COURSE OVERVIEW ME0595
Tank & Tank Farms
Design, Installation, Operation, Maintenance & Troubleshooting

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



Course Date/Venue
Session 1: March 28-April 01, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar
Session 2: October 10-14, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar

3.0 CEUs (30 PDHs) AWARD

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/Outcomes & Benefits for the Participants

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 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

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

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 Fee

US$ 6,000 per Delegate. 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:



Mr. Rod Larmour, PEng, MSc, BSc, is a **Senior Mechanical Engineer** with over **30 years** of **Onshore & Offshore** practical experience within the **Power**, **Petrochemical**, **Oil & Gas** industries. His expertise greatly covers the application of **Rotating Machinery**, **Mechanical Alignment**, **Stress Analysis**, **Thermodynamics**, **Fluid Mechanics**, **Heat & Mass Transfer Engineering**, **Air Conditioning & Refrigeration Technology**, Cooling Towers, **Gas & Steam Turbines**, **Centrifugal Compressor & Pumps** and the **design**, **failure investigation**, and **maintenance** of **Atmospheric Storage Tanks & Tank Farms** and **Bolted Flanges & Joints**.

Currently, Mr. Larmour is working with Transnet overseeing the performance and safety of several **fuel pipelines** including **pumping stations** and **inland tank farms** locally. He also takes lead in the **planning** of detailed design of a **fuel gas supply system** from a site to the **proposed new power station**, the **management** of an **EPC booster gas compressor station** including an **overland piping**, and **spearheads** the **commercial & contractual management** within the **Ilitha Process Group**.

Throughout Mr. Larmour's lengthy career, he has worked with **several international companies** like **Mobil**, **Mossgas**, **Stewarts & Lloyds** and **Ilitha** with prime positions such as **Operations Manager**, **Principal Project Manager**, **Senior Mechanical Engineer**, **Offshore Projects Manager**, **Design Manager**, **Quality Assurance Manager** and **Project Engineer**.

Mr. Larmour's experience was not only confined to the industry alone. He was also able to largely contribute his expertise and impart his knowledge in the academe. He has engaged himself with **researches** and **lectures** in for several **universities** and **companies** and has held numerous **training courses** on **Thermomechanics** & **Fluid mechanics**, **Engineering Design**, **Refrigeration & Air Conditioning** and **Heat Transfer**.

Mr. Larmour is **Registered Professional Engineer** and has **Master** & **Bachelor** degrees in **Mechanical Engineering** and has a **Diploma** in **Nuclear Science**. Further, he is a **Certified Instructor/Trainer**.

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

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

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

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

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

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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