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COURSE BROCHURE

Advanced Heat Exchanger Bundle Repair and Tube Leak Testing Training Course

7 – 18 March 2027
Muscat

Advanced Heat Exchanger Bundle Repair and Tube Leak Testing Training Course

Ref: 906_34229 **Date:** 7 – 18 March 2027 **Location:** Muscat **Fees:** 11700 GBP

Heat Exchanger Bundle Repair and Tube Leak Testing is a 2-week training course for process and mechanical engineers who decide when shell and tube bundles are pulled, cleaned, plugged or retubed, and it ends with an Exchanger Bundle Repair Dossier for one critical unit. Tube leaks contaminate products, cooling water and steam systems, and each unplanned bundle pull extends a shutdown. Jupiter Prime Training runs this course for engineers who own exchanger reliability.

Why Heat Exchanger Bundle Repair and Tube Leak Testing Matters Now

Three pressures shape exchanger upkeep today. Longer run lengths between shutdowns mean bundles must survive more fouling and corrosion cycles before anyone can reach them. Energy and emissions targets make every degree of lost approach temperature visible to operations and finance. Experienced bundle shop supervisors and tube inspectors are leaving, and their repair judgement is rarely written down. Organisations that plan repairs from inspection evidence shorten shutdowns and avoid cross-contamination incidents; those that react to leaks lose product, damage downstream equipment and repeat the same failures. The course rests on ISO 55001 for asset management systems and EN 13306 for maintenance terminology.

Who Gains Most from Heat Exchanger Bundle Repair and Tube Leak Testing

- Engineers who set cleaning methods and intervals for fouled bundles
- Specialists who interpret tube inspection results and plugging limits
- Engineers who specify retubing, tube expansion and tubesheet repairs
- Process engineers who track exchanger duty, pressure drop and approach temperature
- Planners who sequence bundle pulls, shop work and hydrotests during shutdowns

Groups that combine process, mechanical and inspection engineers from one site gain most, because exchanger repair decisions sit exactly where their responsibilities meet.

Heat Exchanger Bundle Repair and Tube Leak Testing Capabilities

Participants link thermal performance trends and tube condition evidence to the repair choices made in the bundle shop.

- Calculate fouling resistance from plant temperatures and flows — cleaning interval decisions
- Assess eddy current and IRIS tube inspection reports — plug, sleeve or retube choices
- Specify tube-to-tubesheet expansion and seal welding — bundle shop contractors
- Test bundles with shell-side hydrotests and tube leak tests — return-to-service approval
- Weigh tube vibration and baffle damage risk — redesign or replacement requests
- Build a bundle repair and spares strategy — shutdown scope and budget owners

Key Heat Exchanger Bundle Repair and Tube Leak Testing Terms

- Fouling resistance — the added thermal resistance from deposits on tube surfaces, which lowers duty and raises energy use.
- Tube plugging limit — the share of tubes that can be blocked before an exchanger can no longer meet its duty or velocity limits.
- Eddy current testing — an electromagnetic method that detects wall loss, pitting and cracks in non-magnetic tubes from the inside.
- Tube-to-tubesheet joint — the expanded or welded connection sealing each tube into the tubesheet against leakage between fluids.
- Retubing — replacing all or most tubes in a bundle while reusing the tubesheets, baffles and shell.
- Approach temperature — the difference between the outlet temperature of one fluid and the inlet of the other, a direct sign of exchanger health.

Heat Exchanger Bundle Repair and Tube Leak Testing Day by Day

Day 1: Exchangers in the Asset Portfolio

- Exchanger Criticality Ranking — Linking Units to Production and Safety Consequences
- ISO 55001 Asset Management Principles — Setting Exchanger Repair Objectives
- EN 13306 Failure Terminology — Consistent Reporting of Tube and Bundle Defects
- Exchanger Data Sheets and Drawings — Reading Design Limits Before Repair
- Leak Incident Case Reviews — Lessons from Refinery and Power Station Bundles

Day 2: Thermal Rating and Performance Monitoring

- Duty, LMTD and Overall Coefficient Checks — Judging Exchanger Health Online
- Approach Temperature Trending — Spotting Fouling Before It Limits Throughput
- Pressure Drop Monitoring — Detecting Blockage and Bypassing
- Fouling Resistance Calculation — Setting Cleaning Triggers from Plant Data
- Performance Dashboards for Exchanger Networks — Prioritising Cleaning Across Units

Day 3: Fouling Mechanisms and Cleaning Methods

- Scaling, Biofouling, Coking and Particulate Deposits — Matching Cause to Cleaning
- Hydroblasting and Rotary Lancing — Selecting Pressure and Tooling
- Chemical Cleaning Circuits — Solvent Choice and Waste Handling
- Online Cleaning and Antifoulant Options — Extending Run Length
- Post-Cleaning Verification — Proving Restored Duty and Cleanliness

Day 4: Mechanical Design and Tube Vibration

- Fixed Tubesheet, U-Tube and Floating Head Bundles — Repair Access Implications
- Baffle Spacing and Tube Support — Reading Vibration Susceptibility
- Flow-Induced Vibration Mechanisms — Diagnosing Baffle Cut Tube Failures
- Impingement Plates and Inlet Erosion — Protecting the First Tube Rows
- Thermal Expansion Stresses — Assessing Tubesheet and Joint Cracking

Day 5: Tube Inspection Techniques

- Eddy Current Testing of Non-Magnetic Tubes — Wall Loss and Pitting Detection
- Remote Field and IRIS Ultrasonic Methods — Inspecting Carbon Steel Tubes
- Visual and Borescope Inspection — Tubesheet Face and Tube End Defects
- Inspection Sampling Plans — Choosing Percentage and Tube Locations
- Tube Map Reporting — Recording Defects for Repair Decisions

Day 6: Tube Leak Testing Methods

- Shell-Side Hydrostatic Testing — Locating Leaking Tubes and Joints
- Helium and Tracer Gas Leak Testing — Finding Small Joint Leaks
- Vacuum and Air Leak Testing of Tube Ends — Fast Shop Screening
- Test Rings and Floating Head Test Fixtures — Isolating Tubesheet Joints
- Leak Test Acceptance Criteria — Approving Bundles for Reassembly

Day 7: Plugging, Sleeving and Tube Joint Repair

- Tube Plugging Methods and Plug Selection — Temporary or Permanent Isolation
- Tube Sleeving and Liner Inserts — Repairing Tube End Erosion
- Tube Re-Expansion — Restoring Leaking Rolled Joints
- Seal Welding of Tube Ends — When Welded Joints Are Required
- Plugging Limit Calculation — Checking Remaining Duty and Velocity

Day 8: Retubing and Bundle Replacement

- Retube Versus New Bundle Economics — Life-Cycle Cost Comparison
- Tube Material Upgrades — Duplex, Titanium and Alloy Options
- Tube Removal and Tubesheet Hole Restoration — Shop Work Sequence
- Baffle and Tie Rod Refurbishment — Preventing Repeat Vibration Damage
- Bundle Handling and Extraction Rigging — Avoiding Damage During Pulls

Day 9: Shutdown Execution and Return to Service

- Bundle Pull Sequencing in Shutdowns — Critical Path and Crane Planning
- Gasket and Channel Cover Reassembly — Leak-Free Closure of Heads
- Final Hydrotest and Pressure Boundary Release — Handover to Operations
- Commissioning and Duty Verification — Confirming Restored Performance
- Repair History Records in the CMMS — Building Evidence for Next Decisions

Day 10: Practising the Exchanger Bundle Repair Dossier

- Cleaning Trigger Sheet — Applying Day 2 Performance Calculations
- Tube Map and Repair Choice — Applying Day 5 and Day 7 Methods
- Leak Test Procedure for One Bundle — Applying Day 6 Techniques
- Retube or Replace Recommendation — Applying Day 8 Economics
- Exchanger Bundle Repair Dossier — Peer Challenge and Final Version

Applying Heat Exchanger Bundle Repair and Tube Leak Testing After the Course

- Set up approach temperature and fouling resistance trending for the five most critical exchangers on site.
- Compare the last tube inspection report for one bundle against its plugging limit and propose a repair or retube decision.

Heat Exchanger Bundle Repair and Tube Leak Testing Questions FAQ

What is heat exchanger bundle repair and tube leak testing, and why does it matter now?

It is the practice of cleaning, inspecting, leak testing, plugging and retubing shell and tube bundles so they return to service reliably. Longer run lengths, energy targets and the loss of experienced shop staff make evidence-based repair decisions essential.

Which roles gain most from heat exchanger bundle repair and tube leak testing training?

Process and mechanical engineers responsible for exchangers gain most, together with tube inspectors and shutdown planners. You will benefit if you approve cleaning, plugging or retubing, or sign bundles off after leak tests.

How does heat exchanger bundle repair and tube leak testing differ from an exchanger design course?

It concentrates on maintaining bundles already in service rather than sizing new ones. Thermal rating and vibration appear as diagnostic tools, while most time goes to inspection, leak testing, plugging, retubing and shutdown execution.

What will you bring back from heat exchanger bundle repair and tube leak testing training?

You bring back a repair dossier for one critical exchanger. It holds cleaning triggers, a tube map with repair choices, a leak test procedure and a retube or replace recommendation ready for the next shutdown scope.

Heat Exchanger Bundle Repair and Tube Leak Testing: The Way Forward

The Exchanger Bundle Repair Dossier first informs whether a critical bundle is cleaned, plugged or retubed at the next shutdown. Process engineers, inspectors and planners use it to agree scope and test methods. After its first use, revisit the plugging limit and cleaning triggers against the new inspection results, so the dossier tracks how that bundle actually degrades.