

COURSE OVERVIEW FE0430-4D

Welding Technology: ASME IX Welding, Fabrication, Brazing, Inspection & Fusing Qualification

Course Title

Welding Technology: ASME IX Welding, Fabrication, Brazing, Inspection & Fusing Qualification

Course Reference

FE0430-4D

Course Duration/Credits

Four days/2.4 CEUs/24 PDHs

Course Date/Venue



| Session(s) | Date | Venue |
|------------|-----------------------------|--|
| 1 | January 29-February 1, 2024 | Boardroom, Warwick Hotel Doha, Doha, Qatar |
| 2 | March 04-07, 2024 | Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE |

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt in the class will be applied using the following practical methods:-



(1) Industrial Facility Visit: Course participants will be taken to an industrial facility where they will practice welding, fabrication and inspection. In case that this course is organized inside client premises (In-House), then client shall provide access to its welding and fabrication workshop for practical sessions.



(2) Welding Simulator: Participants will use in the class the welding & fabrication software and AWS Tool Kit & Structural Weld Replica Kit to practice some of the skills learnt.

Welding Technology plays a major role in all maintenance and fabrication activities in the industry. Production equipment, a highly sophisticated welding technique and qualified personnel allow processing or production of steel products for different applications within short periods. This course provides a much needed source of authoritative information on the complex subject of welding. It provides a comprehensive run-down of the complex science of welding- processes, selection of power sources, weld metallurgy, weldability of metals, testing and inspection techniques.

The course will cover welding processes (GTAW, SMAW, MIG, FCAW, SAW, OAW), welding consumables, design of welded joints, applied welding metallurgy and heat treating, welding quality control, non-destructive testing and major International Welding Codes and Standards such as AWS and API.

Each session will be conducted in a lecture/discussion format and videos designed to provide intensive instruction and guidance. The director will be available following each day's session to provide participants with further opportunity for discussion and consideration of specific problems.

The course includes detailed discussions about welding of pipelines and related facilities in accordance with API 1104, AWS D1.1, ASME IX and API 577 codes and standards.

Course Objectives

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

- Apply and gain an in-depth knowledge on welding technology including welding, fabrication and inspection in accordance with AWS, ASME and API codes and standards
- Differentiate the various welding process such as SMAW, GTAW, GMAW, FCAW and OAW
- Identify the arc welding consumables including welding wires, coated electrodes, sub arc wires and fluxes, neutral and active fluxes and shielding gases
- Describe the properties and strength of materials and carryout destructive testing
- Analyze the fatigue of welded structures, joint design as well as dissimilar welds and weld overlays
- Characterize the metallurgical properties of steel and heat treatment and implement welding quality control
- Practice the latest standards and procedure for welding pipeline and employ related facilities
- Discuss the history and structure of API 1104, AWS D1.1 and ASME code
- Explain the standards and specification of ASME Sec IX and practice the correct welding procedures as well as supplemental variables and special consideration for notch toughness
- Implement welding safety with proper procedure and specification
- Inspect welding in accordance with API 577 standard

Who Should Attend


This course is intended for welding engineers, inspection engineers, facility integrity engineers, fabrication engineers, mechanical engineers, NDT personnel, quality assurance personnel, testing laboratory personnel, and maintenance personnel. Further, this course is a must for anyone involved in inspection of welding construction, qualifying welders, brazers and operators; or involved in writing and qualifying welding and brazing procedure specifications; those responsible for reviewing supplier procedures, auditing or reviewing in-house procedures and qualifications; and those who estimate jobs in compliance of ASME code.

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 Technology is accredited by the following international accreditation organizations: -

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American Welding Society (AWS)

Haward Technology is the **International Agent** of the **American Welding Society (AWS)** and the Authorized Provider of AWS international certification examinations outside the USA. Haward Technology exhibits compliance and adherence to **AWS Quality Control Standards** in the development, conduct and delivery of certification courses and exams for welding and inspection professionals on behalf of the American Welding Society.

The American Welding Society’s certification programs are internationally recognized and are used as a benchmark of quality workmanship and skills within the welding industry around the world.

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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 **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.

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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. Hesham Moharram, is a **Senior Inspection Engineer** with over **35 years** of industrial experience in the **Oil & Gas, Refineries** and **Petrochemical** industries. His expertise includes **Facility Integrity, Technical Integrity, Integrated Safety Management Plan, Inspection, Repair, Maintenance, Alteration** and **Reconstruction of Aboveground Storage Tanks, Pressure Vessels, Piping Inspection, Risk-Based Inspection, Fitness-for-Service (FFS), Asset Integrity**

Management, Plant Inspection & Corrosion Engineering, Pipeline Integrity Assessment, Integrity Management, Pipeline Rehabilitation & Repair, Pipeline Design & Maintenance, Corrosion Monitoring & Cathodic Protection, Pressure & Leak Testing, Metallurgy, Corrosion & Prevention of Failures, Material Selection & Properties, Physical Metallurgy of Steel, Welding Technology, Fabrication & Inspection, Conventional & Advanced Non-destructive Testing (NDT), Process Safety Hazard Analyses (PHA), Risk Assessment, Pigging & Pipe Support and Acoustic Emission. Further, he is also well-versed in Quality Assurance & Quality Control, **HAZOP**, Permit-to-Work, Hazard Identification, Safety Meeting, Accident Investigation, Emergency Response, Task Risk Assessment, Root Cause & Failure Analysis, Fire Fighting, First Aid Basic, CPR, H₂S Awareness, Distillation Units, Preventive Maintenance, FEED, Contract Management, Stress Management, Coaching & Mentoring Skills, Interpersonal Skills and Communication Skills. He is currently the **Senior Inspection Engineer** wherein he is responsible in various inspection works like fitness-for-service, remaining life assessments, risk based inspection, intelligent pigging, problematic pipe supports, non-destructive testing and acoustic emission.

Throughout his career life, Mr. Hesham has provided significant contributions to the companies he has worked with, having filled key positions such as being the **Senior Inspection Engineer, Inspection Engineer, Production Engineer, API Instructor, QA/QC** and **Supervisor** for international companies such as Abu Dhabi Company for Onshore Oil Operations (**ADCO**), Suez Oil Company (**SUCO**), Cairo Oil Refining Company (**CORC**) Refinery, DURA Refinery, State Company for Oil Projects (**SCOP-IRAQ**) and **Iron & Steel**.

Mr. Moharram has a **Bachelor's** degree in **Metallurgical Engineering**, from the Suez Canal University. Further, he is a **Certified Instructor/Trainer, a Certified Pressure Vessel Inspector (API-510), Certified Piping Inspector (API-570), Certified Aboveground Storage Tanks Inspector (API-653), Certified Risk Based Inspector (API-580), an ASNT Certified Level II in UT, RT, MT, PT and Eddy Current Testing.**

Training Methodology

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Workshops & Work Presentations
- 30% Case Studies & Practical Exercises
- 20% Software, Simulators & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

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| Doha | US\$ 5,500 per Delegate. This rate includes H-STK [®] (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day. |
| Dubai | US\$ 4,500 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 course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

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| 0730 – 0800 | <i>Registration & Coffee</i> |
| 0800 – 0815 | <i>Welcome & Introduction</i> |
| 0815 – 0830 | PRE-TEST |
| 0830 – 0930 | Welding Processes <i>Fundamentals • SMAW (Shielded Metal Arc) • GTAW (Gas Tungsten Arc) • GMAW (or MIG) (Gas Metal Arc) • FCAW (Flux Cored Arc)</i> |
| 0930 – 0945 | <i>Break</i> |
| 0945 – 1030 | Welding Processes (cont'd) <i>SAW (Submerged Arc) • Stud Welding • OAW (Oxy Acetylene) • High Energy, Special & Hybrid Welding Processes • Power Sources for Arc Welding • Brazing & Cutting Processes</i> |
| 1030 – 1130 | Classification of Arc Welding Consumables <i>Coated Electrodes • GMAW & GTAW Wires • FCAW Wires • Sub Arc Wires & Fluxes • Neutral & Active Fluxes • Shielding Gases</i> |
| 1130 – 1230 | Properties & Strength of Materials <i>Material Properties • Destructive Testing</i> |
| 1230 – 1245 | <i>Break</i> |

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| 1245 – 1420 | Fatigue of Welded Structures <i>Fatigue Mechanisms • Weld Finish Classifications</i> |
| 1420 – 1430 | Recap <i>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</i> |
| 1430 | <i>Lunch & End of Day One</i> |

Day 2

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| 0730 – 0830 | Joint Designs <i>Joints • Symbols • Preparation • Design for Productivity</i> |
| 0830 – 0930 | Dissimilar Welds & Weld Overlays |
| 0930 – 0945 | <i>Break</i> |
| 0945 – 1045 | Metallurgical Properties of Steel & Heat Treatment <i>Metallurgical Properties of Steel • Preheating • Post Weld Heat Treatment (PWHT) • Field Heat Treating Equipment • Plans for PWHT</i> |
| 1045 – 1215 | Welding Quality Control <i>Planning for QC • Welding Problems & Defects • Visual Inspection • Employment of NDT • Welder Training & Qualification • CSWIP vs. ASNT Qualification</i> |
| 1215 – 1230 | <i>Break</i> |
| 1230 – 1330 | Welding of Pipelines & Related Facilities (API 1104) <i>General • Referenced Publications • Definition of Terms • Specifications • Qualification of Welding Procedures for Welds Containing Filler-Metal Additives • Qualification of Welders • Design & Preparation of a Joint for Production Welding • Inspection & Testing of Production Welds</i> |
| 1330 - 1420 | Welding of Pipelines & Related Facilities (API 1104) (cont'd) <i>Acceptance Standards for Nondestructive Testing • Repair & Removal of Defects • Alternative Acceptance Standards for Girth Welds • In-Service Welding • Procedures for Nondestructive Testing • Automatic Welding • Automatic Welding without Filler-Metal Additions</i> |
| 1420 – 1430 | Recap <i>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</i> |
| 1430 | <i>Lunch & End of Day Two</i> |

Day 3

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| 0730 – 0845 | API 1104 & AWS D1.1: History & Structure <i>Historical Development of AWS D1.1 & API 1104 • Pre-Qualification & Qualification of Welding Procedures • The Use of Pre-qualified Procedures • Base Metal Classifications to AWS & API</i> |
| 0845 – 0945 | ASME Code, History & Structure <i>Historical Development of Section IX • of Section IX to Other Codes (ASME V111 & B31.3) • Organization, Structure & Mechanics of Using Section IX– Essential, Non-Essential & Supplemental Essential Variables</i> |

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| 0945 – 1000 | Break |
| 1000 – 1115 | ASME Section IX: Base & Filler Metal Specifications <i>P numbers & Base Metal Classifications • F-numbers • A-Numbers • SFA & Non-SFA Filler Metal Specifications • The Use of Standard Welding Procedures</i> |
| 1115 – 1230 | ASME Section IX: Selecting & Preparing the Test Coupon for Both Procedure & Welder Qualifications <i>Obtaining Maximum Cost-Effectiveness from Test Coupons • Preparation & Welding of the Test Coupon • Recording Both Necessary & Worthwhile Data • Demonstrating Code Compliance</i> |
| 1230 – 1245 | Break |
| 1245 – 1420 | ASME Section IX: Writing Welding Procedure Specification <i>Meeting Code Requirements • Addressing Customer Requirements • Providing Direction to the Welder • Sources of Information for Preparing Intelligent & Meaningful Welding Procedure Specifications</i> |
| 1420 – 1430 | Recap <i>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</i> |
| 1430 | Lunch & End of Day Three |

Day 4

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| 0730 – 0900 | ASME Supplemental Variables – Special Consideration for Notch-Toughness <i>How Welding Influences Toughness • Toughness Requirements of Construction Codes • Measuring & Recording Heat Input Data • Translating Heat Input Data Into Useful Directions for a Welder • Typical Construction Code Requirements</i> |
| 0900 – 0915 | Break |
| 0915 – 1100 | Welding Safety <i>Electric Shock • Radiation • Fire & Explosions • Eye Injuries • Fume • Hearing Impairment</i> |
| 1100 – 1230 | Procedure Specification <i>Use of Section IX Form • Other Formats • Procedure Qualification Record Forms • Revisions to Records & Procedures • Take-Home Test</i> |
| 1230 – 1245 | Break |
| 1245 – 1345 | API 577 Welding Inspection <i>Welding Inspection Procedure • NDT • Metallurgy • Refinery & Petrochemical Plant Welding Issues</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 Session/Industrial Facility Visit



Simulator (Hands-on Practical Sessions)

Welding & Fabrication

Advanced E-Learning Programme
Aligned to National Occupational Standards





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Re-Instate the Work Area

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E-Welding & Fabrication



AWS Tool Kit



Structural Weld Replica Kit

Course Coordinator

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