Materials Selection for Chemical Plants Training Course.

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Selecting the right materials for chemical plants is a critical decision that directly impacts operational efficiency, safety, and cost-effectiveness. Materials Selection for Chemical Plants Training Course equips professionals with cutting-edge knowledge and practical insights to optimize equipment durability, prevent corrosion, and enhance process performance. By integrating industry best practices, advanced metallurgy, and chemical compatibility principles, participants gain the expertise to make informed material choices that withstand extreme conditions, high temperatures, and aggressive chemical environments.

This comprehensive training leverages a hands-on, case-based approach, ensuring participants not only understand the theoretical foundations of material science but also apply them to real-world chemical plant scenarios. From corrosion mitigation strategies to high-performance alloy selection and sustainable materials adoption, the course empowers engineers, project managers, and plant operators to reduce downtime, improve safety, and increase overall plant efficiency.

Programme Curriculum

Materials Selection for Chemical Plants Training Course

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Course Duration

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Course Objectives

By the end of this course, participants will be able to:

1. Identify material properties suitable for high-temperature and high-pressure chemical processes.
2. Apply corrosion prevention techniques for various chemical plant environments.
3. Evaluate metallic and non-metallic materials for chemical compatibility.
4. Design cost-effective and durable piping and equipment systems.
5. Select advanced alloys for extreme chemical and mechanical conditions.
6. Assess erosion, wear, and fatigue resistance in industrial applications.
7. Implement sustainable and eco-friendly materials for chemical plants.
8. Integrate failure analysis and risk assessment in material selection.
9. Optimize maintenance strategies to extend equipment life.
10. Interpret international material standards and certifications.
11. Apply digital tools and simulation software for material performance prediction.
12. Develop plant-specific material selection guidelines for safety and efficiency.
13. Analyze real-world case studies to implement best practices in material selection.

Target Audience

- Chemical Plant Engineers
- Process Engineers
- Maintenance Engineers
- Project Managers in Chemical Industries
- Materials Scientists and Metallurgists
- Plant Safety Officers
- Procurement Specialists in Industrial Materials
- Industrial Consultants in Chemical and Petrochemical Sectors

Course Modules

Module 1: Fundamentals of Material Science for Chemical Plants

- Overview of metals, alloys, ceramics, and polymers
- Mechanical, thermal, and chemical properties
- Corrosion mechanisms and material degradation
- Material selection criteria in process design
- Case Study: Material failures in a sulfuric acid plant

Module 2: Corrosion and Corrosion Prevention

- Types of corrosion in chemical plants

- Corrosion-resistant materials and coatings
- Cathodic protection techniques
- Corrosion monitoring and inspection
- Case Study: Pitting and stress corrosion cracking in pipelines

Module 3: Metals and Alloys Selection

- Stainless steels, nickel alloys, and titanium
- High-performance superalloys
- Material selection for heat exchangers and reactors
- Cost-benefit analysis of alloy choice
- Case Study: Alloy failure in petrochemical distillation units

Module 4: Non-Metallic Materials

- Polymers, composites, and elastomers
- Chemical resistance and temperature limits
- Applications in gaskets, linings, and seals
- Life expectancy and performance prediction
- Case Study: PTFE lining failure in an acid storage tank

Module 5: High-Temperature and High-Pressure Applications

- Material behavior under extreme conditions
- Creep, fatigue, and thermal expansion
- Pressure vessel and piping design considerations
- Safety standards for high-temperature systems
- Case Study: Superheater tube degradation in chemical reactors

Module 6: Sustainable and Green Materials

- Eco-friendly alloys and recyclable materials
- Life-cycle analysis for chemical plants
- Reducing environmental impact with material choice
- Emerging materials for sustainable processes
- Case Study: Implementation of green piping materials in a plant

Module 7: Material Testing and Quality Assurance

- Non-destructive testing (NDT) methods
- Mechanical and chemical property tests
- Material certification and compliance
- Performance monitoring and inspection schedules
- Case Study: Detecting sub-surface defects in pressure vessels

Module 8: Practical Material Selection Strategies

- Decision matrices and selection tools
- Integration with process and equipment design
- Risk assessment and mitigation strategies
- Cost optimization and lifecycle planning
- Case Study: Material selection for a multi-product chemical plant

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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