

COURSE OVERVIEW ME0137-4D

Tank Design, Construction, Inspection & Maintenance

Course Title

Tank Design, Construction, Inspection & Maintenance

Course Date/Venue

December 09-12, 2024/Club B Meeting Room,
Ramada Plaza by Wyndham Istanbul City
Center, Istanbul, Turkey

Course Reference

ME0137-4D

Course Duration/Credits

Four days/2.4 CEUs/24 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

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.

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:-

- 
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 **2.4 CEUs** (Continuing Education Units) or **24 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.

- 
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 However, we have the right to change the course instructor prior to the course date and inform participants accordingly:



Mr. Andrew Ladwig is a **Senior Mechanical & Maintenance Engineer & HSE Consultant** with over **25 years** of extensive experience within the **Oil & Gas, Refinery, Petrochemical & Power** industries. His expertise widely covers in the areas of **Best Practice In Maintenance Management, Maintenance Troubleshooting, Preventive Maintenance & Corrective Maintenance, Maintenance Planning, Scheduling, Management & Work Control**, Certified Maintenance Planner (**CMP**), Certified Planning & Scheduling

Professional (**AACE-PSP**), **Maintenance Optimization & Best Practices, Engine Construction & Maintenance, Process Plant Shutdown & Turnaround, Maintenance Auditing & Benchmarking, Machinery Lubrication, Machinery Failure Analysis, Reliability, Availability & Maintainability (RAM), Reliability-Centered Maintenance (RCM), Reliability Engineering Analysis (RE), Root Cause Analysis (RCA), Asset Integrity Management (AIM), Reactive & Proactive Maintenance, Compressors & Turbines Operation, Maintenance & Troubleshooting, Reciprocating & Centrifugal Compressors, Screw Compressor, Compressor Control & Protection, Gas & Steam Turbines, Turbine Operations, Gas Turbine Technology, Centrifugal Pumps, Bearings, Couplings, Screw Compressors & Heat Exchangers Operation, Maintenance, Inspection, Troubleshooting, Lubrication & Shaft Alignment, Gas Turbine Operating & Maintenance, Pressure Safety Relief Valve Repair & Recalibration, PSV/PRV Troubleshooting, Valve Testing & Inspection, Control Valves & Actuators, Boiler Inspection & Maintenance, Boiler Systems, Boiler instrumentation & Controls, Boiler Start-up & Shutdown, Boiler Operation & Steam System Management, Heat Recovery Steam Generating (HRSG), Impulse Tube Installation & Inspection, Pipes & Fittings, Tank Design & Engineering, Tank Shell, Tanks & Tank Farms, Bearings & Lubrication and Advanced Machinery Dynamics.** Further, he is also well-versed in **Hazardous Materials & Chemicals Handling, Hazardous Materials (HAZMAT), Hazard Identification & Operability (HAZOP), Professional HAZOP/PHA Leader: Advanced Process Hazard Analysis (PHA) Methods & Leadership (HAZOP, What-if, FMEA), Process Safety Management (PSM), Layer of Protection Analysis (LOPA), Behavioural Based Safety (BBS), Job Safety Analysis (JSA), Permit to Work (PTW), Authorized Gas Tester (AGT), Confined Space Entry & Rescue, Pre-Startup Safety Reviews (PSSR), Safety in Process Plants, Risk Assessment, Risk Management, Emergency Planning, Emergency Response & Crisis Management Operations and Incident Investigation Advanced & HSE Reporting.**

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.

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\$ 5,000 per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), 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 course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1 **Monday, 09th of December 2024**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Codes & Standards Used for Design & Repair of Storage Tanks Design Standards for Tank Design and Repair • Standards Used for Storage Tank Gauging System • Standards Used for Firefighting System for Storage Tanks
0930 – 0945	Break
0945 – 1100	API-650: Storage Tank Types & Features Tank Types and Functions • Primary Components • Appurtenances • Design Specifications
1100 – 1230	API-650: Material Selection Material Property Considerations • Acceptable Material Specification
1230 – 1245	Break
1245 – 1420	API-650: Mechanical Design Requirements Mechanical Design Parameters • Shell Thickness Determination • Wind Girder Requirements • Nozzle Design Details • Roof Requirements • Bottom Requirements • Designing Tanks for Small Internal Pressures • Optional Design Basis for Small Tanks • Elevated Temperature Storage Tanks • Austenitic Stainless Steel Storage Tanks
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2 Tuesday, 10th of December 2024

0730 – 0900	API-650: Fabrication Details <i>Types of Welded Joints • Welding Methodology • Weld Detail Requirements</i>
0900 – 0915	Break
0915 – 1100	API-650: Inspection & Testing Requirements <i>Types of Weld Defects • Inspection Methods • Inspection Requirements</i>
1100 – 1230	API-650: Inspection & Testing Requirements (cont'd) <i>Dimensional/Tolerances • Testing</i>
1230 – 1245	Break
1245 – 1420	API-650: Vents & Fire Protection Systems <i>Pontoon for Floating Roof Tank • Vents for Fixed Roof Tanks • Vents for Floating Roof Tanks • Fire Protection Systems • Platform with the Ladder • Design, Repair / Modification</i>
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3 Wednesday, 11th of December 2024

0730 – 0930	API-650: Supplementary Information <i>API Recommended Practice 651 • API Recommended Practice 652</i>
0930 – 0945	Break
0945 – 1100	API-653: Introduction <i>Scope of API-653 • Definitions • Starting an API-653 Compliance Program • Cost of an API-653 Compliance Program</i>
1100 – 1215	API-653: Tank Inspection <i>Objectives • Prioritization • Inspection Frequencies • Record Keeping • Inspector Qualification</i>
1215 – 1230	Break
1230 – 1430	API-653: Tank Component Evaluation <i>Shell • Bottom • Nozzles • Roof • Foundation • Shell and Bottom Settlement</i>
1420 – 1420	Recap
1430	Lunch & End of Day Three

Day 4 Thursday, 12th of December 2024

0730 – 0930	API-653: Leak Detection Methods
0930 – 0945	Break
0945 – 1100	API-653: Tank Repair & Alteration <i>General Considerations • Material Considerations • General Requirements for Repair and Alteration • Removal, Repair, and Replacement of Shell Plate Material • Repair, Addition, Replacement, and Alteration of Shell Penetrations • Repair of Tank Bottoms • Tank Roof Repair</i>
1100 – 1215	API-653: Dismantling & Reconstruction <i>Dismantling Methods • Reconstruction • Dimensional Tolerances</i>
1215 – 1230	Break
1230 – 1345	API-653: Examination & Testing <i>General • Welding Inspection • Hydrostatic Testing</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	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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org