



Water (Pre) treatment

Course Description

This course provides a detailed overview of key processes, technologies, and equipment used for pretreatment of Water and saline water used for different purposes, and discusses their areas of application, past track record, advantages, and disadvantages. The course describes typical causes and mechanisms of RO-membrane fouling and presents most recent developments in pretreatment technology and science. This course covers the pretreatment of brackish waters, and mainly focused of pretreatment of Underground Water and seawater for desalination. It should be pointed out, however, that practically all technologies and source-water conditioning methods described in this course are equally applicable to pretreatment of seawater and brackish water.

Course Objectives

The Trainees will be able to:

- Water Pretreatment purposes
- Pretreatment system steps
- Understand the Fouling definition.
- Define the different between RO Fouling.

- Know the Membrane Colloidal, Coagulant meaning.
- Understand the RO – DAF disadvantages & advantages
- Recognize the Hard scaling, Post Treatment
- Understand the RO definition and fundamentals of RO .
- Know Membrane Filtration types MF, UF, NF, and RO
- Understand the RO membrane disadvantages & advantages
- To illustrate the operation and troubleshooting of Membrane Filtration technologies.

Who Should Attend?

Reverse Osmosis Water Desalination Engineers, Chemists and Water desalination Operators.

Course Outline

Day One

Pre test

1. Introduction to Water and Saline Water Pretreatment

- Purpose of Pretreatment
- Membrane-Fouling Mechanisms

2. Water and Saline Water Intakes and Pretreatment

- Introduction
- Subsurface Intakes
- Open Intakes

3. Membrane Foulants and Saline Water Pretreatment

- Particulate Foulants
- Colloidal Foulants
- Mineral-Scaling Foulants
- Natural Organic Foulants
- Microbial Foulants
- Combined Effect of Various Foulants on Membrane

Day Two

4. Diagnostics of Membrane Fouling and Scaling

- Purpose of Membrane Fouling and Scaling Diagnostics
- Typical Membrane-Fouling Phenomena
- Typical Diagnostics Procedures
- Membrane Autopsy

5. Pretreatment by Screening

- Introduction
- Bar, Band, and Drum Screens
- Microscreens
- Cartridge Filters

6. Conditioning of Water and Saline Water

- Introduction
- Coagulation
- Flocculation
- Addition of Scale Inhibitors
- Addition of Sodium Hydroxide
- Addition of Biocides
- Addition of Reducing Compounds
- Planning and Design Considerations for Source Water Conditioning

Day Three

7. Sand Removal, Sedimentation, and Dissolved Air Flotation

- Introduction
- Sand Removal Systems
- Sedimentation Tanks
- Dissolved Air Flotation Clarifiers
- Construction Costs of Lamella Settlers and DAF Clarifiers

8. Granular Media Filtration

- Introduction
- The Filter Operation Cycle
- Key Filtration System Components
- Filter Types and Configurations
- Filter Performance
- Source Water Pretreatment Prior to Granular Media Filtration
- Planning and Design Considerations
- Construction Costs of Granular Media Filtration Systems

Day Four

9. Membrane Filtration

- Introduction
- The Membrane Filtration Process
- Key Filtration System Components
- Filter Types and Configurations
- Filter Performance
- Planning and Design Considerations
- Overview of Membrane Products Used for Saline Water Pretreatment
- Design Examples

- Construction Costs of Membrane Pretreatment System

10. Comparison of Granular Media and Membrane Pretreatment

- Introduction
- Effect of Source Water Quality on Performance
- Surface Area Requirements
- Quantity and Quality of Generated Residuals
- Chemical Use
- Power Use
- Economy of Scale
- Filtration Media Replacement Costs
- Commoditization
- Water Production Costs
- Concluding Remarks

Day Five

11. Guidelines for Pretreatment System Selection

- Introduction
- Pretreatment Selection Guidelines
- Additional Considerations for Selection of Pretreatment

12. Reverse Osmosis System Design and Pretreatment

- Overview of Typical SWRO Desalination System
- SWRO Membrane Elements-Key Types and Pretreatment Considerations
- Internally Staged Membrane Configuration and Fouling Implications
- Alternative SWRO-Membrane Systems and Pretreatment
- Alternatives for Control of Microbial Fouling

Post Test

Duration

Five days: 08:00am until 03:30pm daily