



Refractories Applications, Inspection and Maintenance



Introduction:

Refractories are considered the critical factor for the successful and reliable operation of many high-temperature industrial processes. They are often a major cost item both in general maintenance and also in terms of unscheduled downtime of production units arising from premature material failure. There is a continuous need for technical professionals involved in the operation of these processes to be well informed about new technologies related to the refractory material and their physical and technical characteristics.

This training course is designed to provide a detailed discussion of refractory technology as related to high-temperature requirements for different industries. The course will be focused on the practical aspects of refractory evaluation, selection, installation, maintenance, and repair techniques in many industrial applications.

Targeted Competencies:

- Designing characteristics of refractories: Thermal, Mechanical, and Chemical
- Methods of testing refractories
- Efficient installation of refractories for various applications
- Root cause analysis of failures encountered in the operation
- Guidelines for inspection, maintenance, and repair of refractories

Who Should Attend?

- Professionals involved in refractory application
- Professionals involved in refractory production
- Refractory Engineers
- Refractory Supervisors
- Maintenance Engineers

Course Objectives:

By the end of this course delegates will be able to:

- Explain the characteristics of different types of industrial refractories
- Understand refractory properties: mechanical, thermal and chemical
- Implement most appropriate installation techniques
- Understand issues related to their quality and reliability
- Analyze results of inspection and testing

Course Outline:

Unit 1: Overview of Refractories:

- Refractories and Their Role in Modern Industry
- Categories of Refractories
- Refractory Standards Developed By ASTM
- Refractories Based on Chemical Composition (Basic, High Alumina, Silica)
- Refractories Based on Physical Form (Bricks and Shapes)
- Refractories Based on Manufacturing Technologies

Unit 2: Manufacturing Technologies:

- Significance of Raw Material Selection
- Manufacturing Process of Pre-Formed Refractories (Bricks and Shapes)

- Manufacturing of Unformed Monolithics (Castables, Mixes, Plastics, Grains)
- Safety Issues during Manufacturing
- Quality Assurance in Manufacturing
- Environmental Considerations

Unit 3: Technical Properties of Refractories:

- Design Properties: Thermal (Refractoriness) Mechanical (Strength, Spalling)
- Characteristics of Working Refractories: (Max. Service Temperature, Temperature Shock)
- Thermal Stability of Refractory Structures (Creep and Thermal Expansion)
- Corrosion Resistance to Hot Liquids, Hot Gases, Melted Metals
- Wear & Attack Mechanisms of Refractory Materials
- Qualifications for Working Refractory Structures

Unit 4: Testing and Installation:

- Testing of Refractories: Physical, Chemical, Thermomechanical
- Guidelines for PCE, RUL and other Tests
- Analysis of Test Results: Crushing Strength and Thermal Stress
- Installation Technique for Preformed Bricks with Mortar
- Installation Techniques for Monolithics: Castables, Gunning, Ramming, Spray Cast)

Unit 5: Inspection, Maintenance, Troubleshooting, Repair:

- Inspection of Refractories During Installation and in Operation
- Preventive Maintenance Checklist
- Problems in Operation: Typical Failures and Root Causes
- Troubleshooting Methods
- Common Repair Techniques
- Safety and Health Hazards