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COURSE BROCHURE

Advanced Thermal Insulation and Refractory Lining Training Course

1 – 12 August 2027
Muscat

Advanced Thermal Insulation and Refractory Lining Training Course

Ref: 147_4054 **Date:** 1 – 12 August 2027 **Location:** Muscat **Fees:** 11700 GBP

Advanced Thermal Insulation and Refractory Lining is a 2-week training course for maintenance engineers, refractory and insulation supervisors and inspection engineers in process plants, built around one work product: a refractory and insulation work execution pack for a planned shutdown. Energy costs, emissions targets and tight turnaround windows now make lining failures and heat losses expensive in fuel, production and safety. Jupiter Prime Training presents this course on thermal insulation and refractory lining.

Why Thermal Insulation and Refractory Lining Matters Now

Three pressures shape thermal insulation and refractory lining today: plant owners chasing fuel savings and lower emissions from furnaces, boilers and kilns; integrity teams confronting corrosion under insulation on ageing piping and vessels; and shorter turnarounds that compress installation, curing and dry-out. Plants that select linings and insulation systems deliberately run longer between outages, keep shell temperatures safe and avoid hidden corrosion, while poor choices show up as hot spots, spalling and leaks. The course rests on manufacturer data sheets, heat-transfer principles and recognised installation and inspection practice rather than any single product system.

Who Gains Most from Thermal Insulation and Refractory Lining

- Maintenance engineers who plan lining repairs and insulation renewals within outages
- Refractory supervisors responsible for anchoring, placing and curing castables and bricks
- Insulation supervisors who oversee jacketing, cladding and weatherproofing on hot and cold services
- Inspection engineers who assess lining condition and corrosion under insulation
- Reliability engineers who track fuel efficiency and lining life across heaters and kilns

Refinery, petrochemical, power and cement maintenance departments gain most when their refractory, insulation and inspection leads attend together and agree one execution approach.

Thermal Insulation and Refractory Lining Capabilities

Participants link material properties, installation discipline and inspection findings to lining life and energy use.

- Calculate heat loss and surface temperatures for insulated and lined equipment — energy and personnel protection decisions
- Specify castables, bricks and ceramic fibre for each service zone — maintenance planners
- Design anchoring patterns and expansion allowances — refractory installation crews
- Apply dry-out and heat-up schedules to new and repaired linings — operations teams
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Assess corrosion under insulation risk and select inspection methods — integrity engineers
- Communicate repair scopes and quality checks for shutdowns — turnaround managers

Key Thermal Insulation and Refractory Lining Terms

- Castable — a refractory concrete of graded aggregate and binder, placed by pouring, pumping or gunning and cured in place.
- Ceramic Fibre — a low-density refractory insulation in blanket, module or board form, used for fast heat-up and low heat storage.
- Thermal Conductivity — the rate at which a material conducts heat, the main property governing insulation thickness and shell temperature.
- Dry-Out Schedule — a controlled heating sequence that removes free and chemically bound water from a new lining without explosive spalling.
- Corrosion Under Insulation — external corrosion of pipes and vessels caused by moisture trapped beneath insulation and cladding.
- Anchor — a metallic or ceramic fixing welded to the shell that holds a refractory lining in place under thermal movement.

Thermal Insulation and Refractory Lining Day by Day

Day 1: Heat Containment in Process Plants

- Furnaces, Boilers, Kilns and Heaters Compared — Mapping Lining Duties by Equipment
- Energy and Emissions Pressures — Linking Heat Loss to Fuel Cost
- Lining Failure Case Histories in Refining and Cement — Tracing Root Causes
- Turnaround Constraints and Critical Path — Planning Refractory Work Windows
- Safety Hazards of Refractory Work — Controlling Dust, Confined Space and Heat

Day 2: Heat Transfer and Insulation Design

- Conduction, Convection and Radiation Basics — Choosing the Right Calculation Model
- Heat-Loss and Surface Temperature Calculation — Setting Insulation Thickness
- Economic Insulation Thickness — Balancing Material Cost Against Energy Saving
- Personnel Protection and Condensation Control — Designing for Hot and Cold Services
- Multi-Layer Lining Thermal Profiles — Predicting Interface and Shell Temperatures

Day 3: Insulation Materials and Systems

- Mineral Wool, Calcium Silicate and Cellular Glass — Matching Material to Service Temperature
- Aerogel and Microporous Insulation — Weighing Thin Profiles Against Cost
- Jacketing, Cladding and Vapour Barriers — Keeping Water Out of Insulation
- Removable Insulation Covers for Valves and Flanges — Easing Maintenance Access
- Insulation Specification Sheets — Standardising Systems Across Plant Units

Day 4: Corrosion Under Insulation

- CUI Mechanisms and Temperature Ranges — Identifying Susceptible Piping and Vessels
- Risk-Based CUI Screening — Prioritising Inspection Across Plant Circuits
- Protective Coatings Beneath Insulation — Selecting Systems for Wet Service
- Non-Intrusive Inspection Methods — Comparing Radiography, Pulsed Eddy Current and Thermography
- CUI Repair and Re-Insulation Practice — Restoring Integrity After Findings

Day 5: Refractory Materials Science

- Dense and Insulating Firebrick — Choosing Bricks by Load and Temperature
- Conventional, Low and Ultra-Low Cement Castables — Matching Castable to Duty
- Plastic, Ramming and Gunning Mixes — Selecting Materials for Repairs
- Ceramic Fibre Modules and Blankets — Weighing Heat Storage Against Durability
- Chemical Attack, Abrasion and Thermal Shock — Predicting Refractory Wear Modes

Day 6: Anchoring and Lining Design

- Metallic and Ceramic Anchor Selection — Matching Alloy to Shell Temperature
- Anchor Spacing and Orientation Patterns — Holding Linings Under Thermal Movement
- Expansion Joints and Allowances — Preventing Buckling and Cracking
- Hot-Face and Back-Up Layer Combinations — Optimising Lining Thickness
- Lining Drawings and Material Take-Off — Preparing Installation Documents

Day 7: Installation and Work Execution

- Surface Preparation and Anchor Welding Checks — Readying Shells for Lining
- Casting, Pumping and Gunning Methods — Choosing Placement for Each Zone
- Bricklaying Practice and Mortar Joints — Controlling Dimensional Accuracy
- Mixing Water, Temperature and Curing Control — Protecting Castable Strength
- Hold Points and Installation Records — Verifying Work Before Closing Equipment

Day 8: Dry-Out and Heat-Up

- Water Removal Mechanisms in Castables — Avoiding Explosive Spalling
- Dry-Out Schedule Design — Setting Ramp Rates and Holding Temperatures
- Temporary Burners and Thermocouple Placement — Controlling Dry-Out Conditions
- Heat-Up After Partial Repairs — Balancing Production Pressure Against Lining Life
- Dry-Out Monitoring Logs — Documenting Compliance With the Approved Curve

Day 9: Inspection, Repair and Lining Life

- Infrared Thermography Surveys — Locating Hot Spots While Equipment Runs
- Shutdown Lining Inspection and Sounding — Assessing Cracks, Spalls and Erosion
- Repair Method Selection — Deciding Between Patching, Gunning or Relining
- Lining Life Tracking and Failure Analysis — Informing Future Material Choices
- Insulation Condition Surveys — Prioritising Renewal by Energy Loss

Day 10: Practising the Work Execution Pack

- Heat-Loss Assessment of a Case Heater — Applying Thermal Calculation Skills
- Material and Anchor Selection Exercise — Rehearsing Lining Design Choices
- Installation Quality Plan With Hold Points — Testing Shutdown Readiness
- Dry-Out Curve and Inspection Checklist — Linking Commissioning to Lining Life
- Refractory and Insulation Work Execution Pack — Completing the Shutdown Work Product

Applying Thermal Insulation and Refractory Lining After the Course

- Lead a thermography survey of one furnace or heater and rank hot spots for the next shutdown repair scope.
- Screen one plant circuit for corrosion under insulation risk and propose an inspection sequence to the integrity team.

Thermal Insulation and Refractory Lining Questions FAQ

What is thermal insulation and refractory lining and why does it matter now?

Thermal insulation and refractory lining is the selection, installation and upkeep of materials that contain heat in process equipment. It matters now because fuel costs, emissions targets and shorter turnarounds make lining failures, heat losses and corrosion under insulation costly.

Which roles gain most from thermal insulation and refractory lining training?

Maintenance engineers, refractory and insulation supervisors and inspection engineers gain most, with reliability engineers close behind. Each decides on materials, installation quality, dry-out or inspection that determine how long linings last and how much heat escapes.

How does thermal insulation and refractory lining training differ from a general corrosion or coatings course?

Thermal insulation and refractory lining training centres on heat containment rather than corrosion protection alone. A coatings course covers paint systems and surface protection; this training covers heat-loss design, refractory materials, anchoring, installation, dry-out, thermography and lining repair.

What do you bring back from thermal insulation and refractory lining training?

You bring back a refractory and insulation work execution pack for a planned shutdown, with material selections, anchoring details, hold points, a dry-out curve and inspection checks that your maintenance crews can use directly.

Thermal Insulation and Refractory Lining: The Way Forward

The refractory and insulation work execution pack first informs the repair scope and material order for the next shutdown. Maintenance planners, refractory supervisors and inspectors use it to sequence installation, curing and dry-out. After its first use, compare thermography results and lining wear with the design assumptions and adjust materials, anchoring or heat-up rates for the following campaign.