# COURSE OVERVIEW FE0015
# Design General Specification

**Course Title**
Design General Specification

**Course Date/Venue**
Session 1: July 14-18, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Seesion 2: December 21-25, 2025/Boardroom 1, Elite Byblos Hotel A l Barsha, Sheikh Zayed Road, Dubai, UAE


**Course Reference**
FE0015

**Course Duration/Credits**
Five days/3.0 CEUs/30 PDHs

**Course Description**

***This practical 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 Piping Mechanical Design and Specification. It covers the principles of piping mechanical design and the role of mechanical design in piping systems; the codes and standards relevant to piping mechanical design and considerations for various process conditions and materials; the material selection criteria based on process conditions and fluid properties; the piping material specifications and standards; the corrosion resistance and material compatibility considerations, temperature and pressure limitations for different materials; and the documentation and traceability requirements for piping materials.

Further, the course will also discuss the types of loads acting on piping systems; the methods for determining loads and stresses; the stress categories and allowable stress analysis, thermal expansion, contraction analysis and software tools for stress analysis; the pipe wall thickness calculation, pressure design thickness calculation methods, accounting for corrosion allowances and mill tolerance; the external pressure design calculations and verification of pipe wall thickness using applicable codes and standards; the piping supports and restraints; the load distribution and selection of support types; the design considerations for spring hangers, snubbers and restraints; and the analysis of piping systems with variable loads and movements.

During this interactive course, participants will learn the pipe stress analysis, load case development and analysis procedure, flexibility analysis and pipe displacement evaluation; the piping vibration analysis and mitigation measures for addressing excessive vibration; the piping component design and selection, expansion joints and flexible joints; and the piping specification development and documentation.

**Course Objectives**

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

- Apply and gain an in-depth knowledge on piping mechanical design and specification
- Discuss the principles of piping mechanical design and the role of mechanical design in piping systems
- Explain the codes and standards relevant to piping mechanical design and considerations for various process conditions and materials
- Discuss material selection criteria based on process conditions and fluid properties and identify piping material specifications and standards
- Analyze corrosion resistance, material compatibility considerations, temperature and pressure limitations for different materials and documentation and traceability requirements for piping materials
- Identify the types of loads acting on piping systems and calculate methods for determining loads and stresses
- Recognize stress categories and allowable stress analysis, thermal expansion and contraction analysis and software tools for stress analysis
- Carryout pipe wall thickness calculation, pressure design thickness calculation methods, accounting for corrosion allowances and mill tolerance, external pressure design calculations and verification of pipe wall thickness using applicable codes and standards
- Identify piping supports and restraints, load distribution and selection of support types, design considerations for spring hangers, snubbers and restraints and analysis of piping systems with variable loads and movements
- Apply pipe stress analysis, load case development and analysis procedure, flexibility analysis and pipe displacement evaluation
- Employ piping vibration analysis and mitigation measures for addressing excessive vibration
- Determine piping component design and selection, expansion joints, flexible joints and piping specification development and documentation

## 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 piping mechanical design and specification for piping engineers, mechanical engineers, plant designers, project managers, construction professionals, piping inspectors and those who are interested in pursuing a career in mechanical engineering or related fields.

## 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.

## Accommodation

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

**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 **30 years** of extensive **On-shore/Offshore** experience in the **Oil & Gas**, **Construction**, **Refinery** and **Petrochemical** industries. His expertise widely covers in the areas of **Welding Technology**, **Welding & Fabrication**, **Welding Inspection**, **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, 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***

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| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0930* | ***Introduction to Piping Mechanical Design***<br>*Piping Mechanical Design Principles • The Role of Mechanical Design in Piping Systems • Codes & Standards Relevant to Piping Mechanical Design • Mechanical Design Considerations for Various Process Conditions & Materials • Stress Analysis & Its Relationship to Mechanical Design* |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Piping Material Selection & Specifications***<br>*Material Selection Criteria Based on Process Conditions & Fluid Properties • Piping Material Specifications & Standards (ASME B31.3, ASTM, etc.)* |
| *1100 – 1215* | ***Piping Material Selection & Specifications (cont'd)***<br>*Corrosion Resistance & Material Compatibility Considerations • Temperature & Pressure Limitations for Different Materials* |
| *1215 – 1230* | *Break* |
| *1230 – 1420* | ***Piping Material Selection & Specifications (cont'd)***<br>*Documentation & Traceability Requirements for Piping Materials* |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day One* |

***Day 2***

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|---|---|
| *0730 – 0930* | ***Piping Loads & Stresses***<br>*Types of Loads Acting on Piping Systems (Thermal, Pressure, Deadweight, etc.) • Calculation Methods for Determining Loads & Stresses • Stress Categories & Allowable Stress Criteria (ASME B31.3)* |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Piping Loads & Stresses (cont'd)***<br>*Thermal Expansion & Contraction Analysis • Introduction to Software Tools for Stress Analysis (e.g., Caesar II)* |
| *1100 – 1215* | ***Pipe Wall Thickness Calculation***<br>*Design Considerations for Determining Pipe Wall Thickness • Pressure Design Thickness Calculation Methods (ASME B31.3) • Accounting for Corrosion Allowances & Mill Tolerance* |
| *1215 – 1230* | *Break* |
| *1230 – 1420* | ***Pipe Wall Thickness Calculation (cont'd)***<br>*External Pressure Design Calculations • Verification of Pipe Wall Thickness Using Applicable Codes & Standards* |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day Two* |

**Day 3**

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|---|---|
| 0730 – 0930 | ***Piping Supports & Restraints***<br>*Introduction to Piping Support Design Principles • Types of Supports & Restraints in Piping Systems • Load Distribution & Selection of Support Types* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Piping Supports & Restraints (cont'd)***<br>*Design Considerations for Spring Hangers, Snubbers & Restraints • Analysis of Piping Systems with Variable Loads & Movements* |
| 1100 – 1215 | ***Pipe Stress Analysis & Flexibility***<br>*Pipe Stress Analysis Principles • Load Case Development & Analysis Procedures • Flexibility Analysis for Accommodating Thermal Expansion & Contraction* |
| 1215 – 1230 | *Break* |
| 1230 – 1420 | ***Pipe Stress Analysis & Flexibility (cont'd)***<br>*Evaluating Pipe Displacements, Nozzle Loads & Equipment Interactions • Case Studies & Practical Exercises Using Stress Analysis Software* |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Three* |

**Day 4**

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|---|---|
| 0730 – 0930 | ***Piping Vibration Analysis & Mitigation***<br>*Piping Vibration & Its Impact on Mechanical Design • Types of Vibration & their Causes (Flow-Induced, Mechanical, etc.) • Vibration Analysis Techniques & Criteria* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Piping Vibration Analysis & Mitigation (cont'd)***<br>*Mitigation Measures for Addressing Excessive Vibration • Design Considerations for Supporting & Isolating Vibrating Equipment* |
| 1100 – 1215 | ***Piping Component Design & Selection***<br>*Design Considerations for Pipe Fittings, Valves & Flanges • ASME B16.5 & ASME B16.9 Standards for Flange & Fitting Design • Material Selection & Specifications for Components* |
| 1215 – 1230 | *Break* |
| 1230 – 1420 | ***Piping Component Design & Selection (cont'd)***<br>*Gasket Selection & Flange Face Design Considerations • Valve Selection Criteria Based on Process Requirements* |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Four* |

**Day 5**

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|---|---|
| 0730 – 0830 | ***Expansion Joints & Flexible Elements***<br>*Introduction to Expansion Joints & Their Function in Piping Systems • Types of Expansion Joints (Bellows, Gimbal, Universal, etc.) • Selection Criteria & Design Considerations for Expansion Joints* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Expansion Joints & Flexible Elements (cont'd)***<br>*Flexible Hoses & Connectors in Piping Systems • Installation, Maintenance & Inspection of Expansion Joints* |

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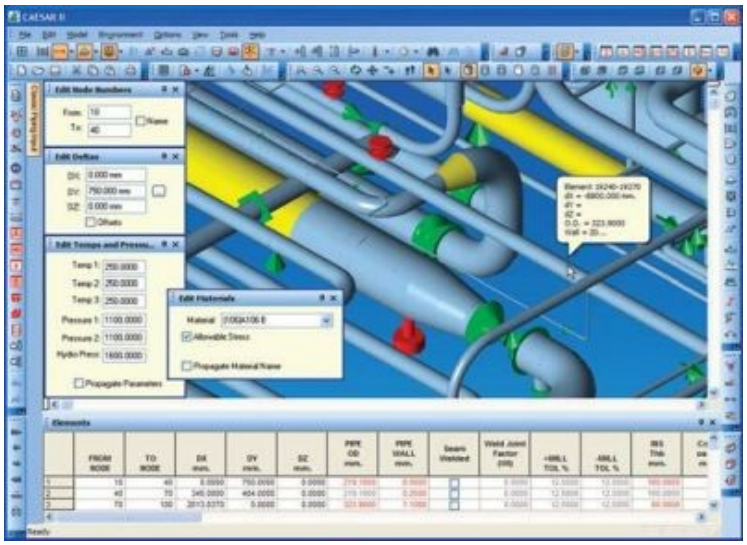
|---|---|
| *1100 – 1215* | ***Piping Specification Development & Documentation***<br>*Creating Piping Specifications Based on Project Requirements • Documenting Mechanical Design Considerations in Specifications • Piping Material Takeoff & Bill of Materials Development* |
| *1215 – 1230* | *Break* |
| *1230 - 1345* | ***Piping Specification Development & Documentation (cont'd)***<br>*Coordinating with Other Engineering Disciplines (Civil, Electrical, etc.) • Reviewing & Finalizing Piping Mechanical Design Deliverables* |
| *1345 – 1400* | ***Course Conclusion*** |
| *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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