COURSE OVERVIEW FE0070

Process Piping Design, Construction, Inspection, Maintenance & Mechanical Integrity (ASME B31.3 & API 570)

Course Title

Process Piping Design, Construction, Inspection, Maintenance & Mechanical Integrity (ASME B31.3 & API 570)

Course Date/Venue

February 08-12, 2026/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference

FE0070

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Process Piping Design, Construction, Inspection, Maintenance & Mechanical Integrity (ASME B31.3 & API 570). It covers the ASME B31.3 piping code, ASME piping system standards and other piping system standards; the ASME B31.1, ASME B31.3, ASME B31.4, ASME B31.5, ASME B31.8, ASME B31.9, ASME B31.11 and design and construction code selection; the furnace butt welded pipe, electric-fusion welded pipe, double submerged-arc welded pipe, seamless pipe and spiral welded pipe; and the piping components, piping elements, piping installation, pipe-supporting elements, fixtures and structural attachments.

Further, the course will also discuss the metallic pipe, fitting selection and material selection, materials, strength, fatigue and toughness; the requirements for low temperature toughness tests and carbon steel lower temperature limits; the pressure design, valve selection and layout and support; the thermal expansion and contraction effects, effects of support, anchor, piping flexibility, preheat zone, post weld heat treatment and heat treatment requirements; and the types of expansion joints, pressure thrust, installation of expansion joints, bellows movement, universal expansion joint, hinged expansion joint and other types of expansion joints.

During this interactive course, participants will learn the fabrication and installation, welding procedure specification (WPS), welding processes, shielded metal arc welding and other welding techniques; inspecting, examining and testing various requirements and criteria and methods used in ASMI B31.3 including instrument piping and pressure relieving systems; the API 570 repairs and alterations, welding repairs, hot tapping, pressure tests and pneumatic and combination tests; the high pressure piping and implement proper inspection, repair, alteration and rerating of in-service piping; the external inspection checklist including leaks, misalignment and vibration; the various types of inspection like internal visual, thickness measurement and external visual; the inspections practices including frequency and extent of inspection, extent of CUI inspections, extent of small bore piping inspection and maximum allowable working pressure; the piping calculations and corrosion rate determination; and the design requirements, fabrication requirements, examination requirements, metallic leak test requirements in category M fluid service.

Course Objectives

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

- Apply the latest revision of process piping design, construction, inspection, maintenance and mechanical integrity (ASME B31.3 & API 570)
- Discuss ASME B31.3 piping code, ASME piping system standards and other piping system standards
- Explain ASME B31.1, ASME B31.3, ASME B31.4, ASME B31.5, ASME B31.8, ASME B31.9, ASME B31.11 and design and construction code selection
- Recognize furnace butt welded pipe, electric-fusion welded pipe, double submerged-arc welded pipe, seamless pipe and spiral welded pipe
- Identify piping components, piping elements, piping installation, pipe-supporting elements, fixtures and structural attachments
- Conduct metallic pipe, fitting selection and material selection, as well as discuss materials, strength, fatigue and toughness
- Recognize the requirements for low temperature toughness tests and carbon steel lower temperature limits
- Illustrate pressure design, valve selection and layout and support
- Identify thermal expansion and contraction effects, effects of support, anchor, piping flexibility, preheat zone, post weld heat treatment and heat treatment requirements
- Recognize the types of expansion joints, pressure thrust, installation of expansion joints, bellows movement, universal expansion joint, hinged expansion joint and other types of expansion joints
- Carryout fabrication and installation, welding procedure specification (WPS), welding processes, shielded metal arc welding and other welding techniques
- Inspect, examine and test various requirements and discuss criteria and methods used in ASMI B31.3 including instrument piping and pressure relieving systems
- Carryout API 570 repairs and alterations, welding repairs, hot tapping, pressure tests and pneumatic and combination tests
- Discuss high pressure piping and implement proper inspection, repair, alteration and rerating of in-service piping

- Review the external inspection checklist including leaks, misalignment and vibration
- Apply various types of inspection like internal visual, thickness measurement and external visual
- Carryout inspections practices including frequency and extent of inspection, extent of CUI inspections, extent of small bore piping inspection and maximum allowable working pressure
- Employ piping calculations and corrosion rate determination as well as recognize design requirements, fabrication requirements, examination requirements, metallic leak test requirements in category M fluid service

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 process piping design, construction, inspection, maintenance and mechanical integrity (ASME B31.3 & API 570) for those who are involved in the design, analysis, fabrication, installation, maintenance or ownership of piping systems. engineers, senior draftsmen, maintenance, quality assurance, and manufacturing personnel who work in the chemical, petroleum, utility, plastic processing, pulp and paper, and manufacturing, fields will find it a time-saving means to broaden and update their knowledge of piping. Those who must comply with code requirements will benefit from the practical approach presented in this course in obtaining satisfactory and economical piping systems.

Accommodation

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

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$ 5,500 per Delegate + **VAT**. 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

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**. 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. Steve Magalios, CEng, PGDip (on-going), MSc, BSc, is a **Senior Welding & Pipeline Engineer** with almost **40 years** of extensive **On-shore/Offshore** experience in the **Oil & Gas**, **Construction**, **Refinery** and **Petrochemical** industries. His expertise widely covers in the areas of **Pipeline** Operation & Maintenance, **Pipeline** Design & Construction, **Pipeline** Repair Methods, **Pipeline** Engineering, Pipeline Integrity Management System (**PIMS**), **Pipeline** Pigging, Piping & Pipe Support Systems, **Piping** Systems & Process Equipment, **Piping** System Repair & Maintenance, **Piping** Integrity Management, **Material Science & Selection**, **Composite Repair Materials**, **Material Selection & Properties**, **Material & Inspection Foundation**, **Refractory Material Design, Application**, **Installation & Inspection**, **Welding Technology**, **Welding & Fabrication**, **Welding Inspection**, Computer Aided Design (**CAD**), **Building & Road** Design Skills, **Civil Engineering Design**, **Structural Reliability** Engineering, **Road** Construction & Maintenance, **Concrete Structures & Building Rehabilitation**, **Reinforced Concrete Structures Protection**, **Geosynthetics & Ground Improvement Methods**, **Blueprint** Reading & Interpretation, **Blue Print** Documentation, Mechanical **Drawings**, **P&ID**, **Flow Diagram** Symbols and **Land Surveying** & Property Evaluation. He is also well-versed in Lean & Sour Gas, Condensate, **Compressors**, **Pumps**, Flare Knockout Drum, Block **Valve** Stations, New Slug Catcher, Natural **Gas Pipeline** & Network, Scraper Traps, Burn Pits, Risk Assessment, HSE Plan & Procedures, Quality Plan & Procedures, Safety & Compliance Management, Permit-to-Work Issuer, ASME, API, ANSI, ASTM, BS, NACE, ARAMCO & KOC Standards, MS Office tools, **AutoCAD**, **STAAD-PRO**, GIS, ArcInfo, ArcView, Autodesk Map and various programming languages such as FORTRAN, BASIC and AUTOLISP. Currently, he is the **Chartered Professional Surveyor Engineer & Urban-Regional Planner** wherein he is deeply involved in providing exact data, measurements and determining properly boundaries. He is also responsible in preparing and maintaining sketches, maps, reports and legal description of surveys.

During his career, Mr. Magalios has gained his expertise and thorough practical experience through challenging positions such as a **Project Site Construction Manager**, **Construction Site Manager**, **Project Manager**, **Deputy PMS Manager**, **Head of the Public Project Inspection Field Team**, **Technical Consultant**, **Senior Consultant**, **Consultant/Lecturer**, **Construction Team Leader**, **Lead Pipeline Engineer**, **Project Construction Lead Supervising Engineer**, **Lead Site Engineer**, **Senior Site Engineer, Welding Engineer, Lead Engineer**, **Senior Site Engineer**, **R.O.W. Coordinator**, **Site Representative**, **Supervision Head** and **Contractor** for international Companies such as the Penspen International Limited, Eptista Servicios de Ingeneria S.I., J/V ILF Pantec TH. Papaioannou & Co. – Emenergy Engineering, J/V Karaylannis S.A. – Intracom Constructions S.A., Ergaz Ltd., Alkyonis 7, Palaeo Faliro, Piraeus, Elpet Valkaniki S.A., Asprofos S.A., J/V Depa S.A. just to name a few.

Mr. Magalios is a **Registered Chartered Engineer** and has **Master** and **Bachelor** degrees in **Surveying Engineering** from the **University of New Brunswick**, **Canada** and the **National Technical University of Athens**, **Greece**, respectively. Further, he is currently enrolled for **Post-graduate** in **Quality Assurance** from the **Hellenic Open University**, **Greece**. He has further obtained a Level 4B Certificates in Project Management from the National & Kapodistrian University of Athens, Greece and Environmental Auditing from the Environmental Auditors Registration Association (EARA). Moreover, he is a **Certified Instructor/Trainer**, a **Chartered Engineer** of Technical Chamber of Greece and has delivered numerous trainings, workshops, seminars, courses 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: ***Sunday, 08th of February 2026***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction ASME B31.3 Process Piping Code*** *ASME/ANSI • ASME B31 Code • Piping System Standards • ASME Piping System Standards • More ASME Piping System Standards • Other Piping System Standards • ASME B31.1 • ASME B31.3 • ASME B31.4 • ASME B31.5 • ASME B31.8 • ASME B31.9 • ASME B31.11 • Design & Construction Code Selection • Other Design / Construction Codes*
0930 – 0945	*Break*
0945 – 1100	***ASME B31.3 (Scope & Definition)*** *Scope • Content and Coverage • Exclusions • Definitions • Category D Fluid Service • Category M Fluid Service • High Pressure Fluid Service • Elevated Temperature Fluid Service • High Purity Fluid Service • Normal Fluid Service • Definition • Flexibility Stresses (SE) • Allowable Displacement Stress (SA) • Packaged Equipment • Pipe • Electric Resistance-welded Pipe*
1100 – 1215	***ASME B31.3 (Scope & Definition) (cont'd)*** *Furnace Butt Welded Pipe • Electric-fusion Welded Pipe • Double Submerged-Arc Welded Pipe • Seamless Pipe & Spiral Welded Pipe • Piping • Piping Components • Piping Elements • Piping Installation • Pipe-supporting Elements • Fixtures • Structural Attachments • Stress Terms • Design • Piping Development Process • Responsibilities*
1215 – 1230	*Break*
1230 - 1330	***Metallic Pipe & Fitting Selection*** *Bases for Material Selection • Fire Resistance • Material Toughness • Example of Brittle Fracture • Material Cost • Material Selection of Piping • Elevated Temperature Fluid Service • Pipe Components – ASME • Other Listed Components • Weld Joint Quality Factor E_j • Fittings • Solder & Brazed Joint Fluid Service Requirements • Branches • Flanges (ASME B16.5) • Gaskets (ASME B16.20) • Bolting • Flanged Joints*
1230 – 1420	***Materials*** *Materials • Metal Properties • Strength of Materials • Fatigue • Toughness • Charpy Specimen • Toughness Test • Transition Temperature Samples*
1420 – 1430	***Recap*** *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*
1430	*Lunch & End of Day One*

Day 2: ***Monday, 09th of February 2026***

0730 – 0830	***Materials (cont'd)*** *Requirements for Low Temperature Toughness Tests • Carbon Steel Lower Temperature Limits • Impact Test Methods and Acceptance • Fluid Service Requirements • Deterioration in Service*
0830 - 0930	***Pressure Design*** *Straight Piping Under Internal Pressure B31.3 304.1B • Stainless Steel Piping Schedules • New Piping • Required Thickness of Permanent Blanks*

0930 – 0945	Break
0945 – 1100	***Valve Selection*** *Pipe Line Valves (API-6D) • Bolted Bonnet Gate Valve (API 600) • Type of Gate Valve Bonnet • Type of Gate Valve Stems • Gate Valve Stem Pull Test • Type of Gate Valve Trim • Type of Gate Valve Discs • Extended Body Gate Valve – API-606 • Knife Gate Valves • Globe Valve • Check Valve • Types vs. P-T Ratings • Types vs. Attributes • Butterfly Valve - Low Pressure • Butterfly Valve - High Pressure • Ball Valve • Plug Valve • Diaphragm Valve*
1100 – 1230	***Flanged Fitting (ASME B16.5)*** *Scope •Markings/Materials • Pressure Testing • Pressure Tests • ASME B16.5 Pressure Testing • ASME B31.3 Flange Selection • Slip on Flange • ASME B16.5 Flange Selection • ASME B16.5 Flange PT Rating Selection • ASME B31.3 Bolt Selection• General Consideration for Bolting Selection • ASME B16.5 Bolts Selection • Bolt Lengths • ASME B31.3 Gaskets • F308.4 Gaskets • ASME B16.5 Gaskets • F312 Flanged Joints • Factors Affecting Flange Joint Performance*
1230 – 1245	Break
1245 – 1350	***Layout & Support*** *General Considerations • Support Spacing • Sagging Due to Creep (12 Years) •Support Locations • Simple Support • Guide • Spring Hangers • Special Purpose Supports • Support Element Selection • The Sustained Load Analysis • Fixing Problems*
1350 - 1420	***Thermal Expansion & Contraction*** *Thermal Expansion & Contraction Effects • Effects of Support, Anchor • Piping Flexibility • Properties for Flexibility Analysis • Thermal Expansion & Contraction • Piping Support • Sliding Supports*
1420 – 1430	***Recap*** *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*
1430	Lunch & End of Day Two

Day 3: ***Tuesday, 10th of February 2026***

0730 – 0900	***Preheat & PWHT*** *Preheating • Requirements and Recommendations • Temperature Verification • Preheat Zone • Post Weld Heat Treatment • Heat Treatment Requirements • Governing Thickness • Heating & Cooling • Temperature Verification • Hardness Tests • Specific Requirements • Alternative Heat Treatment • Exceptions to Basic Requirements • Dissimilar Materials • Delayed Heat Treatment • Local Heat Treatment*
0900 – 0915	Break
0915 – 1100	***Designing with Expansion Joints*** *Types of Expansion Joints • Pressure Thrust • Pressure Thrust Workshop • Installation of Expansion Joints • Bellows Movement • Universal Expansion Joint • Hinged Expansion Joint • Gimbal Expansion Joint • Pressure Balanced Expansion Joint • Bellows Expansion Joint Types • Metal Bellows Expansion Joints • Bellows Shapes (EJMA) • Metal Bellows Failure Modes • Flixborough Disaster • Metal Bellows Fatigue • Special Designs • Designer Responsibilities • Metal Bellows Design Conditions • Piping Design for Metal Bellows • Installation & Testing • Manufacturer Responsibilities • Other Considerations • Problems to Avoid*

1100 - 1230	***Fabrication & Installation*** *Welder Qualification • Welding Procedure Specification (WPS) • Welding Processes • Shielded Metal Arc Welding • Gas Metal Arc Welding • Flux Cored Arc Welding • Gas Tungsten Arc Welding • Welding Processes • Welding Processes Accepted • Weld Preparation • Typical Welds • Preheating • Heat Treatment • Bending & Forming • Installation • Flanged Joints Alignment • Tighten Procedure for Flange Joints • Threaded Joints*
1230 – 1245	*Break*
1245 - 1420	***Inspection, Examination & Testing*** *Inspection • Examination Requirements • Acceptance Criteria • Ultrasonic Examination • Examination Methods • Examination Requirements • Examination – Normal Fluid Service • Examination - Severe Cyclic Conditions • Testing• Leak Test Methods*
1420 – 1430	***Recap*** *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*
1430	*Lunch & End of Day Three*

Day 4: ***Wednesday, 11th of February 2026***

0730 – 0830	***Specific Piping Systems*** *Instrument Piping • Pressure Relieving Systems*
0830 - 0930	***Repairs, Alterations & Rerating of Piping Systems*** *API 570 Repairs and Alterations • Welding Repairs (Including on-Stream) • Welding & Hot Tapping • Re-rating • Case Study: Marcus Oil*
0930 – 0945	*Break*
0945 – 1100	***Pressure Tests Hydrostatic, Pneumatic & Combination Tests*** *API 570 Pressure Testing, Requirements • ASME B31.3 Calculation of Test Pressures • Pressure Tests • Initial Service Leak Test*
1100 - 1215	***High Pressure Piping*** *General – High Pressure • Materials • Pressure Design • Limitations • Flexibility Analysis • Fabrication • Examination Requirements • Testing • Overpressure Protection*
1215 – 1230	*Break*
1230 – 1300	***In-Service: Piping API 570 – Inspection, Repair, Alteration & Rerating of In-Service*** *In-Service Piping • API 570 Piping Inspection Code • Responsibilities*
1300 – 1420	***What to Inspect*** *Erosion & Corrosion/Erosion • Environmental Cracking • Corrosion Beneath Linings & Deposits • Fatigue Cracking • Creep Cracking • Brittle Fracture • Freeze Damage*
1420 – 1430	***Recap*** *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*
1430	*Lunch & End of Day Four*

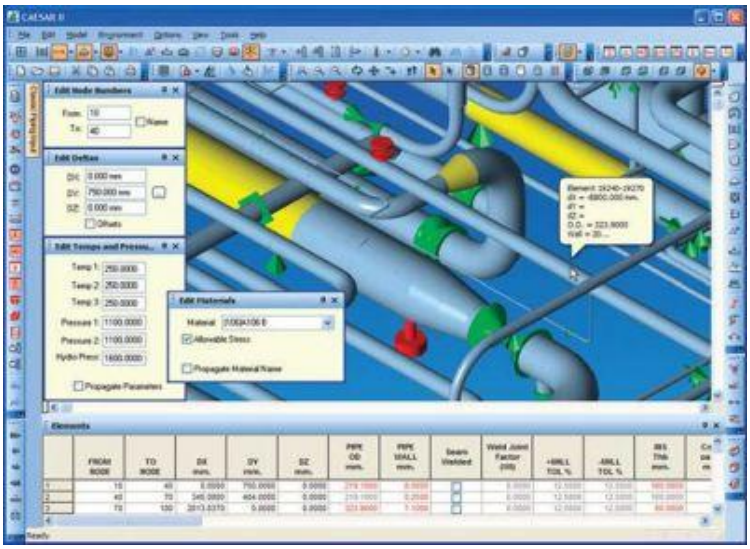
Day 5: ***Thursday, 12th of February 2026***

0730 – 0830	***External Inspection Checklist*** *Leaks • Misalignment • Vibration • Supports • Corrosion • Insulation*
0830 – 0930	***Types of Inspection*** *Internal Visual • Thickness Measurement • External Visual • Vibrating Piping • Supplemental*

0930 – 0945	*Break*
0945 – 1100	***Inspection Practices*** *Frequency & Extent of Inspection • Inspection Intervals • Extent of CUI Inspections • Extent of Small Bore Piping Inspection • Remaining Life Calculation • Corrosion Rate Calculations [LT or ST] • Maximum Allowable Working Pressure • Required Minimum Thickness • Assessment of Inspection Findings • Repairs & Alterations • Temporary Repairs • Fabrication & Examination • Leak Testing • Rerating*
1100 – 1215	***Existing Piping Calculations (API-570)*** *Piping Calculations (API-570) • Injection Point Limits (API-570 5.10) • Existing Piping Calculations • Corrosion Rate Determination • Short Term (S.T.) Corrosion Rate • Maximum Allowable Working Pressure (Half Life) • Pressure Design Thickness (API-574- 11.1) • Structural Minimum Thickness • Minimum Required Thickness • Determination of Retirement Thickness for Valves*
1215 – 1230	*Break*
1230 – 1345	***Category M Fluid Service*** *General • Design Requirements • Fabrication Requirements • Examination Requirements • Metallic Leak Test Requirements • Nonmetallic Examination & Testing Requirements • Typical Owner Added Requirements*
1345 - 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on 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 various exercises using the "CAESAR II" simulator.



CAESAR II

Course Coordinator

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