle Fracture Considerations:** General, Basic Considerations, Assessment Procedure

16:45 – 17:00 Distribute Homework

Course Outline: Day - 2

07:30 – 08:00 Coffee

08:00– 08:30 Review Homework Answers

08:30 – 10:30 **API 653 - Section 6 - Inspection:** General, Inspection Frequency Considerations, Inspections from the Outside of the Tank, Internal Inspection, Alternative to Internal Inspection to Determine Bottom Thickness, Preparatory Work for Internal Inspection, Inspection Checklists, Records, Reports, Non-Destructive Testing

API 653 - Section 7 - Materials:

General, New Materials, Original Materials for Reconstructed Tanks, Welding Consumables,
API 653 - Section 8 - Design Considerations for Reconstructed Tanks:

General, New Weld Joints, Existing Weld Joints, Shell Design, Shell Penetrations, Wind Girders and Shell Stability, Roofs, Seismic Design

10:30 – 12:30 **API 653 - Section 9 - Tank Repair and Alteration:**

General, Removal and Replacement of Shell Plate Material, Shell Repairs Using Lap-Welded Patch Plates, Repair of Defects in Shell Plate Material, Alteration of Tank Shells to Change Shell Height, Repair of Defective Welds, Repair of Shell Penetrations, Addition or Replacement of Shell Penetrations, Alteration of Existing Shell Penetrations, Repair of Tank Bottoms, Repair of

Fixed Roofs, Floating Roofs, Repair or Replacement of Floating Room Perimeter Seals, Hot Taps

API 653 - Section 10 - Dismantling and Reconstruction: General, Cleaning and Gas Freeing, Dismantling Methods, Reconstructions, Dimensional Tolerances

API 653 - Section 11 - Welding:

Welding Qualifications, Identification and nRecords

API 653 - Section 12 - Examination and Testing:

Nondestructive Examination, Radiographs, Hydrostatic Testing, Leak Tests, Measured Settlement During Hydrostatic Testing

API 653 - Section 13 - Marking and Recordkeeping:

Nameplates, Recordkeeping, Certification

API 653 – Appendices A – G:

12:30 – 13:30 Lunch

13:30 – 14:00 Administer API 653 Section Quiz.

14:00 – 15:00 **API 650 - Section 1 - Scope:**

General, Limitations, Compliance, Referenced Publications

API 650 - Section 2 - Materials:

General, Plates, Welding Electrodes

15:00 – 15:15 Break

15:15 – 16:45 **API 650 - Section 3 - Design:**

Joints, Bottom Plates, Annular Bottom Plates, Shell Design, Shell Openings, Shell Attachments and Tank Appurtenances, Roofs, Wind Load on Tanks (Overturning Stability)

API 650 - Section 4 - Fabrication:

API 650 - Section 5 - Erection:

General, Details of Welding, Inspection, Testing and Repairs, Repairs to Welds, Dimensional Tolerances

16:45 – 17:00 Distribute Homework & Recap

Course Outline: Day - 3

07:30 – 08:00 Coffee

08:00 – 09:45 **API 650 - Section 6 - Methods of Inspecting Joints:**

Radiographic Method, Magnetic Particle Examination, Ultrasonic Examination, Liquid Penetrant Examination, Visual Examination

API 650 - Section 7 - Welding Procedure & Welder Qualifications:

Definitions, Qualification of Welders

API 650 - Section 8 - Marking:

Nameplates, Division of Responsibility, Certification

09:45 – 10:00 Break

10:00 – 11:30 **API 650 - Appendices B - S**

11:30 – 12:00 Administer API 650 Section Quiz

12:00 – 12:30 Slide Show – “Don’t Let this Happen to your Tank”

API RP 575 - Section 1 – Scope

API RP 575 - Section 3 - Selected

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Agenda

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Nondestructive Examination (NDE) Methods:

Ultrasonic-Thickness Measurement, Magnetic Floor Testing

API RP 575 - Section 4 - Types of Storage Tanks:

General, Storage Tanks with Linings and/or Cathodic Protection, Storage Tanks with Leak Detection Systems, Low-Pressure Storage Tanks

14:45 – 15:00 Break

15:00 – 16:45 API RP 575 - Section 5 - Reasons for Inspection and Causes of Deterioration:

Reasons for Inspection, Corrosion of Steel Tanks

API RP 575 - Section 6 - Frequency of Inspection

API RP 575 - Section 7 - Methods of Inspection and Inspection Scheduling:

External Inspection of In-Service Tanks, Foundation Inspection, Anchor Bolt Inspection, Grounding Connection Inspection, Thickness

Measurements, Caustic Cracking, Tank Bottoms,

Inspection Scheduling, Inspection Checklists

API RP 651 - Section 1 – Scope

API RP 651 - Section 3 – Definitions

API RP 651 - Section 4 - Corrosion of Above ground Steel Storage Tanks:

Introduction, Corrosion Mechanisms

API RP 651 - Section 5 - Determination of Need for Cathodic Protection

API RP 651 - Section 6 - Methods of Cathodic Protection for Corrosion Control:

Introduction, Galvanic Systems, Impressed

Current Systems, Cathodic Protection Rectifiers

API RP 651 - Section 7 - Design of Cathodic Protection Systems:

Barriers to Cathodic Protection, Tank Bottom

Replacement, Impervious Membrane Lining, Effects of Impermeable Membrane Secondary

Containment Systems

API RP 651 - Section 8 - Criteria for Cathodic Protection

API RP 651 - Section 9 - Installation of Cathodic Protection Systems:

Introduction, Galvanic Anode Systems, Impressed Current Systems

API RP 651 - Section 10 - Interference Currents

API RP 651 - Section 11 - Operation and Maintenance of Cathodic Protection Systems

API RP 652 - Section 1 – Introduction

API RP 652 - Section 3 – Definitions

API RP 652 - Section 4 - Corrosion Mechanisms:

Chemical Corrosion, Concentration Cell Corrosion,

Corrosion Caused by Sulfate-Reducing Bacteria, Erosion-Corrosion in Water Treatment

API RP 652 - Section 5 - Determination of the Need for Tank Bottom Lining:

General, Design Considerations and Tank Internals, Tank History, Environmental Considerations, Flexibility for Service Change

API RP 652 - Section 6 - Tank Bottomlining Selection:

General, Thin-Film Tank Bottom Linings, Thick-Film Tank Bottom Linings

API RP 652 - Section 7 - Surface Preparation General, Precleaning

API RP 652 - Section 9 – Inspection

API RP 652 - Section 10 - Repair of Tank Bottom Linings:

General, Types of Repairs

API RP 652 - Section 11 - Safety:

Tank Entry, Manufacturer's Material Safety Data Sheets

API RP 571 - Section 1 – Scope

API RP 571 sec. 4 and sec. 5

16:45 – 17:00 Distribute Homework & Recap

Course Outline: Day - 4

07:30 – 08:00 Coffee

08:00 – 10:00 API RP 577 - Section 1 - Scope

API RP 577 - Section 3 - Definitions

API RP 577 - Section 4 – Welding Inspection

Tasks Prior to, During and Upon Completion of Welding Operations; Non-conformances and Defects; NDE Examiner Certification; Safety Precautions

API RP 577 - Section 5 – Welding Processes

Shielded Metal Arc Welding (SMAW), Gas Tungsten Arc Welding (GTAW), Gas Metal Arc Welding (GMAW), Flux Cored Arc Welding (FCAW), Submerged Arc Welding (SAW), Stud Arc Welding (SW)

10:00 – 10:15 Break

10:15 – 12:30 API RP 577 - Section 11 – Refinery and petrochemical Plant Welding Issues

API RP 577 – Appendix A – Terminology and Symbols:

Weld Joint Types, Weld Symbols, Weld Joint Nomenclature, Electrode Identification ASME

Section V - Nondestructive Test Methods

Ultrasonic Thickness Testing, Liquid Penetrant Testing, Magnetic Particle Testing, Radiographic Film Interpretation

12:20 - 13:30 Lunch

13:30 – 15:30 ASME Section IX - WPS and PQR Requirements

Review Procedure Exercise

15:30 – 15:45 Break

15:45 – 16:45 ASME Section IX - Welder Certification

16:45 – 17:00 Distribute Homework & Recap

Course Outline: Day - 5

07:30 – 08:00 Coffee

08:00 – 10:00 Question and Answer Session

10:00 – 10:15 Break

10:15 – 12:30 API 653 Sample Exam

12:30 – 13:30 Lunch

13:30 – 16:15 Continue API 653 Sample Exam Review API 653 Exam Answers

16:15 – 16:30 Break

16:30 – 16:45 Course Conclusion

16:45 – 17:00 Presentation of Course Certificates Post Test and Evaluation

End of Course



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Fill in the form and send to: **Ryan**

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✉ 372 Oak Avenue, Randburg 2160, Johannesburg, RSA 🌐 www.empiretraining.co.za

RESERVE YOUR PLACE TODAY!

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- A copy of the bank deposit receipt should accompany your registration form and must be posted or faxed

DELEGATE ATTENDANCE FORM
NOTE: Please provide information as you wish it to appear on your name badge and on the official participant database

Title	Delegate Name & Surname	Position	Email	Phone

FEE/ DELEGATE

Yes. [I / We] will attend the event

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Per Delegate

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