



**COURSE OVERVIEW FE0216**

**Piping Design in Accordance with ASME B31.3 (Level 2)**

**Course Title**

Piping Design in Accordance with ASME B31.3 (Level 2)

**Course Date/Venue**

July 20-24, 2026/TBA Meeting Room, Blue Waters Hotel, Durban, South Africa

**Course Reference**

FE0216

**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 Piping Design in Accordance with ASME B31.3. It covers the ASME B31.3 overview and scope, piping system design criteria and P&ID interpretation and enhancement; the isometric drawing fundamentals, line list and piping specifications and plot plans and equipment layout; the pressure design of straight pipe (B31.3), corrosion and mill tolerance allowances including fittings and branch reinforcement calculations; the flange rating and pressure-temperature relationship, valve selection and pressure class matching and line sizing and velocity calculations; and the carbon steel and alloy steels (B31.3), stainless steels and specialty alloys, non-metallic and lined piping.



During this interactive course, participants will learn the piping components standards, gaskets, bolts and sealing technology and special piping components; the purpose of piping stress analysis, types of loads in piping systems, types of pipe supports and support location and spacing rules; the CAESAR II/stress tools, expansion loop and flexibility concepts, B31.3 compliance and documentation; the isometrics and MTO generation and stress review; and the practical interpretation including constructability and site considerations.



### Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on piping design in accordance with ASME B31.3
- Discuss ASME B31.3 overview and scope, piping system design criteria and P&ID interpretation and enhancement
- Recognize isometric drawing fundamentals, line list and piping specifications and plot plans and equipment layout
- Illustrate pressure design of straight pipe (B31.3), corrosion and mill tolerance allowances including fittings and branch reinforcement calculations
- Recognize flange rating and pressure-temperature relationship and apply valve selection and pressure class matching and line sizing and velocity calculations
- Identify carbon steel and alloy steels (B31.3), stainless steels and specialty alloys as well as non-metallic and lined piping
- Discuss piping components standards, gaskets, bolts and sealing technology and special piping components
- Recognize the purpose of piping stress analysis, types of loads in piping systems, types of pipe supports and support location and spacing rules
- Identify CAESAR II/stress tools and discuss expansion loop and flexibility concepts, B31.3 compliance and documentation
- Review isometrics and MTO generation and apply stress review and practical interpretation including constructability and site considerations

### 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 design in accordance with ASME B31.3 for piping design engineers, mechanical engineers, piping supervisors and senior draftsmen, plant engineers in, EPC contractors and engineering consultants, quality, inspection, and reliability engineers and those who involved in stress analysis, material selection, code compliance, and complex piping design challenges under ASME B31.3.

### 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**

Haward's certificates are accredited by the following international accreditation organizations:

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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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

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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 **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.

**Accommodation**

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

### 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. Den Bazley, PE, BSc**, is a **Senior Mechanical & Maintenance Engineer** with over **30 years** of industrial experience in **Oil, Gas, Refinery, Petrochemical, Power and Utilities** industries. His wide expertise includes **Pigging & Integrity Assessment, Process Piping Design, Pipeline Operation & Maintenance, Welding & Fabrication, Brazing, Fitness-for-Service (FFS), Process Plant Equipment, Pressure Vessels, Piping & Storage Facilities, Layout of Piping Systems & Process Equipment, Pipe Work Design & Fabrication, Centrifugal Pump Installation & Operation, Centrifugal Pump Maintenance & Troubleshooting, Centrifugal & Positive Displacement Pump Technology, Pumps & Valves Operation, Bearings, Seals & Couplings, Compressors & Turbines Maintenance & Troubleshooting, Gas Turbine Design & Maintenance, Gas Turbine Troubleshooting, Pressure Vessel Design, Fabrication & Testing, Tank & Tank Farms, Heat Exchangers Operation & Maintenance, Boilers & Steam System Management, Re-tubing & Tube Expanding Technology, Propylene Compressor & Turbine, Valve Installation & Repair, Safety Relief Valve Sizing & Troubleshooting, Dry Gas Seal Operation, Mechanical Seal Installation & Maintenance, Industrial Equipment & Turbomachinery, Pumps, Compressors, Turbines & Motors, Boiler & Steam System Management, Tune-Up, Heat Recovery & Optimization, Boiler Operation & Maintenance, Process Control Valves, Steam Turbine Operation, Valve Types, Troubleshooting & Repair Procedure, Pressure Vessels & Heat Exchangers, Corrosion Inspection, PSV Maintenance & Testing, Pump Maintenance, Machinery Troubleshooting, Valves, Safety Relief Valves, Strainers & Steam Traps, Pipeline Rules of Thumb, Analytical Prevention of Mechanical Failure, Gear Boxes Troubleshooting & Repair, Piping & Pipeline Design & Inspection, Mechanical Integrity & Reliability, Mechanical Rotating Equipment & Turbomachinery, Motors & Variable Speed Drives, Mechanical Engineering Design, Process Plant Shutdown, Turnaround & Troubleshooting, Mechanical Alignment, Laser & Dial-Indicator Techniques, Material Cataloguing, Condition Based Monitoring, Maintenance Management, Reliability Management, Reliability Centred Maintenance (RCM), Total Plant Maintenance (TPM) and Reliability-Availability-Maintainability (RAM), Engineering Drawings, Codes & Standards, P&ID Reading, Interpretation & Developing, Maintenance & Reliability Best Practices, Maintenance Auditing, Benchmarking & Performance Improvement, Excellence in Maintenance & Reliability Management, Preventive & Predictive Maintenance & Machinery Failure Analysis (RCFA), Total Plant Reliability Centered Maintenance (RCM), Rotating Equipment Reliability Optimization, Machinery Failure Analysis, Prevention & Troubleshooting, Maintenance Planning, Scheduling & Work Control and Maintenance Planning & Cost Estimation.**

During his career life, Mr. Bazley has gained his practical and field experience through his various significant positions and dedication as the **General Manager, Branch Manager, Refinery Chairman, Engineering Manager, Maintenance Engineer, Construction Engineer, Project Engineer, Mechanical Engineer, Associate Engineer, Oil Process Engineer, Mechanical Services Superintendent, Quality Coordinator, Planning Coordinator, Consultant/Instructor, Lecturer/Trainer** and **Public Relations Officer** for numerous international companies like **ESSO, FFS Refinery, Dorbyl Heavy Engineering (VECOR), Vandenbergh Foods (Unilever), Engen Petroleum, Royle Trust** and **Pepsi-Cola**.

Mr. Bazley is a **Registered Professional Engineer** and has a **Bachelor** degree in **Mechanical Engineering**. Further, he is a **Certified Engineer** (Government Certificate of Competency GCC Mechanical Pretoria), a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management (ILM)**, an active member of the **Institute of Mechanical Engineers (IMechE)** and has delivered numerous trainings, courses, seminars and workshops 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.

### Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

### Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

#### **Day 1: Monday, 20<sup>th</sup> of July 2026**

0730 – 0800	<i>Registration &amp; Coffee</i>
0800 – 0815	<i>Welcome &amp; Introduction</i>
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>ASME B31.3 Overview &amp; Scope</b> <i>Scope and Application Areas (Process Piping) • Differences Between B31.1, B31.4, B31.8 and B31.3 • Fluid Service Categories (Normal, Category D, Category M, High-Pressure) • Code Responsibilities – Owner, Designer, Inspector</i>
0930 – 0945	<i>Break</i>
0945 – 1030	<b>Piping System Design Criteria</b> <i>Design Pressure and Design Temperature • Operating Conditions versus Upset Conditions • Corrosion Allowance &amp; Design Margin • Design Life &amp; Safety Factor Concept</i>
1030 – 1130	<b>P&amp;ID Interpretation &amp; Enhancement</b> <i>Standard P&amp;ID Symbols and Conventions • Equipment, Valve, Instrument Identification • Flow Direction, Line Numbers and Specifications • Process Conditions and Control Philosophy Reading</i>
1130 – 1215	<b>Isometric Drawing Fundamentals</b> <i>Difference Between Orthographic and Isometric • Line Routing Principles • Dimensioning and Elevation Control • Spool Identification (Field versus Shop)</i>
1215 – 1230	<i>Break</i>
1230 – 1330	<b>Line List &amp; Piping Specifications</b> <i>Line Number Breakdown (Service, Size, Material, Class) • Specification Sheets Interpretation • Line Class Responsibilities • Tie-in and Battery Limit Identification</i>



1330 – 1420	<b>Plot Plans &amp; Equipment Layout</b> Equipment Spacing Requirements • Pipe Rack Corridors • Access, Maintenance and Safety Clearance • Expansion and Layout Flexibility Concept
1420 – 1430	<b>Recap</b> 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: Tuesday, 21<sup>st</sup> of July 2026**

0730 – 0830	<b>Pressure Design of Straight Pipe (B31.3)</b> Hoop Stress Calculation • Allowable Stress & Efficiency Factor • Seam Type Factor (E) • Thickness Calculation per Code
0830 – 0930	<b>Corrosion &amp; Mill Tolerance Allowances</b> Typical Corrosion Allowance Values • Mill Tolerance (12.5% Rule) • Erosion versus Corrosion Effects • Design-for-Life Considerations
0930 – 0945	Break
0945 – 1100	<b>Fittings &amp; Branch Reinforcement Calculations</b> Branch Connection Types • Area Replacement Method • Reinforcement Pad Requirements • Integrally Reinforced Fittings
1100 – 1215	<b>Flange Rating &amp; Pressure-Temperature Relationship</b> ASME B16.5 and B16.47 Classes (150–2500) • Pressure-Temperature Derating • Gasket Selection Basics • Bolting Stress Control
1215 – 1230	Break
1230 – 1330	<b>Valve Selection &amp; Pressure Class Matching</b> Gate, Globe, Ball, Butterfly, Check Valves • Fire-Safe and Fugitive Emission Valves • Cryogenic and High-Temperature Valves • Pressure Class Matching to Line Spec
1330 – 1420	<b>Line Sizing &amp; Velocity Calculations</b> Gas and Liquid Velocity Limits • Pressure Drop Calculation • Erosion Velocity Concept • Economic Pipe Diameter Principles
1420 – 1430	<b>Recap</b> 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: Wednesday, 22<sup>nd</sup> of July 2026**

0730 – 0830	<b>Carbon Steel &amp; Alloy Steels (B31.3)</b> ASTM A106, A53, A333, A335 • Temperature Limitations • Low-Temperature Service Requirements • Impact Testing Requirements
0830 – 0930	<b>Stainless Steels &amp; Specialty Alloys</b> Austenitic versus Duplex Stainless Steel • Corrosion Resistance & Pitting • High-Temperature Alloy Selection • NACE & Sour Service Material Requirements
0930 – 0945	Break
0945 – 1100	<b>Non-Metallic &amp; Lined Piping</b> FRP, HDPE, PVC, PTFE Lined Piping • Temperature & Pressure Limits • Chemical Compatibility • Support and Expansion Behavior



1100 – 1215	<b>Piping Components Standards</b> ASME B16.9 (Butt-Weld Fittings) • ASME B16.11 (Forged Fittings) • ASME B16.10, B16.34 (Valve Standards) • MSS SP Standards
1215 – 1230	Break
1230 – 1330	<b>Gaskets, Bolts &amp; Sealing Technology</b> Spiral Wound, RTJ, Flat, Ring Gaskets • ASTM Bolting Grades (A193 / A194) • Bolt Torque Principles • Leak Prevention Methods
1330 – 1420	<b>Special Piping Components</b> Expansion Joints & Bellows • Steam Traps & Strainers • Pressure Relief Valves (PRV) • Inline Mixers / Orifice Plates
1420 – 1430	<b>Recap</b> 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: Thursday, 23<sup>rd</sup> of July 2026**

0730 – 0830	<b>Purpose of Piping Stress Analysis</b> Thermal Expansion Problems • External Loads and Vibration • Failure Mechanisms • Code Compliance Verification
0830 – 0930	<b>Types of Loads in Piping Systems</b> Sustained Loads (Pressure + Weight) • Occasional Loads (Wind/Seismic) • Thermal Loads (Expansion/Contraction) • Dynamic Loads (Surge, Vibration)
0930 – 0945	Break
0945 – 1100	<b>Types of Pipe Supports</b> Rigid Supports • Spring Supports • Guides and Anchors • Variable versus Constant Effort Supports
1100 – 1215	<b>Support Location &amp; Spacing Rules</b> Span Charts and Deflection Control • Based on Pipe Size & Material • Lateral versus Longitudinal Spacing • Heavy Valve & Equipment Supports
1215 – 1230	Break
1230 – 1330	<b>CAESAR II/ Stress Tools</b> Model Input Data Requirement • Boundary Conditions & Restraints • Load Cases Generation • Understanding Output Reports
1330 – 1420	<b>Expansion Loop &amp; Flexibility Concepts</b> Natural versus Engineered Flexibility • Anchor and Guide Placement • Offset and Loop Design • Cold Spring and Stress Reduction
1420 – 1430	<b>Recap</b> 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: Friday, 24 of July 2026**

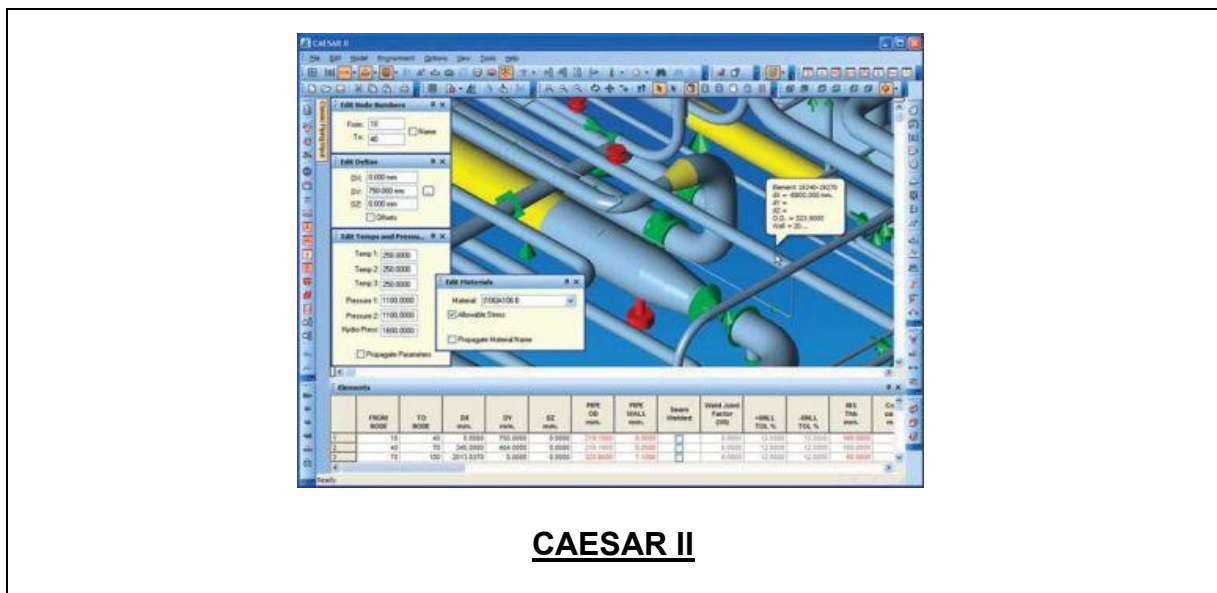
0730 – 0830	<b>B31.3 Compliance &amp; Documentation</b> Design Calculations Documentation • Required Code Statements • Material Traceability • Design Verification Reports
0830 – 0930	<b>Review of Isometrics &amp; MTO Generation</b> Checking Elevations & Slopes • Clash Detection Basics • Material Take-Off Process • Fabrication Drawing Coordination
0930 – 0945	Break



0945 – 1100	<b>Stress Review &amp; Practical Interpretation</b> Allowable Stress versus Calculated Stress • Overstress Indicators • Support Re-Adjustment Methods • Design Modification Options
1100 – 1215	<b>Constructability &amp; Site Considerations</b> Welding Access and NDT Requirements • Lifting and Erection Planning • Field Fit & Tolerance Allowance • Cold Alignment Issues
1215 – 1230	Break
1230 – 1300	<b>Failure Case Studies &amp; Lessons Learned</b> Pipe Rupture Incidents • Flange Leak Failures • Thermal Stress Cracks • Poor Support Examples
1300 - 1345	<b>Capstone Design Workshop</b> Mini-Project: Process Unit Piping Design • Apply B31.3 Rules • Prepare P&ID + Iso + Calc + Support Plan • Group Review and Feedback
1345 – 1400	<b>Course Conclusion</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 – 1415	<b>POST-TEST</b>
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.



**Course Coordinator**

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