

€ TRAINING

Seawater Reverse Osmosis RO and
Demineralization System





Seawater Reverse Osmosis RO and Demineralization System

Introduction:

This training program in seawater reverse osmosis RO and demineralization processes for power plants, covers principles of membrane separation technology, operation and maintenance of key components, and various demineralization technologies. It empowers participants to enhance water treatment processes, ensure high-purity water supply, and optimize power plant performance.

Program Objectives:

At the end of this program, participants will be able to:

- Gain a thorough understanding of seawater RO and demineralization process.
- Master the principles of membrane separation technology used in RO systems.
- Learn the operation and maintenance procedures for key RO system components
- Master the fundamentals of demineralization processes and their applications.
- Gain in-depth knowledge of various demineralization technologies, including ion exchange and membrane deionization EDI.
- Develop proficiency in operating and maintaining demineralization systems effectively.

Targeted Audience:

- Water treatment plant operators and technicians.
- Chemical engineers and process engineers.
- Facility maintenance personnel responsible for demineralization systems.
- Operations and maintenance personnel.
- Water treatment specialists.
- Project managers involved in RO system design and implementation.

Program Outlines:

Unit 1:

Seawater RO Fundamentals and System Overview:

- Introduction to RO Water Requirements: Understanding the need for high-purity water and its role in power generation.
- Seawater Characteristics and Pretreatment: Challenges associated with seawater composition and pre-treatment processes like filtration and chlorination.
- Reverse Osmosis Principles: Fundamentals of membrane separation technology, pressure-driven permeate flow, and salt rejection.
- RO System Components and Design: Detailed exploration of pre-treatment systems, high-pressure pumps, membrane vessels, and permeate recovery systems.
- RO System Integration: Understanding the role of RO systems within the overall water cycle and their connection to other water treatment processes.

Unit 2:

RO Membrane Technology and Feedwater Quality Management:

- Types of RO Membranes: Exploring different membrane configurations spiral-wound, hollow fiber and their performance characteristics.
- Membrane Fouling and Cleaning Strategies: Identifying types of membrane fouling, understanding its impact on performance, and learning cleaning techniques chemical, physical.
- Feedwater Quality Monitoring and Control: Analyzing key parameters like conductivity, pH, and chlorine levels to ensure optimal RO membrane performance.
- Membrane Replacement and Disposal Considerations: Factors influencing membrane replacement decisions and proper disposal procedures.
- Minimizing Environmental Impact of RO Systems: Understanding brine disposal methods and regulations.

Unit 3:

Operation and Maintenance of Demineralization Systems:

- Standard Operating Procedures SOPs for Demineralization Systems: Establishing safe and efficient operating practices for ion exchange systems and EDI units.
- Pre-treatment Requirements for Demineralization: Understanding the importance of pre-treatment steps like filtration and chlorination to ensure optimal system performance.
- Monitoring and Control Systems: Utilizing instrumentation to track critical parameters like conductivity, pH, and flow rates for effective system control.
- Demineralization System Maintenance Practices: Develop routine maintenance plans for all system components, including filters, valves, and pumps.
- Chemical Handling and Safety Procedures: Learning safe handling procedures for chemicals used in

demineralization systems and proper disposal methods.

Unit 4:

Troubleshooting Common Demineralization System Problems:

- Identifying and Diagnosing Water Quality Issues: Analyzing causes of poor water quality in demineralized water, such as incomplete ion removal, resin exhaustion, and leaks.
- Troubleshooting Pressure Drop and Flow Rate Deviations: Understanding factors contributing to pressure drops and flow rate deviations, and implementing corrective measures.
- Resin Leakage and Bed Breakdown: Identifying causes of resin leakage and bed breakdown, and corrective actions.
- Troubleshooting Electrical and Instrumentation Issues: Understanding basic troubleshooting techniques for electrical components and instrumentation associated with demineralization systems.
- Utilizing Data Analysis for Fault Diagnosis: Leveraging data from monitoring systems to identify trends and pinpoint root causes of system malfunctions.

Unit 5:

Troubleshooting Common RO System Problems:

- Identifying and Diagnosing Permeate Quality Issues: Analyzing causes of low permeate quality like membrane fouling, feedwater contamination, and inadequate rejection rates.
- Troubleshooting Pressure Drop and Flow Rate Issues: Understanding factors contributing to pressure drops and flow rate deviations, and implementing corrective measures.
- Membrane Integrity Testing and Leak Detection: Evaluating membrane integrity and identifying potential leaks within the RO system.
- Troubleshooting Pump Problems: Identifying and addressing common issues faced with high-pressure pumps used in RO systems.
- Utilizing Data Analysis for Fault Diagnosis: Leveraging data from monitoring systems to identify trends and pinpoint root causes of malfunctions.