MERCURY

Process Plant Equipment Integrity: Inspection, Evaluation, & Repair Techniques for Piping

30 Sep - 11 Oct 2024
Vienna (Austria)

Istanbul - Turkey: +90 539 599 12 06
Amman - Jordan: +962 785 666 966
London - UK: +44 748 136 28 02

Process Plant Equipment Integrity: Inspection, Evaluation, & Repair Techniques for Piping

Ref.: 6053_301003 **Date:** 30 Sep - 11 Oct 2024 **Location:** Vienna (Austria) **Fees:** 7800 **Euro**

Introduction:

Petroleum refineries, petrochemicals, and process plants contain vast arrays of equipment and extensive piping networks handling hazardous and corrosive fluids across a broad spectrum of temperatures and pressures.

In this process plant equipment integrity and inspection techniques course, participants will ensure the integrity and reliability of this equipment and the associated piping, which requires conscientious design efforts, along with vigilant monitoring to assure continued fitness for service between scheduled turnarounds.

The construction of process equipment and piping systems adheres to industry codes and standards, with fabrication and welding processes undergoing rigorous inspections to rectify any deficiencies and comply with the acceptance criteria of the respective codes.

Deployed equipment and piping endure various deterioration rates due to exposure to process fluids, necessitating a precise understanding of their current condition and degradation rate. Timely maintenance and repairs are critical to avert equipment failures, and this is where practical inspection and evaluation techniques come into play - they are essential for sustaining plant integrity.

Regular and thorough inspections are cornerstone practices within any industrial plant maintenance regimen, with the success of such programs largely depending on Nondestructive Inspection NDI or NDT techniques utilized. NDT methods enable flaw detection that could lead to future failures, providing valuable insights into the integrity of pipelines and a gauge of their safety margins.

The process plant equipment integrity and inspection techniques course is imperative to grasp the capabilities and constraints of both traditional and advanced NDE tools to optimize the efficacy of every inspection exercise.

Moreover, modern-day plant operators are compelled to minimize maintenance costs by reducing downtime. Practical inspection is a significant contributor to achieving this goal.

Piping Connection and Flexible Piping Connections:

A critical component of process plant integrity is the quality and reliability of piping connections. Whether they are standard rigid joints or flexible piping connections, these components are crucial for maintaining the continuous and safe operation of the plant.

This process plant equipment integrity and inspection techniques course will delve into the standards, inspection techniques in the oil and gas industry, and maintenance strategies that ensure the long-term reliability and integrity of these connections.

Istanbul - Turkey: +90 539 599 12 06
Amman - Jordan: +962 785 666 966
London - UK: +44 748 136 28 02

MERCURY

Targeted Groups:

- Process, Mechanical, and Chemical Engineers.
- Operation and Maintenance Engineers.
- Project Engineers.
- Supervisors and Managers.
- Technical Personnel are involved in the inspection.

Course Objectives:

By the end of this process plant equipment integrity and inspection techniques course, participants will be able to:

- Recognize damage and degradation mechanisms that affect process equipment and piping, which progressively undermine their condition and suitability for continued service.
- Acknowledge that practical inspection is the backbone of plant integrity, with significant implications for Environmental Health and Safety EHS and the company's financial performance.
- Understand industry codes and promote best practices related to the inspection, repair, and alteration of process equipment and piping, including ASME Boiler and Pressure Vessel Code BPVC and various API standards and recommended practices.
- Gain comprehensive insights into fitness-for-service assessment methodologies and API/ASME FFS standards crucial for making informed run/repair/replace decisions concerning damaged equipment/piping.
- Explore the primary industry codes and practices for repairs and alterations to align maintenance with business objectives and cost reductions.
- Learn methods for executing fitness-for-service assessments of impaired equipment/piping to facilitate informed run/repair/replace decisions.

Targeted Competencies:

At the end of this process plant equipment integrity and inspection techniques course, the participants will be able to:

- Understand essential knowledge regarding in-service degradation and damage mechanisms affecting process equipment and piping systems.
- Learn about the interpretation of the integral role of practical inspection in determining the state of equipment/piping.
- Understand risk-based inspection methodology and its practical application.
- Apply fitness-for-service assessment methodologies, reducing the chance of failure and downtime and enhancing plant performance.
- Learn about awareness of industry codes, standards, and best practices in plant integrity management, including conducting efficient inspections, maintenance, and repairs on process equipment/piping.

Istanbul - Turkey: +90 539 599 12 06
Amman - Jordan: +962 785 666 966
London - UK: +44 748 136 28 02

MERCURY

Course Content:

Unit 1: Inspection of the Backbone of Plant Integrity:

- Learn about the significance of inspection throughout the life cycle.
- Inspection and understand why? What? Where? How? when?
- The objective function of inspection.
- Regulatory requirements.
- Impact on plant integrity, safety, reliability, and business performance.
- Inspect the construction codes.
- Manufacture, fabrication, and repair/alteration deficiencies.
- QA/QC requirements in fabrication and welding.
- ASME BPVC requirements - examination vs. inspection.
- ASME code case 2235-3 is for the use of ultrasonic examination instead of radiography.
- Learn about fraudulent/substandard materials in the code construction.
- Understand degradation and damage mechanisms affecting pressure equipment and piping.
- Overview of API 571 - damage mechanisms affecting fixed equipment in the refining industry.
- Learn about Areas of vulnerability in petroleum refineries.
- Injection points.
- Corrosion Under Insulation CUI.
- Soil-to-air interface.
- Integrity of structures and supports.
- In-service inspection - the big picture.
- Non-intrusive inspections.
- Shutdown inspections.
- Inspector qualification and competence.
- API inspector certification.
- API Body of Knowledge.

Unit 2: Inspection Strategies, Plans, Methods, and Techniques:

- Inspection strategies and systems.
- Learn about external and internal inspections and their limitations, costs, and benefits.
- Inspection plans and procedures.
- Statutory requirements.
- Risk-Based Inspection RBI.
- Fundamentals and benefits.
- Overview of API RP 580 - risk-based inspection.
- Overview of API RP 581 - risk-based inspection technology.
- Nondestructive testing NDT.
- Understand highlights of main NDT methods and their application.
- Overview of ASME BPVC Section V - nondestructive examination.
- Advanced inspection techniques and best practices.
- Guided wave ultrasonic long-range inspection.
- Advance phased array for weld inspection.
- On-line monitoring - sensors typically used are strain gauges, thermocouples, displacement transducers, and pressure transducers.

Istanbul - Turkey: +90 539 599 12 06
Amman - Jordan: +962 785 666 966
London - UK: +44 748 136 28 02

MERCURY

Unit 3: Inspection Codes Standards and Best Practices:

- Pressure vessel inspection - API 572 and API 510.
- Learn about fired boilers and heaters inspection.
- API 573 - inspection of fired boilers and heaters.
- ABSA AB 507 - guidelines for the inspection of installed fired heaters.
- FTIS - furnace tube inspection system quest TruTec.
- Inspection of heat exchanger, condenser and fin fan, and cooler tubes.
- Aboveground storage tank inspection.
- ANSI/API RP 575 - guidelines and methods for inspection of existing atmospheric and low-pressure storage tanks, second edition.
- STI SP001 is the standard for inspection of aboveground storage tanks.
- API 653 - tanks inspection, repair, alteration, and reconstruction.
- API 12R1, setting, maintenance, inspection, operation, and repair of tanks in production service.
- Piping and components inspection.
- API 574 - inspection practices for piping system components.
- API 570 - piping inspection code: In-service inspection, repair, and alteration of piping systems.
- Learn about pressure-relieving devices - code and regulatory requirements and best practices.
- API RP 576 - inspection of pressure-relieving devices.
- Pressure testing - code requirements and best practices.
- Hydrostatic testing.
- Pneumatic testing.
- API standard 936 - refractory installation quality control guidelines - inspection and testing monolithic refractory linings and materials.
- API inspector certification.

Unit 4: Evaluation and Analysis of Inspection Data:

- Inspection data verification and evaluation.
- Data completeness.
- Data quality.
- Learn about data management and risk assessment.
- Inspection Data Management System IDMS.
- Understand software systems for managing and assessing inspection data.
- Corrosion rate calculations.
- Remain life calculations.
- Learn about Fitness-For-Service FFS assessment and remaining life determination.
- Understand fundamentals and industry practices.
- Overview of API Std 579-1/ASME FFS-1.
- Learn about the Inspection, Maintenance, and Repair IMR plan.
- Appropriate mitigation activities.

Istanbul - Turkey: +90 539 599 12 06
Amman - Jordan: +962 785 666 966
London - UK: +44 748 136 28 02

MERCURY

Unit 5: Repair and Alteration of Process Equipment and Piping:

- Repair codes, standards, and best practices - API 510, 570, 653.
- API 578 Positive material identification PMI.
- Learn about post-construction codes and an overview of ASME PCC-2.
- Repairs and modifications.
- Temporary and permanent repairs.
- Weld repairs - ASME BPVC IX.
- Mechanical repairs.
- Learn about specialized repair methods - composites.
- Learn about hot tapping and line stop - key considerations, practices, and procedures.
- API 2201 - Safe hot tapping practices in the petroleum and petrochemical industries.
- Rerating.
- Assess the need for rerating.
- Minimum required thickness determination.
- MAWP determination.
- Authorization and registration.

Istanbul - Turkey: +90 539 599 12 06
Amman - Jordan: +962 785 666 966
London - UK: +44 748 136 28 02

MERCURY

Registration form on the :
Process Plant Equipment Integrity: Inspection, Evaluation, & Repair Techniques for Piping

code: 6053 **From:** 30 Sep - 11 Oct 2024 **Venue:** Vienna (Austria) **Fees:** 7800 **Euro**

Complete & Mail or fax to Mercury Training Center at the address given below

Delegate Information

Full Name (Mr / Ms / Dr / Eng):
.....
Position:
.....
Telephone / Mobile:
.....
Personal E-Mail:
.....
Official E-Mail:
.....

Company Information

Company Name:
.....
Address:
.....
City / Country:
.....

Person Responsible for Training and Development

Full Name (Mr / Ms / Dr / Eng):
.....
Position:
.....
Telephone / Mobile:
.....
Personal E-Mail:
.....
Official E-Mail:
.....

Payment Method

☐ Please invoice me

☐ Please invoice my company