

**COURSE OVERVIEW FE0930**  
**API 577: Welding Inspection and Metallurgy**  
*(API Exam Preparation Training)*

**Course Title**

API 577: Welding Inspection and Metallurgy  
*(API Exam Preparation Training)*

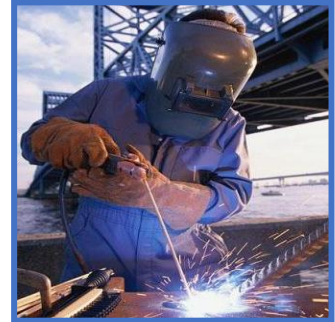
**Course Reference**

FE0930

**Course Duration/Credits**

Five days/4.0 CEUs/40 PDHs

**Course Date/Venue**



Sessions	Date	Venue	Exam Window	Exam Closing Date
1	April 29-May 03, 2024	Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE	August 09-30, 2024	May 31, 2024
2	July 21-25, 2024	Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA	August 09-30, 2024	May 31, 2024
3	October 13-17, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE	December 06-27, 2024	September 27, 2024
<b>Exam Venue</b>	Abu Dhabi, Dubai, Al Khobar, Jeddah, Kuwait, Amman, Beirut, Cairo, Manama and Muscat. Participant has the option to attend at any of the above cities.			

**Course Description**



***This practical and highly-interactive course includes practical sessions and exercises where participants carry out welding inspection. Theory learnt in the class will be applied using the “AWS Tool Kit” and “Structural Weld Replica Kit” suitable for in-class training.***



This course is designed to provide participants with a detailed and up-to-date overview of Welding Inspection and Metallurgy in accordance with the API 577 Standard. It covers the welding process for SMAW, GTAW, GMAW, FCAW, SAW, SW, PAW and EGW; the welding materials, P-number assignment and F-number assignment; the AWS classification, filler metal selection, consumable storage and handling; the welding procedure specification (WPS), procedure qualification record (PQR) and tube-to-tubesheet welding procedures; and the welding qualification including expiration, revocation and renewal.



During this interactive course, participants will learn the welding general requirements of ASME BPVC IX; the welding procedure qualifications and welding performance qualifications; the welding data and standard welding procedure specifications (SWPSs); the nondestructive examination and welding inspection; the metallurgy and refinery and petrochemical plant welding issues; and the safety precautions and annexes of API 577.

**Course Objectives**

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

- Get prepared for the next API 577 exam and have enough knowledge and skills to pass such exam in order to get the API 577 Inspector certificate
- Apply welding process for SMAW, GTAW, GMAW, FCAW, SAW, SW, PAW and EGW
- Identify welding materials including P-number assignment and F-number assignment
- Carryout AWS classification, filler metal selection, consumable storage and handling
- Employ welding procedure specification (WPS), procedure qualification record (PQR) and tube-to-tubesheet welding procedures
- Recognize welding qualification including expiration, revocation and renewal
- Discuss the welding general requirements of ASME BPVC IX as well as apply welding procedure qualifications and welding performance qualifications
- Review welding data and standard welding procedure specifications (SWPSs)
- Apply nondestructive examination and welding inspection and discuss metallurgy and refinery and petrochemical plant welding issues
- Explain the safety precautions and annexes of API 577 covering technology and symbols, actions to address improperly made production welds, WPS/PQR review, etc

**Who Should Attend**

Any inspector who is currently certified as API 510, 570 or 653 Inspector. Valid certificate (or certification number) in one of the above three programs shall be submitted to Haward Technology prior to registration in this course. Otherwise, you must have one of the combinations of education and experience listed in the grid below:

- The minimum years of experience required is based upon your level of education and must have been acquired within the last 10 years.

<b>Education</b>	<b>Years of Experience</b>	<b>Minimum Experience Required</b>
BS or higher in engineering or technology	1 year	Any experience in the petrochemical industry
2-year degree or certificate in engineering & technology	2 years	Any experience in the petrochemical industry
High school diploma or equivalent	3 years	Any experience in the petrochemical industry
No Formal Education	5 or more years	Any experience in the petrochemical industry

**Required Codes & Standards**

**API Publications**

- **API Recommended Practice 577, Welding Processes, Inspection, and Metallurgy, 3<sup>rd</sup> Edition, October 2020**
  - Entire document is subject to testing

**American Society of Mechanical Engineers (ASME) Publications**

- **ASME Boiler and Pressure Vessel Code (BPVC), 2021 edition**
  - **Section IX, Welding, Brazing, and Fusing Qualifications: Part QW only**

**Note:** API and ASME publications are copyrighted material. Photocopies of API and ASME publications are not permitted. CD-ROM versions of the API documents are issued quarterly by Information Handling Services and are allowed. Be sure to check your CD-ROM against the editions noted on this sheet.

**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.

**Training Fee**

Abu Dhabi	<b>US\$ 7,500</b> per Delegate + <b>VAT</b> . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	<b>US\$ 7,500</b> per Delegate + <b>VAT</b> . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	<b>US\$ 7,500</b> per Delegate + <b>VAT</b> . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

**Exam Fees**

**US\$ 550** per Delegate + **VAT**.

**Accommodation**

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

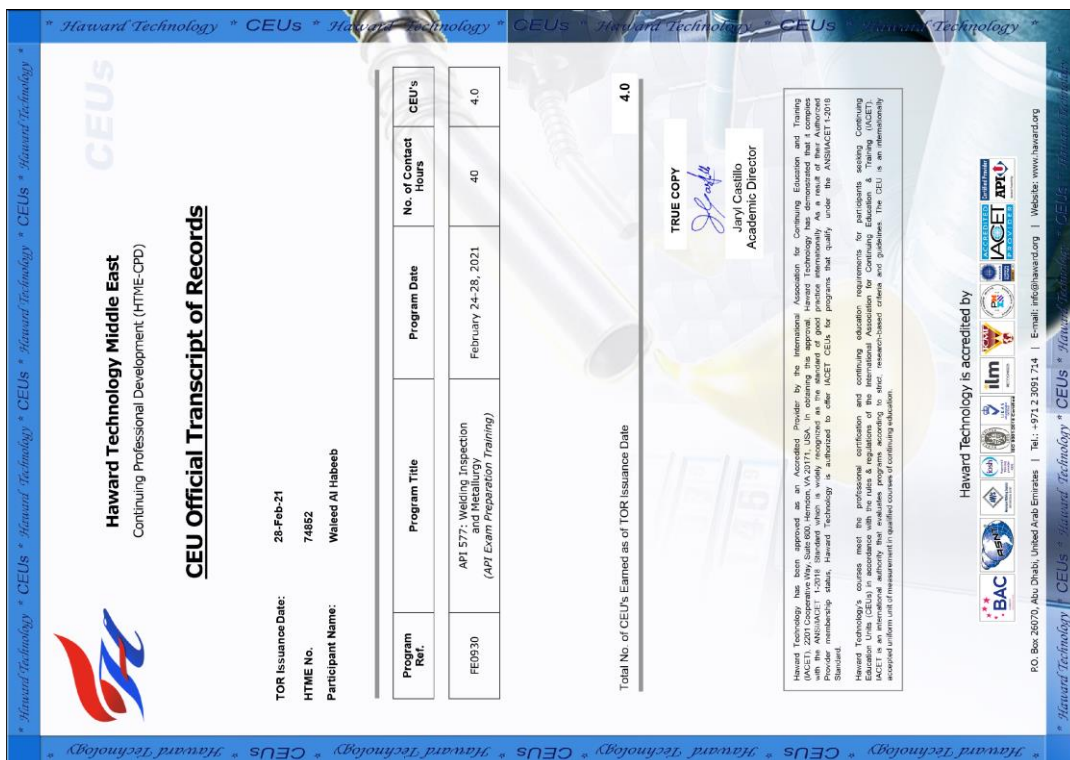


**API Certificate(s)**

API-577 certificate will be issued to participants who have successfully passed the API-571 examination.




- (2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.



**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 **4.0 CEUs** (Continuing Education Units) or **40 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:



**Dr. Igor Martic** PhD, MSc, BSc, is a **Senior Mechanical & Inspection Engineer** with extensive years of industrial experience within the **Oil & Gas, Refineries** and **Petrochemical** industries. His expertise lies in the areas of **Welding Engineering, Fabrication & Inspection, Welding Techniques, Practical Welding Technology, Welding Inspection, Welding & Machine Shop, Welding & Fabrication, Welding & Machining, Welding Types &**

**Applications, Welding Safety, Welding Defects Analysis, TIG & Arc Welding, Shielded Metal Arc Welding, Gas Tungsten & Gas Metal Arc Welding, Welding Procedure Specifications & Qualifications (WPS & WPQ), Aluminium Welding, Safe Welding, International Welding Codes, Welding Procedure Specifications, Welding & Brazing, Welder Performance Qualification, Inspection & Test Plans, Pipe Stress & Flexibility Analysis using CAESAR II Software, NDT/NDE Procedures, Corrosion, Painting, Underwater Inspection of Rigs, Platforms & Jackets, Static Equipment, Piping, Pipelines & Valves, Liquid Penetrant Testing, Magnetic Particle Testing, Ultrasonic Testing, Radiographic Testing, Visual Testing, Eddy Current Testing, External & Internal Auditing for API Q1/Q2, API Monogram Specifications, ISO 9001, ISO 17020, ISO 17025 and ISO 17024.** He is currently the **API Auditor** within Europe, Africa, Middle East and Asia wherein he performs audits worldwide at manufacturers and service company in Oil & Gas industry against the criteria of API Q1/Q2, API product specifications and ISO 9001.

Throughout his career life, Dr. Igor has provided significant contributions to the companies he has worked with, having filled key positions such as being the **Senior Inspector, Quality Inspector, Mechanical Static Engineer/Inspector, Inspector Coordinator, Auditor, Teaching Assistant** and **Researcher** for various international companies such as the Wafa Plant / Sabratha Platform-Libya, Zubair Oil Field-Iraq and University of Belgrade.

Dr. Martic is a **Chartered Engineer** and has **PhD, Master** and **Bachelor** degrees in **Mechanical Engineering** and **Industrial Management & Engineering** from the **University of Belgrade** and **Novi Sad University, UK** respectively and a **Graduate Engineer of Production Management**. Further, he is a **Certified Instructor/Trainer**, a **Certified Piping Inspector (API 570)**, a **Certified Pressure Vessel Inspector (API-510)**, a **Certified Welding Inspection & Metallurgy (API 577)**, a **Certified NDT Level II Inspector** Liquid Penetrant Testing (PT), Magnetic Particle Testing (MT), Ultrasonic Testing (UT), Visual Testing (VT), Radiography Testing (RT) and Eddy Current Testing; a Recognized Quality Management Systems (QMS) **Auditor/Lead Auditor**, a Recognized **European Welding Engineer** and **International Welding Inspector**; a member of the **Institution of Mechanical Engineers** and holds certification in Underwater Inspection Controller Grade 3.4U in accordance with the **CSWIP DIV-7-95 Part 2, 4<sup>th</sup> Edition** and **API Auditor Summit Certificate**. He has further published numerous scientific paper and journals and has delivered numerous trainings, courses, workshops, seminars 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**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>API 577: Welding Process</b> Shielded Metal Arc Welding (SMAW) • Gas Tungsten Arc Welding (GTAW) • Gas Metal Arc Welding (GMAW) • Flux-Cored Arc Welding (FCAW)
0930 - 0945	Break
0945 – 1230	<b>API 577: Welding Process (cont'd)</b> Submerged Arc Welding (SAW) • Stud Arc Welding (SW) • Plasma Arc Welding (PAW) • Electrogas Welding (EGW)
1230 – 1330	Lunch
1330 – 1530	<b>API 577: Welding Materials</b> P-Number Assignment to Base Metals • F-Number Assignment to Filler Metals • AWS Classification of Filler Metals • A-Number • Filler Metal Selection • Consumable Storage & Handling
1530 – 1545	Break
1545 – 1645	<b>API 577: Welding Procedure</b> Welding Procedure Specification (WPS) • Procedure Qualification Record (PQR) • Reviewing the WPS & PQR • Tube-to-Tubesheet Welding Procedures
1645 – 1700	<b>Distribute Homework &amp; Recap</b>
1700	End of Day One

#### **Day 2**

0730 – 0830	<b>Review of Day 1 &amp; Homework Answers</b>
0830 – 0930	<b>API 577: Welding Qualification</b> Welders & Welding Operators • Examination Failure of a Production Weld • Retest for Qualification • Expiration, Revocation, and Renewal of Welder or Welding Operator Qualification
0930 – 0945	Break
0945 – 1230	<b>API 577: Welding Qualification (cont'd)</b> Welder Performance Qualification • Reviewing a WPQ • Limitations for Welder Qualifications
1230 – 1330	Lunch
1330 – 1530	<b>ASME BPVC IX: Welding General Requirements</b> Weld Orientation • Test Position for Groove Welds • Test Position for Fillet Welds • Types & Purposes of Tests & Examination
1530 – 1545	Break
1545 – 1645	<b>ASME BPVC IX: Welding General Requirements (cont'd)</b> Tension Tests • Guided-Bend Tests • Toughness Tests • Fillet-Weld Tests • Other Test & Examinations
1645 – 1700	<b>Distribute Homework &amp; Recap</b>
1700	End of Day Two

**Day 3**

0730 – 0830	<b>Review of Day 2 &amp; Homework Answers</b>
0830 – 0930	<b>ASME BPVC IX: Welding Procedure Qualifications</b> Preparation of Test Coupon • Hybride Welding Procedure Variables • Welding Variables • Temper Bead Welding
0930 – 0945	Break
0945 – 1230	<b>ASME BPVC IX: Welding Performance Qualifications</b> Qualification Test Coupons • Retests & Renewal of Qualification • Welding Variables for Welders • Welding Variables for Welding Operators • Special Processes
1230 – 1330	Lunch
1330 – 1530	<b>ASME BPVC IX: Welding Data</b> Variables • Technique • P- Numbers • F-Numbers • Weld Metal Chemical Composition • Specimens • Graphics • Etching- Processes & Reagents
1530 – 1545	Break
1545 – 1645	<b>ASME BPVC IX: Standard Welding Procedure Specifications (SWPSs)</b> Adoption of SWPSs • Use of SWPSs Without Discrete Demonstration • Forms • Production Use of SWPSs
1645 – 1700	<b>Distribute Homework &amp; Recap</b>
1700	End of Day Three

**Day 4**

0730 – 0830	<b>Review of Day 3 &amp; Homework Answers</b>
0830 – 0930	<b>API 577: Nondestructive Examination</b> Discontinuities/Imperfections • Materials Identification • Visual Examination (VT) • Magnetic Particle Examination (MT) • Alternating Current Field Measurement • Liquid Penetrant Examination (PT)
0930 – 0945	Break
0945 – 1230	<b>API 577: Nondestructive Examination (cont'd)</b> Eddy Current Examination (ET) • Radiographic Examination (RT) • Ultrasonic Examination (UT) • Hardness Testing • Pressure & Leak Testing/Examination (LT)
1230 – 1330	Lunch
1330 – 1530	<b>API 577: Welding Inspection</b> Tasks Prior to Welding • Tasks During Welding Operations • Tasks Upon Completion of Welding
1530 – 1545	Break
1545 – 1645	<b>API 577: Welding Inspection (cont'd)</b> Nonconformances and Defects • NDE Examiner Certification • Weld Inspection Recording
1645 – 1700	<b>Distribute Homework &amp; Recap</b>
1700	End of Day Three



**Day 5**

0730 – 0830	<b>Review of Day 4 &amp; Homework Answers</b>
0830 – 0930	<b>API 577: Metallurgy</b> Structure of Metals and Alloys • Physical Properties • Mechanical Properties • Preheating • Heat Treatment • Material Test Reports • Weldability of Metals • Weldability of High Alloys
0930 – 0945	Break
0945 – 1230	<b>API 577: Refinery &amp; Petrochemical Plant Welding Issues</b> Hot Tapping & In-Service Welding. • Lack of Fusion with GMAW-S Welding Process • Caustic Service • Controlled Deposition Welding
1230 – 1330	Lunch
1330 – 1530	<b>API 577: Safety Precautions &amp; Annexes</b> Safety Precautions • Annex A: Technology and Symbols • Annex B: Actions to Address Improperly Made Production Welds • Annex C: WPS/PQR Review
1530 – 1545	Break
1545 – 1615	<b>API 577: Safety Precautions &amp; Annexes (cont'd)</b> Annex D: Guide to Common Filler Metal Selection • Annex E: Example Report of RT Results • Annex F: Inspection Considerations • Annex G: Welding Safety
1615 – 1630	<b>Course Conclusion</b>
1630 – 1645	<b>POST TEST</b>
1645 – 1700	Presentation of Course Certificates
1700	End of Course

**MOCK Exam**

Upon the completion of the course, participants have to sit for a MOCK Examination similar to the exam of the Certification Body through Haward's Portal. Each Participant will be given a username and password to log in Haward's Portal for the Mock exam during the 7 days following the course completion. Each participant has only one trial for the MOCK exam within this 7-day examination window. Hence, you have to prepare yourself very well before starting your MOCK exam as this exam is a simulation to the one of the Certification Body.

**Practical Sessions**

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout welding inspection using the “AWS Tool Kit” and “Structural Weld Replica Kit”, suitable for classroom training.



**Course Coordinator**

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