

COURSE OVERVIEW TE0395

Water Quality in Distribution Systems

Course Title

Water Quality in Distribution Systems

Course Date/Venue

September 28-October 02, 2026/Al Dhafra Meeting Room, Royal Rose Abu Dhabi, a Curio Collection by Hilton Affiliated Hotel, Abu Dhabi, UAE

Course Reference

TE0395

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.



This course is designed to provide participants with a detailed and up-to-date overview of Water Quality in Distribution Systems. It covers the water distribution systems, basics of water quality and sources of water contamination; the water quality changes in distribution, microbiological water quality, regulatory framework and standards; the disinfection and residual management, corrosion and scaling in pipes and water chemistry in distribution; the taste, odor and aesthetic issues, sediment and turbidity control; the heavy metals and contaminants and hydraulics of distribution systems; and the water age and residence time, storage systems and tanks.



During this interactive course, participants will learn the network modeling for water quality, leak detection and non-revenue water; the operational practices for quality control and water quality monitoring systems; the laboratory testing and analysis, real-time monitoring and SCADA; the risk assessment and management, contamination events and response; the regulatory compliance and reporting; the advanced treatment in distribution, smart water networks, asset management and rehabilitation; the sustainability and environmental impact and reducing chemical usage; and the energy efficiency, water conservation and environmental compliance.

Course Objectives/Outcomes & Benefits for the Participants

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain a comprehensive knowledge on water quality in distribution systems
- Discuss water distribution systems, basics of water quality and sources of water contamination
- Recognize water quality changes in distribution, microbiological water quality and regulatory framework and standards
- Carryout disinfection and residual management, corrosion and scaling in pipes and water chemistry in distribution
- Identify taste, odor and aesthetic issues, sediment and turbidity control as well as heavy metals and contaminants
- Recognize hydraulics of distribution systems, water age and residence time including storage systems and tanks
- Apply network modeling for water quality, leak detection and non-revenue water and operational practices for quality control
- Employ water quality monitoring systems, laboratory testing and analysis, real-time monitoring and SCADA
- Apply risk assessment and management, contamination events and response including regulatory compliance and reporting
- Carryout advanced treatment in distribution, smart water networks, asset management and rehabilitation
- Discuss sustainability and environmental impact covering reducing chemical usage, energy efficiency, water conservation and environmental compliance

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes electronic version of the course materials conveniently saved in a Tablet PC.

Who Should Attend

This course provides an overview of all significant aspects and considerations of water quality in distribution systems for regulatory compliance professionals, water distribution system supervisors, water treatment plant personnel, water utility operators and other technical staff.

Course Fee

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Haward's certificates are accredited by the following international accreditation organizations: -

-  British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

-  The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.



Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Dr. Tarek Samir, PhD, MSc, BSc, is a **Senior Chemical Engineer** and an **International Expert** in **Analytical Laboratory** with over **20 years** of integrated industrial experience and academic experience as a **University Professor**. His expertise widely covers in the areas of **Distribution System Water Quality** Modelling & Prediction, **Water Age & Residence Time Management** in **Distribution Networks**, **Disinfectant Residual Management** in **Water Distribution Systems**, **Microbial Water Quality** Control in **Distribution Networks**, **Distribution Network** Contamination Risk Management, **Water Quality** Incident Detection & Response, **Cross-Connection Control & Backflow Prevention**, **Water Quality** Deterioration in **Distribution Networks**, **Water Quality** Sampling Point Selection & **Network** Monitoring, **Distribution System Water Quality** Data Analysis, **Biofilm Formation & Control** in **Water Distribution Networks**, **Corrosion & Scaling Impacts** on Distributed **Water Quality**, **Pressure Management** for **Water Quality** Protection, **Water Quality** Surveillance & Early Warning **Systems**, **Operational Strategies** for Maintaining **Distribution Water Quality**, **Water Distribution Systems**, **Water Networking**, **Hydraulic Modelling Systems**, **Pumping Stations**, **Water Reservoirs**, **Water Storage Tanks**, **Water Treatment**, **Extended Activated Sludge Treatment**, **Water Analysis**, **Water Treatment Technology**, **MBBR**, **Hydraulic Design**, **Hydraulic Network System**, **Water Pipeline System**, **Water Distribution System**, **Water Quality** Analysis, **Steam Boiler**, **Hydro-Treating Technology**, **Water Storage Tanks**, **Quantitative & Qualitative Analysis** of Organic Micro-Pollutants, **Water Quality** Management, **Advanced Organic Material & Separation**, **Water Desalination**, **Oil Polluted Wastewater Treatment**, **Reverse Osmosis**, **Water Quality** Assessment, **Water Assurance & Quality Control** and **Measurement Uncertainty Estimation**. Further, he is also well versed in **Laboratory Practice**, **Analytical Measurement & Uncertainty**, **Uncertainty Estimation**, **Statistical Process Control (SPC)**, **GC**, **GC/MS**, **HPLC**, **Validation Method**, **Laboratory Equipment**, **Laboratory Quality Management Systems (ISO 17025)**, **Lab Safety & Health**, **Good Laboratory Practice (GLP)**, **Water Pollution Control**,

During Dr. Tarek's career life, he has handled challenging positions wherein he has acquired his wide technical and practical experience in the field of process & chemical industry such as the **Professor**, **Associate Professor**, **Lead Auditor**, **Technical Expert**, **Technical Auditor**, **Assistant Researcher**, **Researcher** and **Senior Instructor/Lecturer** for various companies and universities such as the National Researcher Center, Van Hall Institute – Part of Wageningen University, Science Valley Academy and Benha University.

Dr. Tarek has a **PhD**, **Master** and **Bachelor** degrees in **Chemical Engineering**. Further, he is a **Certified Instructor/Trainer** and published numerous technical papers, patents and journals. He has further delivered numerous trainings, courses, seminars, conferences and workshops globally.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: Monday, 28th of September 2026

0730 – 0800	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Water Distribution Systems <i>Components of Distribution Systems (Pipes, Pumps, Reservoirs) • Water Flow and Pressure Zones • Role of Distribution in Water Supply • Challenges in Maintaining Water Quality</i>
0930 – 0945	<i>Break</i>
0945 – 1030	Basics of Water Quality <i>Physical, Chemical, and Biological Parameters • Drinking Water Standards (WHO, EPA, Local Regulations) • Key Indicators (pH, Turbidity, Chlorine, TDS) • Importance of Compliance</i>
1030 – 1130	Sources of Water Contamination <i>Internal vs External Contamination • Cross-Connections and Backflow • Pipe Deterioration and Leaks • Environmental Influences</i>
1130 – 1215	Water Quality Changes in Distribution <i>Loss of Disinfectant Residual • Temperature Effects • Residence Time and Stagnation • Interaction with Pipe Materials</i>
1215 – 1230	<i>Break</i>
1230 – 1330	Microbiological Water Quality <i>Bacteria, Viruses, Protozoa • Biofilm Formation • Pathogen Risks • Monitoring Microbial Contamination</i>

1330 – 1420	Regulatory Framework & Standards National and International Standards • Monitoring Requirements • Reporting and Compliance • Public Health Implications
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2: Tuesday, 29th of September 2026

0730 – 0830	Disinfection & Residual Management Chlorination Methods • Free Chlorine vs Chloramine • Maintaining Residuals in Networks • Disinfection By-Products (DBPs)
0830 – 0930	Corrosion & Scaling in Pipes Causes of Corrosion • Types (Uniform, Galvanic, Pitting) • Scaling Mechanisms • Impact on Water Quality and Infrastructure
0930 – 0945	Break
0945 – 1100	Water Chemistry in Distribution pH, Alkalinity, Hardness • Dissolved Oxygen • Chemical Reactions in Pipes • Stability Indices (Langelier Index)
1100 – 1215	Taste, Odor & Aesthetic Issues Causes of Taste and Odor • Organic Compounds • Algae-Related Issues • Consumer Perception
1215 – 1230	Break
1230 – 1330	Sediment & Turbidity Control Sources of Turbidity • Sediment Accumulation • Resuspension During Flow Changes • Flushing Programs
1330 – 1420	Heavy Metals & Contaminants Lead, Copper, Iron, Manganese • Sources and Health Effects • Monitoring and Control • Regulatory Limits
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

Day 3: Wednesday, 30th of September 2026

0730 – 0830	Hydraulics of Distribution Systems Flow Patterns and Velocity • Pressure Management • Dead Zones and Low-Flow Areas • Impact on Water Quality
0830 – 0930	Water Age & Residence Time Definition of Water Age • Effects on Disinfectant Decay • Stagnation Issues • Reducing Water Age
0930 – 0945	Break
0945 – 1100	Storage Systems & Tanks Role of Storage Tanks • Mixing and Stratification • Tank Design Considerations • Maintenance Practices
1100 – 1215	Network Modeling for Water Quality Hydraulic Modeling Basics • Water Quality Modeling Tools (EPANET) • Simulating Chlorine Decay • Scenario Analysis

1215 – 1230	Break
1230 – 1330	Leak Detection & Non-Revenue Water Impact of Leaks on Contamination • Detection Methods • Pressure Management • Reducing Water Losses
1330 – 1420	Operational Practices for Quality Control Flushing Programs • Valve Operations • Pump Scheduling • Preventive Maintenance
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Three

Day 4: Thursday, 01st of October 2026

0730 – 0830	Water Quality Monitoring Systems Sampling Techniques • Online Sensors and Analyzers • Monitoring Frequency • Data Collection Methods
0830 – 0930	Laboratory Testing & Analysis Physical, Chemical, Microbiological Testing • Standard Testing Methods • Quality Assurance and Control • Data Interpretation
0930 – 0945	Break
0945 – 1100	Real-Time Monitoring & SCADA Integration with SCADA Systems • Remote Monitoring • Alarm Systems • Data Visualization
1100 – 1215	Risk Assessment & Management Hazard Identification • Risk Assessment Frameworks • Water Safety Plans (WSP) • Preventive Measures
1215 – 1230	Break
1230 – 1330	Contamination Events & Response Types of Contamination Incidents • Emergency Response Planning • Public Communication • Incident Investigation
1330 – 1420	Regulatory Compliance & Reporting Reporting Requirements • Documentation Practices • Audits and Inspections • Continuous Improvement
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four

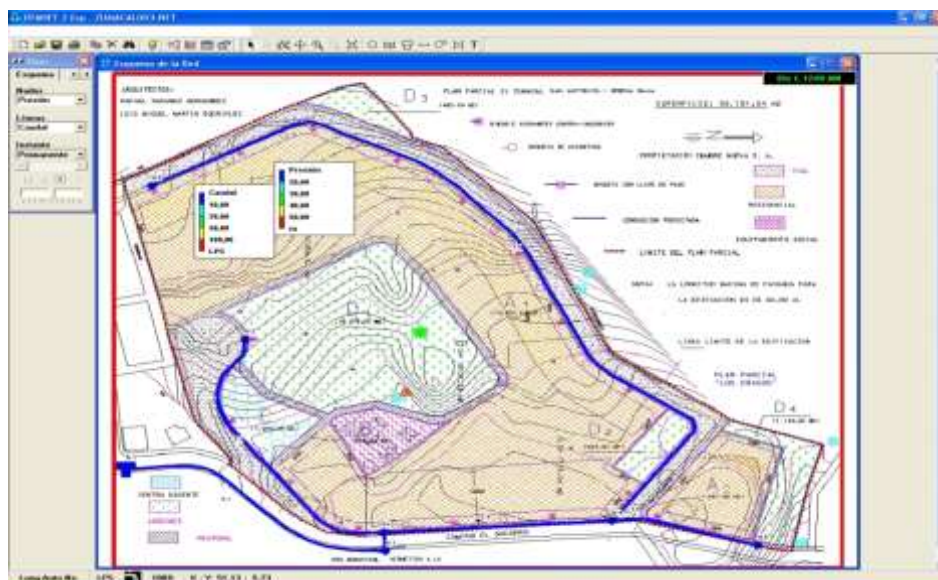
Day 5: Friday, 02nd of October 2026

0730 – 0830	Advanced Treatment in Distribution Booster Chlorination • Secondary Disinfection • Advanced Oxidation Processes • Point-of-Use Treatment
0830 – 0930	Smart Water Networks IoT-Based Monitoring • Smart Sensors and Analytics • Leak Detection Systems • Digital Water Management

0930 – 0945	<i>Break</i>
0945 – 1100	Asset Management & Rehabilitation <i>Pipe Condition Assessment • Rehabilitation Techniques • Replacement Strategies • Lifecycle Management</i>
1100 – 1230	Sustainability & Environmental Impact <i>Reducing Chemical Usage • Energy Efficiency • Water Conservation • Environmental Compliance</i>
1230 – 1245	<i>Break</i>
1245 – 1315	Case Studies in Water Quality Management <i>Real-World Contamination Cases • Successful Water Quality Programs • Lessons Learned • Best Practices</i>
1315 - 1345	Capstone Project & Evaluation <i>Assessing a Distribution System • Identifying Water Quality Risks • Proposing Mitigation Strategies • Presenting Findings and Recommendations</i>
1345 – 1400	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the latest revision of “EPANET” simulators.



EPANET Simulator

Course Coordinator

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