Industrial Water Treatment and Desalination Operations Training Course

30 Nov - 04 Dec 2026

Cape town

4600 € (Per Person)

Ref: #ACE6041_296351

Course Introduction / Overview:

This comprehensive course provides an in-depth exploration of the critical processes involved in industrial water treatment and desalination plant operations. In an era of increasing water scarcity and stringent environmental regulations, mastering these technologies is paramount for sustainable industrial growth and public welfare. This program is meticulously designed to bridge the gap between theoretical knowledge and practical application, covering everything from the fundamental principles of water chemistry to the advanced operational management of reverse osmosis and thermal desalination systems. As detailed by experts like Syed R. Qasim in his seminal work, "Wastewater Treatment Plants: Planning, Design, and Operation," effective water management requires a holistic understanding of both treatment and production processes. Participants will gain actionable insights into process optimization, troubleshooting, maintenance strategies, and regulatory compliance. BIG BEN Training Center has developed this curriculum to empower professionals with the skills needed to enhance operational efficiency, ensure water quality, and minimize the environmental footprint of their facilities, making them invaluable assets in the global pursuit of water security.

Target Audience / This training course is suitable for:

- Plant Operators and Technicians.
- Process and Chemical Engineers.
- Water Treatment Plant Managers and Supervisors.
- Maintenance and Instrumentation Engineers.
- Environmental Health and Safety (EHS) Officers.
- Water Quality Analysts and Laboratory Staff.
- Facility and Utility Managers.
- Project Engineers involved in water infrastructure projects.
- Consultants in the water and wastewater industry.
- Regulatory and compliance personnel.

Target Sectors and Industries:

- Oil and Gas Production and Refining.
- Power Generation and Utilities.
- Petrochemical and Chemical Manufacturing.
- Mining and Metals Processing.
- Pharmaceuticals and Biotechnology.
- Food and Beverage Production.
- Pulp and Paper Manufacturing.
- Municipal Water and Wastewater Authorities.
- Governmental bodies and environmental protection agencies.
- Large-scale commercial and residential complex management.

Target Organizations Departments:

- Operations and Production.
- Maintenance and Reliability.
- Engineering and Technical Services.
- Environmental, Health, and Safety (EHS).
- Quality Control and Assurance (QC/QA).
- Utilities and Facilities Management.
- Research and Development (R&D).
- Process Improvement and Optimization.
- Project Management.
- Regulatory Affairs and Compliance.

Course Offerings:

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

- Analyze raw water characteristics and select appropriate industrial treatment methods.
- Master the operational principles of key desalination technologies, including reverse osmosis (RO) and multi-stage flash (MSF).
- Implement effective pre-treatment and post-treatment strategies to optimize plant performance and longevity.
- Develop and execute robust maintenance schedules for critical equipment like pumps, membranes, and filters.
- Troubleshoot common operational problems such as membrane fouling, scaling, and chemical dosing imbalances.
- Apply best practices for water quality monitoring, sampling, and data analysis to ensure compliance with standards.
- Evaluate and implement strategies for energy efficiency and energy recovery in desalination processes.
- Manage brine concentrate and other waste streams in an environmentally responsible manner.
- Ensure a safe working environment by adhering to health and safety protocols specific to water treatment plants.
- Utilize process control and automation systems for efficient plant operation and monitoring.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a dynamic and engaging learning environment that maximizes knowledge retention and practical skill development. This course moves beyond traditional lectures by integrating a blended learning approach. Mornings will feature interactive presentations led by industry experts, who will break down complex concepts in industrial water treatment and desalination into understandable modules. These sessions are enriched with real-world case studies from various industries, allowing participants to analyze challenges and successful solutions. Afternoons are dedicated to hands-on learning through collaborative group workshops, practical exercises on process calculations, and simulation-based problem-solving. Participants will work in teams to troubleshoot operational scenarios, design basic maintenance plans, and debate the pros and cons of different technologies. This interactive format encourages active participation, peer-to-peer learning, and direct application of concepts. Continuous feedback from the instructor ensures that all participants can grasp the material and confidently apply their new skills in their respective professional roles upon completion of the course.

Course Agenda (Course Units):

Unit One: Fundamentals of Water Chemistry and Treatment Processes

- Introduction to water sources and impurities.
- Key water quality parameters and their significance.
- Principles of coagulation and flocculation.
- Sedimentation and clarification processes and equipment.
- Fundamentals of media filtration and backwashing.
- Introduction to chemical dosing systems and calculations.
- Health and safety in handling water treatment chemicals.

Unit Two: Advanced Industrial Water Treatment Technologies

- Principles of ion exchange for water softening and demineralization.
- Activated carbon adsorption for organic removal.
- Membrane filtration processes (Microfiltration, Ultrafiltration, Nanofiltration).
- Disinfection technologies: chlorination, ozonation, and UV irradiation.
- Industrial wastewater characteristics and treatment objectives.
- Sludge and solids handling, dewatering, and disposal.
- Boiler feed water and cooling tower water treatment requirements.

Unit three: Principles and Technologies of Desalination

- Global water scarcity and the role of desalination.
- Thermodynamic principles of desalination processes.
- Reverse Osmosis (RO): membrane science and system design.
- Pre-treatment requirements for RO systems to prevent fouling.
- Thermal Desalination: Multi-Stage Flash (MSF) distillation.
- Thermal Desalination: Multi-Effect Distillation (MED) technology.
- Comparing thermal and membrane desalination technologies.

Unit Four: Desalination Plant Operations and Maintenance

- Standard operating procedures for plant start-up and shutdown.
- Monitoring key performance indicators (KPIs) in RO and thermal plants.
- Diagnosing and troubleshooting membrane fouling, scaling, and biofouling.
- Membrane cleaning and chemical treatment protocols (Clean-In-Place).
- High-pressure pump operation and maintenance.
- Post-treatment and remineralization of desalinated water.
- Data logging, trend analysis, and operational reporting.

Unit Five: Process Control, Safety, and Environmental Management

- Introduction to SCADA and Distributed Control Systems (DCS) in water plants.
- Automation of chemical dosing and process adjustments.
- Energy consumption in desalination and energy recovery devices (ERDs).
- Environmental impact of desalination plants.
- Brine concentrate management, disposal, and beneficial reuse strategies.
- Hazard Identification and Risk Assessment (HIRA) for plant operations.
- Developing an integrated approach to sustainable water management.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

Considering the increasing energy costs and environmental regulations, how can the symbiotic integration of industrial water treatment and desalination processes create a circular economy model for water and resource recovery?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself through its holistic and integrated curriculum, which uniquely combines the distinct yet interconnected fields of industrial water treatment and desalination operations. Unlike specialized courses that focus on only one area, this program provides a comprehensive 360-degree view of water management, reflecting the real-world challenges faced by modern industries and municipalities. The content is deeply rooted in practical application, moving beyond theory to address the day-to-day operational hurdles, maintenance requirements, and troubleshooting scenarios that professionals encounter. Our curriculum emphasizes sustainability and future-readiness, with dedicated modules on energy efficiency, brine management, and environmental compliance—topics critical for responsible and cost-effective plant management. Furthermore, the course structure is built on a foundation of operational excellence, equipping participants not just with knowledge of how systems work, but with the critical thinking skills to optimize performance, enhance reliability, and ensure the long-term viability of water treatment and desalination assets. This practical, integrated, and forward-looking approach ensures participants leave with a versatile and immediately applicable skill set.