



COURSE OVERVIEW ME0595
Tank & Tank Farms

Design, Installation, Operation, Maintenance & Troubleshooting

Course Title

Tank & Tank Farms: *Design, Installation, Operation, Maintenance & Troubleshooting*

Course Date/Venue

October 13-17, 2024/ Boardroom, Warwick Hotel Doha, Doha, Qatar



Course Reference

ME0595



Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.



Storage tanks store a diverse variety of liquids used in the hydrocarbon processing industry at oil/gas fields, refineries, petrochemical plants, marine terminals, bulk storage, oil depots and marketing terminals. They are also part of the support facilities in other industries, such as fuel storage tanks at power plants. These tanks have gained importance and visibility in recent years due to failures that have resulted in hydrocarbon spills and environmental impact. Following these incidents, there has been a marked increase in governmental regulation and industry attention to tanks.



A tank maintenance and integrity evaluation programme can only be effective if it also considers tank design requirements. Recognizing the primary features of these tanks and understanding how they are designed provide the information needed to better understand their maintenance requirements. The first part of this course focuses on atmospheric storage tank design requirements in accordance with API 650.





Once the basics of storage tank design have been established, the course will turn to maintenance requirements in accordance with API 653. The course includes slides of actual installations, sample problems, and classroom exercises to illustrate specific points and give course participants the opportunity to practice application of the topics discussed. It is recommended that participants bring copies of API 650 and API 653 to the course. Participants are asked to bring their laptops or hand-held calculators to the course.

This course is meant for providing the participants with the knowledge about types of conventional storage tanks, fixed and floating roof tanks, tank selection and product classification including cost awareness for new structures. The participants will learn the design aspects, codes and standards, tank shell design and tank foundations. Operational aspects like blending, tank mixers, floating roof movements, roof drains and roof seals are also covered under this course. During this course, the participants will also learn to develop proactive maintenance activities, develop tank inspection plans and intervals, design codes and operation of tanks, Safety aspects and dominant failure modes.

Course Objectives

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

- Apply systematic techniques, tools and procedures on the design, installation, operation, maintenance and troubleshooting of tanks and tank farms in order to achieve the maximum performance and efficiency
- Develop and implement a cost effective tank maintenance strategy
- Assess the configuration, operation and management practices of tank farms in terms of facility capacity, operational effectiveness, and the cost/benefit of feed, intermediate and product storage
- Appreciate the importance of codes, standards, regulations and recommended practices in terms of hazard management and incident scenario layer of protection safeguarding
- Identify the different types and classifications of tanks and their applications
- Recognize considerations of materials-of-construction and various corrosion protection strategies and tactics including cleaning, coating and cathodic protection
- Perform fire protection of tanks and tank farms: venting, frangible roofs, flame and detonation arrestors, protection from ignition by static electricity, principles and practices of bonding and grounding, principles of inerting, electrical classification, selection criteria for fire suppression systems
- Employ the principles, practices and benefits of “Fire System Integrity Assurance”
- Apply tank emission control measures and procedures to satisfy regulatory requirements
- Describe pollution equipment including fugitive emissions potential, hydrocarbons blanketing, nitrogen equipment, tank product containment bund walls and tank floating top drainage systems
- Carryout principles, preparations & practices associated with tank cleaning, entry, and inspection & repair



- Execute a system approach on tank operations including tank entry, tank bottoms, sludge, source reduction, mitigation, vapor freeing, degassing and tank cleaning
- Discuss the various tank accessories used in the tank and tank farm design, operation, inspection and maintenance and explain their features and functions

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, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides an overview of all significant aspects and considerations of tank and tank farms for managers, engineers and other technical and operational staff involved in the design, operation, instrumentation, inspection or maintenance of tanks and tank farms. This includes personnel in-charge of oil movement, bulk storage, marine terminals, tank farms and oil depots.

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\$ 6,000 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 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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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.

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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.





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. Andrew Ladwig is a **Senior Process & Mechanical Maintenance Engineer** with over **25 years** of extensive experience within the **Oil & Gas, Refinery, Petrochemical & Power** industries. His expertise widely covers in the areas of **Maintenance Planning, Maintenance & Reliability Management, Material Cataloguing, Equipment Maintenance, Root Cause Failure Analysis (RCFA), Rotating Machinery Troubleshooting, Maintenance Auditing & Benchmarking, Condition Monitoring Techniques, Machinery Lubrication Technology, Lubricant Oil & Grease Testing & Analysis,**

Crude Oil Storage & Management, Ammonia Manufacturing & Process Troubleshooting, Crude Oil Distillation, Distillation Operation and Troubleshooting, Ammonia Storage & Loading Systems, Fertilizer Storage Management (Ammonia & Urea), Sulphur Recovery, Nitrogen Fertilizer Production, Refining Process & Petroleum Products, Safe Refinery Operations, Hydrotreating & Hydro-processing, Fractionation, Process Plant Operations, Storage Tanks Operations & Measurements, Process Plant Troubleshooting & Engineering Problem Solving, Process Plant Performance, Process Troubleshooting Techniques, Pressure Vessel Operation, Process Equipment Performance & Troubleshooting, Plant Startup & Shutdown and Flare & Relief System. Further, he is also well-versed in **Compressors & Turbines Maintenance, Heat Exchanger Overhaul & Testing Techniques, Balancing of Rotating Machinery (BRM), Pipe Stress Analysis, Valves & Actuators Technology, Control Valve Engineering, Tank Design, Material Cataloguing, Specifications, Handling & Storage, Steam Trap Design, Operation, Maintenance & Troubleshooting, Steam Trapping & Control, Column, Pump & Exchangers, Troubleshooting & Design, Detailed Engineering Drawings, Codes & Standards, Production Optimization, Permit to Work (PTW), Project Engineering, Data Analysis, Process Hazard Analysis (PHA), HAZOP Study, Sampling & Analysis, Training Analysis, Job Analysis Techniques, Storage & Handling of Toxic Chemicals & Hazardous Materials, Hazardous Material Classification & Storage/Disposal, Dangerous Goods, Environmental Management System (EMS), Supply Chain, Purchasing, Procurement, Logistics Management & Transport & Warehousing & Inventory, Risk Monitoring Authorized Gas Tester (AGT), Confined Space Entry (CSE), Personal Protective Equipment (PPE), Fire & Gas, First Aid and Occupational Health & Safety.**

During his career life, Mr. Ladwig has gained his practical experience through his various significant positions and dedication as the **Mechanical Engineer, Project Engineer, Reliability & Maintenance Engineer, Maintenance Support Engineer, Process Engineer, HSE Supervisor, Warehouse Manager, Quality Manager, Business Analyst, Senior Process Controller, Process Controller, Safety Officer, Mechanical Technician, Senior Lecturer and Senior Consultant/Trainer** for various companies such as the Sasol Ltd., Sasol Wax, Sasol Synfuels, just to name a few.

Mr. Ladwig has a **Bachelor's degree in Chemical Engineering** and a **Diploma in Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and has delivered various trainings, workshops, seminars, courses and conferences internationally.





Course Program

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

Day 1: Sunday, 13rd of October 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 1000	Introduction Tanks & Tank Farms as Part of Production & Terminal Systems • Tank Types & Designs • Tank Components • Tank Design & Engineering Considerations Relative to Performance Parameters, Maximum Allowable Inventory, & Physical, Chemical & Hazardous Properties of Contained Fluids • Introduction to Codes, Standards, Regulations, & Recommended Practices
1000 – 1015	Break
1015 – 1130	API-650: Storage Tank Types & Features Tank Types & Functions • Primary Components • Appurtenances • Design Specifications
1130 – 1215	API-650: Material Selection Material Property Considerations • Acceptable Material Specification
1215 – 1230	Break
1230 – 1400	API-650: Mechanical Design Requirements Mechanical Design Parameters • Shell Thickness Determination • Wind Girder Requirements • Nozzle Design Details • Roof Requirements
1400 - 1420	Video Presentation "Above-Ground Storage Tanks"
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2: Monday, 14th of October 2024

0730 – 0930	API-650: Mechanical Design Requirements (cont'd) Detailed Examples for Thickness Calculations of the Different Courses of the Shell
0930 – 1000	API-650: Fabrication Details Types of Welded Joints • Welding Methodology • Weld Detail Requirements
1000 – 1015	Break
1015 – 1215	API-650: Inspection & Testing Requirements Types of Weld Defects • Inspection Methods • Inspection Requirements • Dimensional/Tolerances • Testing
1215 – 1230	Break
1230 – 1400	API-650: Vents & Fire Protection Systems Vents for Fixed Roof Tanks • Vents for Floating Roof Tanks • Fire Protection Systems
1400 - 1420	Video Presentation "Hydrocarbon Storage Tank Inspections"
1420 – 1430	Recap
1430	Lunch & End of Day Two





Day 3: Tuesday, 15th of October 2024

0730 – 0900	API-650: Mechanical Design Requirements Detailed Examples for Thickness Calculations of the Roof & Bottom & Foundation Design
0900 – 1000	Tank Roofs Floating Roofs • Rim Seals • Flexible Piping System for Roofs Aluminum Dome Roofs • Fixed Roof Tanks • Internal Floaters
1000 – 1015	Break
1015 – 1215	Tank Emissions - Monitoring & Prevention Overview of Tank Emissions Concepts • Computing Emissions from Internal & External Floating Roofs
1215 – 1230	Break
1230 – 1330	Tank Emissions - Monitoring & Prevention (cont'd) Emission Estimation Procedures for Fixed-Roof Tanks • Emissions from Slotted & Unslotted Guide Poles
1330 – 1400	Pollution Equipment Fugitive Emissions Potential • Hydrocarbons Blanketing • Nitrogen Generation Equipment • Tank Product Containment Bund Walls • Tank Floating Top Drainage Systems
1400 - 1420	Video Presentation "Storage Tank Accidents"
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4: Wednesday, 16th of October 2024

0730 – 0900	API 653: Tank Inspection, Repairs & Maintenance Industrial Standards • Intent of API Standard 653 • How does API 653 Prevent Tank Failures? • Responsibility & Compliance • How Long Will It Take to Implement the API 653 Program?
0900 – 1000	API 653: Tank Inspection, Repairs & Maintenance (cont'd) API 653 & Costs • In-House versus Contract Inspection • Thoroughness of Inspection • Getting Started
1000 – 1015	Break
1015 – 1215	Tank Settlement Settlement & Tank Failure Mechanics • Different Kinds of Settlement Sloped Bottoms • Edge Settlement
1215 – 1230	Break
1230 – 1400	Tank Settlement (cont'd) Designing for Settlement • Releveling Tanks • Methods of Releveling
1400 - 1420	Video Presentation "Storage Tank Foundations"
1420 – 1430	Recap
1430	Lunch & End of Day Four





Day 5: Thursday, 17th of October 2024

0730 – 0900	Tank Operations Tank Entry Standard • Basic Requirements of API 2015 • Overview of Tank Bottoms & Sludge
0900 – 1000	Tank Operations (cont'd) Problems Caused by Sludge • Source Reduction & Mitigation • Vapor Freeing & Degassing
1000 – 1015	Break
1015 – 1215	Tank Operations (cont'd) Tank Cleaning Safe Vapor Freeing, Degassing & Cleaning Operations
1215 – 1230	Break
1230 – 1345	Tank Accessories Ladders, Platforms, Stairs & Accessways • Miscellaneous Tank Appurtenances
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Practical Sessions

This practical highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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