



## COURSE OVERVIEW TE0302 Flushing, Disinfection & Bacteriological Tests

### Course Title

Flushing, Disinfection & Bacteriological Tests

### Course Date/Venue

Session 1: July 14-18, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Session 2: November 10-14, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE



### Course Reference

TE0302

### 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 Flushing, Disinfection & Bacteriological Tests. It covers the water quality standards and regulations, water treatment processes and types of water contaminants; the water treatment plant layout and health impact of contaminated water; the importance of flushing and cleaning in water systems; planning a flushing operation and timing and frequency of flushing and regulatory considerations for flushing; the methods of flushing water systems, flushing for contaminant removal and flushing equipment and tools; ensuring safety during flushing operations and protecting workers and the public; and monitoring system pressure during flushing and the risk mitigation strategies.



Further, the course will also discuss the importance of disinfection in drinking water including chlorine and chlorine compounds, UV disinfection and ozone disinfection; maintaining disinfectant residuals in distribution systems and measuring residual chlorine levels; the effects of residual chlorine on water taste and odor and regulatory requirements for residual levels; monitoring and controlling disinfection through online analyzers for residual detection, adequate disinfection throughout the system; and troubleshooting disinfection issues.

During this interactive course, participants will learn the importance of bacteriological testing, sampling techniques and laboratory techniques for bacteriological testing; the bacteriological results, monitoring bacteriological quality and regulatory standards for bacteriological testing; flushing and disinfection with bacteriological monitoring and maintaining and monitoring post-disinfection; and the advanced bacteriological testing techniques, emergency response and contingency planning.

### Course Objectives

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

- Apply and gain an in-depth knowledge on flushing, disinfection and bacteriological tests
- Discuss water quality standards and regulations, water treatment processes and types of water contaminants
- Apply water treatment plant layout and explain the health impact of contaminated water including the importance of flushing and cleaning in water systems
- Plan a flushing operation and apply timing and frequency of flushing and regulatory considerations for flushing
- Carryout methods of flushing water systems and flushing for contaminant removal as well as identify flushing equipment and tools
- Employ risk management during flushing by ensuring safety during flushing operations, protecting workers and the public, monitoring system pressure during flushing and risk mitigation strategies
- Explain the importance of disinfection in drinking water including chlorine and chlorine compounds, UV disinfection and ozone disinfection
- Maintain disinfectant residuals in distribution systems and measure residual chlorine levels and discuss the effects of residual chlorine on water taste and odor and regulatory requirements for residual levels
- Monitor and control disinfection through online analyzers for residual detection, ensuring adequate disinfection throughout the system and troubleshooting disinfection issues
- Discuss the importance of bacteriological testing and apply sampling techniques and laboratory techniques for bacteriological testing
- Interpret bacteriological results, monitor bacteriological quality and recognize regulatory standards for bacteriological testing
- Integrate flushing and disinfection with bacteriological monitoring and maintain and monitor post-disinfection
- Apply advanced bacteriological testing techniques, emergency response and contingency planning

### 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 flushing, disinfection and bacteriological tests for plumbing technicians and supervisors, mechanical engineers, facilities maintenance personnel, commissioning engineers and specialists, quality assurance & control (QA/QC) inspectors, health and safety officers, environmental engineers and public health specialists, utility and water treatment plant operators and other technical staff.

### 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

Certificates are accredited by the following international accreditation organizations: -

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. 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.

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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.





### 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:



**Mr. Salameh Al-Mahasneh**, MSc, BSc, PMP, is a **Senior Water Engineer** with over **25 years** of practical and extensive experience within the **Oil & Gas, Power & Water Utilities** and other **Energy** sectors. His expertise lies extensively in the areas of **Water Balance & Managing (NRW), Water Leak Detection, Leakage Verification, Leakage Prevention, Leakage Detection Methods, Leak Noise Identification, Leak Repairs, Structural & Pinpoint Leaks, Pipe Materials & Failure, Sound Transmission & Sounding Techniques, Using Listening Devices, Water Fittings Regulation & Standards,**

**Water System Design & Installation, Surface Water Hydrology, Water & Wastewater Projects, Water Desalination Technologies, Water Distribution & Pump Station, Best Water Equipment Selection & Inspection, Hydraulic Modelling for Water Network Design, Water Utility Industry, Water Desalination Technologies & New Development, Water Hydrology, Water Conveyors, Water Networks Rehabilitation, Water Fittings Regulations & Standards, Fittings & Valves, Couplings & Pressure Testing, 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, Water Loss Reduction, Leaking Pipelines & Installation, Pipes & Fittings Supply, Excavation, Domestic Water Meters Supply & Installation, Wells & Water Networks Rehabilitation, MBBR, Hydraulic Design, Hydraulic Network System, Water Pipeline System, Water Distribution System, Watershed Management, Water Quality Analysis, Steam Boiler, Hydro-Treating Technology, Waste Water Effluent Treating Facilities, Waste Water Treatment, Best Practice in Sewage & Industrial Waste Water Treatment & Environmental Protection, Advanced Waste Water Treatment Operation & Process, Water Storage Tanks, Water Harvesting & Artificial Recharge, Environmental Impact Assessment (EIA), Dams & Geotechnical Engineering, Surface Water Hydrology, Water Systems Operation, Water Supply Management, Reservoir Management, Dam Safety, Wastewater Treatment Plant Process, MyWAS + WEAP Water Allocation & Management Systems and Asset Management for Water Utilities.**

During his career life, Mr. Salameh occupied several significant positions as the **Water (Hydrological) Engineer/Hydrologic Expert, Water & Wastewater Infrastructure Master Plan Team Leader, Water Expert, Water & Training Expert, Content Writing & Water Expert, Senior Planning Engineer, Contract Engineer, Site Engineer, Project Manager, Deputy Project Manager, Procurement Expert, Procurement & Contract Manager, Team Leader, Infrastructure Expert, O&M Contracts & Cost Analysis Expert, Local Expert, Strategic Advisor, Technical Advisor, Consultant, Project Coordinator, Senior Instructor/Trainer and Teaching Assistant (Course Instructor)** for various companies such as the **Water Authority of Jordan, Yarmouk Water Company, Saudi National Water Company, Ministry of Water and Irrigation, Veolia Water, Arabtech Jardaneh, Jordan Valley Authority, GIZ, Sabra Contracting, The International Committee of the Red Cross, Swiss Development Agency, USAID, The Embassy of the Kingdom of Netherlands (in Amman), European Investment Bank, Lilongwe City Council, Japan International Cooperation Agency (JICA), UNICEF, World Bank, AlBaha Consultant, Real Estate Development Company and Jordan University of Science and Technology.**

Mr. Salameh has a **Master's degree in Civil Engineering/Water & Environmental Engineering** and a **Bachelor's degree in Civil Engineering**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer by the Institute of Leadership and Management (ILM), a PMI Certified Project Management Professional** and a member of **Project Management Institute (PMI) and The Jordanian Engineers Association**. Moreover, he is classified as the **Chief Project Management Engineer** based on the Jordanian Engineers Association Classification and delivered numerous trainings, seminars, courses, workshops and conferences internationally.

### 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.

### 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.

### Accommodation

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

### 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**

0730 – 0800	<i>Registration &amp; Coffee</i>
0800 – 0815	<i>Welcome &amp; Introduction</i>
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>Water Quality Standards &amp; Regulations</b> <i>International Water Quality Standards (Who, EPA) • Local Regulations for Water Treatment • Safe Drinking Water Criteria • Monitoring and Enforcement of Water Quality Standards</i>
0930 – 0945	<i>Break</i>
0945 – 1030	<b>Water Treatment Processes Overview</b> <i>Pre-Treatment Processes (Screening, Coagulation) • Filtration and Sedimentation • Disinfection Methods • Post-Treatment Processes</i>
1030 – 1130	<b>Types of Water Contaminants</b> <i>Physical, Chemical and Biological Contaminants • Common Waterborne Pathogens • Chemical Pollutants and their Effects • Managing Contamination Risks</i>
1130 – 1215	<b>Water Treatment Plant Layout</b> <i>Components of a Water Treatment Plant • Flow Diagram of Water Treatment Processes • Key Equipment Involved in Water Treatment • Understanding System Operation</i>
1215 – 1230	<i>Break</i>
1230 – 1330	<b>Health Impact of Contaminated Water</b> <i>Pathogens Causing Waterborne Diseases • Case Studies of Waterborne Outbreaks • Impact of Poor Water Quality on Health • Preventive Measures and Public Health Protection</i>



1330 – 1420	<b>Importance of Flushing &amp; Cleaning in Water Systems</b> Flushing Procedures in Pipelines • Benefits of Regular System Flushing • Types of Flushing: Initial, Routine and Emergency • Flushing Techniques and Equipment
1420 – 1430	<b>Recap</b> 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

0730 – 0830	<b>Flushing Objectives &amp; Planning</b> Objectives of Flushing Water Systems • Planning a Flushing Operation • Timing and Frequency of Flushing • Regulatory Considerations for Flushing
0830 – 0930	<b>Methods of Flushing Water Systems</b> Manual versus Automated Flushing Techniques • Flushing with Water Pressure • Directional Flushing and Reverse Flushing • Flushing Velocities and Flow Rates
0930 – 0945	Break
0945 – 1100	<b>Flushing for Contaminant Removal</b> Removing Sediment and Debris • Flushing to Clear Biofilm Build-Up • Flushing to Prevent Pipeline Corrosion • Effectiveness of Different Flushing Techniques
1100 – 1215	<b>Flushing Equipment &amp; Tools</b> Types of Flushing Equipment Used • Selection of Equipment Based on System Size • Equipment Maintenance and Safety Precautions • Practical Demonstration of Flushing Tools
1215 – 1230	Break
1230 – 1330	<b>Risk Management During Flushing</b> Ensuring Safety During Flushing Operations • Protecting Workers and the Public • Monitoring System Pressure During Flushing • Risk Mitigation Strategies
1330 – 1420	<b>Case Studies in Flushing Practices</b> Successful Flushing Projects in Municipal Systems • Challenges Encountered and Solutions Found • Lessons Learned from Real-World Operations • Flushing in Emergency Situations
1420 – 1430	<b>Recap</b> 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

0730 – 0830	<b>Overview of Water Disinfection</b> Importance of Disinfection in Drinking Water • Common Disinfection Methods Used Worldwide • Chemical versus Physical Disinfection Methods • Overview of Disinfectant Properties
0830 – 0930	<b>Chlorine &amp; Chlorine Compounds</b> Chlorine as a Disinfectant • Chlorine Dosage Calculation • Chlorine Gas, Chlorine Dioxide and Hypochlorite • Benefits and Challenges of Chlorine-Based Disinfection



0930 – 0945	Break
0945 – 1100	<b>UV Disinfection</b> Principles of Ultraviolet (UV) Disinfection • UV Equipment and Operational Considerations • UV Dose and System Design • Advantages of UV Over Chemical Disinfectants
1100 – 1215	<b>Ozone Disinfection</b> Ozone Production and Application • Ozone's Effectiveness as a Disinfectant • Ozone in Combination with Other Treatments • Advantages and Limitations of Ozone Disinfection
1215 – 1230	Break
1230 – 1330	<b>Disinfection Residuals &amp; Their Importance</b> Maintaining Disinfectant Residuals in Distribution Systems • Measuring Residual Chlorine Levels • Effects of Residual Chlorine on Water Taste and Odor • Regulatory Requirements for Residual Levels
1330 – 1420	<b>Monitoring &amp; Controlling Disinfection</b> Methods for Monitoring Disinfection Effectiveness • Using Online Analyzers for Residual Detection • Ensuring Adequate Disinfection Throughout the System • Troubleshooting Disinfection Issues
1420 – 1430	<b>Recap</b> 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

0730 – 0830	<b>Basics of Bacteriological Water Quality</b> Importance of Bacteriological Testing • Common Waterborne Pathogens (E. Coli, Salmonella, Etc.) • Risk of Pathogens in Untreated Water • Overview of the Bacteriological Testing Process
0830 – 0930	<b>Sampling Techniques for Bacteriological Testing</b> Sampling Methods for Water Analysis • Sample Collection and Handling Protocols • Ensuring Sample Integrity during Transport • Chain of Custody in Water Sampling
0930 – 0945	Break
0945 – 1100	<b>Laboratory Techniques for Bacteriological Testing</b> Standard Plate Count (SPC) • Most Probable Number (MPN) Test • Membrane Filtration Method • Automated versus Manual Bacteriological Analysis
1100 – 1215	<b>Interpreting Bacteriological Results</b> Understanding Coliform Counts • Interpreting MPN Results • Risk Analysis Based on Bacteriological Findings • Action Thresholds for Bacterial Contamination
1215 – 1230	Break
1230 – 1330	<b>Continuous Monitoring of Bacteriological Quality</b> Real-Time Monitoring Technologies • Use of Sensors and Online Analyzers • Integrating Real-Time Data into Water Management Systems • Early Warning Systems for Bacterial Contamination





1330 – 1420	<b>Regulatory Standards for Bacteriological Testing</b> WHO and EPA Standards for Bacteriological Quality • National Standards for Coliform Bacteria • Reporting Requirements for Test Results • Handling Non-Compliance Issues
1420 – 1430	<b>Recap</b> 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

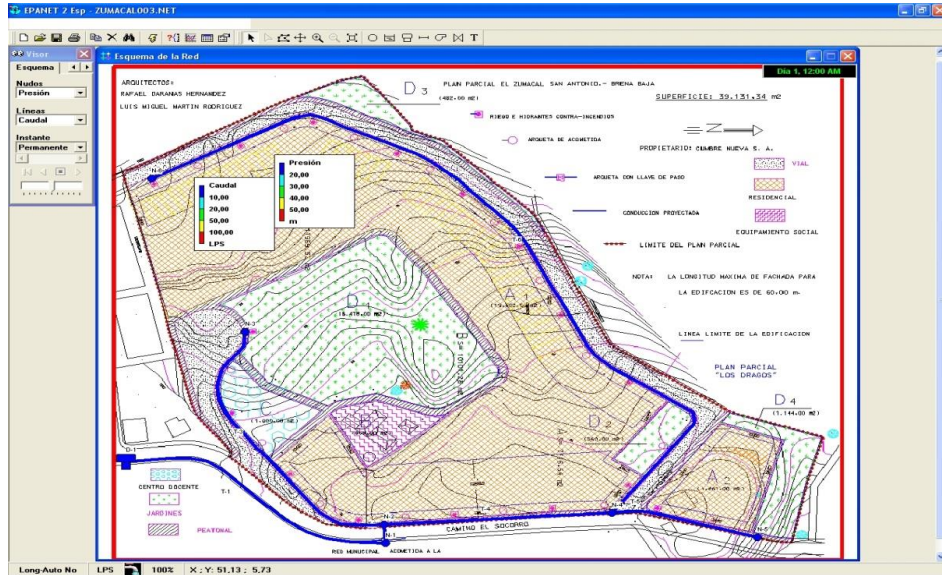
0730 – 0830	<b>Flushing, Disinfection &amp; Bacteriological Test Integration</b> Integrating Flushing and Disinfection with Bacteriological Monitoring • Timely Flushing to Prevent Contamination • Enhancing Bacteriological Test Results with Proper Disinfection • Case Study on Integrated Water Quality Management
0830 – 0930	<b>Practical Demonstrations of Flushing &amp; Disinfection</b> Live Demonstration of Flushing Procedures • On-Site Disinfection Practices and Monitoring • Understanding System Performance in Real Time • Troubleshooting Common Issues in Flushing and Disinfection
0930 – 0945	Break
0945 – 1100	<b>Maintenance &amp; Monitoring Post-Disinfection</b> Continuous Monitoring of Water Quality Post-Treatment • Long-Term Maintenance of Disinfected Systems • Preventing Recontamination through System Design • Best Practices for Maintaining Disinfection Levels
1100 – 1230	<b>Advanced Bacteriological Testing Techniques</b> Emerging Methods in Bacteriological Analysis • DNA-Based Testing for Pathogen Detection • Rapid Testing Technologies for Field Use • Innovations in Waterborne Pathogen Testing
1230 – 1245	Break
1245 – 1345	<b>Emergency Response &amp; Contingency Planning</b> Response Protocols for Bacteriological Contamination • Handling Disinfection Failures in Critical Situations • Developing Contingency Plans for Public Health Safety • Case Studies of Waterborne Disease Outbreaks
1345 – 1400	<b>Course Conclusion</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course





### **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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