



## COURSE OVERVIEW ME0137 Storage Tank Design, Construction, Inspection & Maintenance

### Course Title

Storage Tank Design, Construction, Inspection & Maintenance

### Course Date/Venue

Please see page 3

### Course Reference

ME0137

### 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.***

Aboveground atmospheric 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. Therefore, establishing a programme for evaluating the structural integrity of aboveground atmospheric storage tanks has become an important priority.



A tank maintenance, inspection, 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 and inspection 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 inspection and 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 intended to give participants a comprehensive understanding of the design, construction, inspection and maintenance of above ground storage tanks which are used in the refining and chemicals industries. It will include an introduction to the API Standard 650 and API Standard 653 and will cover industry practices for long term tank maintenance, inspection and best practices for sustaining operational integrity. The focus of the course will be on introducing work practices for tank operation/inspection/maintenance which are practical and have proven successful in preventing unplanned outages and major incidents.

### **Course Objectives**

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

- Apply systematic techniques on the design, construction, inspection and maintenance of storage tank in accordance with the API 650 and API 653 standards
- Discuss the codes and standards used for design and repair of storage tanks
- Identify the storage tank types and features as well as material selection covering material property considerations and acceptable material specification
- Recognize the mechanical design requirements, fabrication details and inspection and testing requirements
- Discuss vents and fire protection systems including API Recommended Practice 651 and 652
- Explain the API-653 standard and carryout tank inspection and record keeping
- Employ tank component evaluation, leak detection methods and tank repair and alteration
- Apply proper removal, repair and replacement of shell plate material including repair, addition, replacement and alteration of shell penetrations
- Illustrate dismantling methods, reconstruction, welding inspection and hydrostatic testing

### **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**.*



### Course Date/Venue

Session(s)	Date	Venue
1	February 01-05, 2026	Pierre Lotti Meeting Room, Movenpick Hotel Istanbul Golden Horn, Istanbul, Turkey
2	May 03-07, 2026	Crowne Meeting Room, Crowne Plaza Al Khobar, an IHG Hotel, Al Khobar, Kingdom of Saudi Arabia
3	August 16-20, 2026	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

### Who Should Attend

This course covers systematic techniques and methodologies on the design, construction, inspection and maintenance of storage tanks for those who have engineering, inspection, maintenance, facility integrity and/or management responsibility related to aboveground atmospheric storage tanks that store hydrocarbon liquids. Those with engineering, inspection, facility integrity or maintenance responsibilities will benefit from the discussion and practical application of the API 650 and API 653 requirements. Those with management responsibility will benefit by gaining a better overall understanding of design, inspection and maintenance requirements and why these are important.

### 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

Istanbul	<b>US\$ 6,000</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	<b>US\$ 5,500</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	<b>US\$ 5,500</b> per Delegate + <b>VAT</b> . 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.



### **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 **spearsheads 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**.

### **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 course 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>Codes &amp; Standards Used for Design &amp; Repair of Storage Tanks</b> Design Standards for Tank Design and Repair • Standards Used for Storage Tank Gauging System • Standards Used for Firefighting System for Storage Tanks
0930 – 0945	<i>Break</i>
0945 – 1100	<b>API-650: Storage Tank Types &amp; Features</b> Tank Types and Functions • Primary Components
1100 – 1230	<b>API-650: Storage Tank Types &amp; Features (cont'd)</b> Appurtenances • Design Specifications
1230 – 1245	<i>Break</i>
1245 – 1420	<b>API-650: Material Selection</b> Material Property Considerations • Acceptable Material Specification
1420 – 1430	<b>Recap</b>
1430	<i>Lunch &amp; End of Day One</i>

#### **Day 2**

0730 – 0900	<b>API-650: Mechanical Design Requirements</b> Mechanical Design Parameters • Shell Thickness Determination • Wind Girder Requirements • Nozzle Design Details • Roof Requirements
0900 – 0915	<i>Break</i>
0915 – 1100	<b>API-650: Mechanical Design Requirements (cont'd)</b> Bottom Requirements • Designing Tanks for Small Internal Pressures • Optional Design Basis for Small Tanks • Elevated Temperature Storage Tanks • Austenitic Stainless Steel Storage Tanks
1100 – 1230	<b>API-650: Fabrication Details</b> Types of Welded Joints • Welding Methodology • Weld Detail Requirements
1230 – 1245	<i>Break</i>
1245 – 1420	<b>API-650: Inspection &amp; Testing Requirements</b> Types of Weld Defects • Inspection Methods • Inspection Requirements • Dimensional/Tolerances • Testing
1420 – 1430	<b>Recap</b>
1430	<i>Lunch &amp; End of Day Two</i>

#### **Day 3**

0730 – 0930	<b>API-650: Vents &amp; Fire Protection Systems</b> Pontoon for Floating Roof Tank • Vents for Fixed Roof Tanks • Vents for Floating Roof Tanks
0930 – 0945	<i>Break</i>
0945 – 1100	<b>API-650: Vents &amp; Fire Protection Systems (cont'd)</b> Fire Protection Systems • Platform with the Ladder • Design, Repair / Modification

1100 – 1215

#### **API-650: Supplementary Information**

API Recommended Practice 651 • API Recommended Practice 652



1215 – 1230	Break
1230 – 1430	<b>API-653: Introduction</b> Scope of API-653 • Definitions • Starting an API-653 Compliance Program • Cost of an API-653 Compliance Program
1420 – 1420	<b>Recap</b>
1430	Lunch & End of Day Three

#### Day 4

0730 – 0930	<b>API-653: Tank Inspection</b> Objectives • Prioritization • Inspection Frequencies
0930 - 0945	Break
0945 – 1100	<b>API-653: Tank Inspection (cont'd)</b> Record Keeping • Inspector Qualification
1100 – 1215	<b>API-653: Tank Component Evaluation</b> Shell • Bottom • Nozzles • Roof • Foundation • Shell and Bottom Settlement
1215 – 1230	Break
1230 – 1430	<b>API-653: Leak Detection Methods</b>
1420 – 1420	<b>Recap</b>
1430	Lunch & End of Day Four

#### Day 5

0730 – 0930	<b>API-653: Tank Repair &amp; Alteration</b> General Considerations • Material Considerations • General Requirements for Repair and Alteration • Removal, Repair, and Replacement of Shell Plate Material
0930 – 0945	Break
0945 – 1100	<b>API-653: Tank Repair &amp; Alteration (cont'd)</b> Repair, Addition, Replacement, and Alteration of Shell Penetrations • Repair of Tank Bottoms • Tank Roof Repair
1100 – 1215	<b>API-653: Dismantling &amp; Reconstruction</b> Dismantling Methods • Reconstruction • Dimensional Tolerances
1215 – 1230	Break
1230 – 1345	<b>API-653: Examination &amp; Testing</b> General • Welding Inspection • Hydrostatic Testing
1345 – 1400	<b>Course Conclusion</b>
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course



## **Practical Sessions**

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



## **Course Coordinator**

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