



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

November 02-06, 2026/Boardroom - Ground Floor, 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 Centred 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

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

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, 02nd of November 2026

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	ASME B31.3 Overview & Scope 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
0930 – 0945	Break
0945 – 1030	Piping System Design Criteria Design Pressure and Design Temperature • Operating Conditions versus Upset Conditions • Corrosion Allowance & Design Margin • Design Life & Safety Factor Concept
1030 – 1130	P&ID Interpretation & Enhancement Standard P&ID Symbols and Conventions • Equipment, Valve, Instrument Identification • Flow Direction, Line Numbers and Specifications • Process Conditions and Control Philosophy Reading
1130 – 1215	Isometric Drawing Fundamentals Difference Between Orthographic and Isometric • Line Routing Principles • Dimensioning and Elevation Control • Spool Identification (Field versus Shop)



1215 – 1230	Break
1230 – 1330	Line List & Piping Specifications Line Number Breakdown (Service, Size, Material, Class) • Specification Sheets Interpretation • Line Class Responsibilities • Tie-in and Battery Limit Identification
1330 – 1420	Plot Plans & Equipment Layout Equipment Spacing Requirements • Pipe Rack Corridors • Access, Maintenance and Safety Clearance • Expansion and Layout Flexibility Concept
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: Tuesday, 03rd of November 2026

0730 – 0830	Pressure Design of Straight Pipe (B31.3) Hoop Stress Calculation • Allowable Stress & Efficiency Factor • Seam Type Factor (E) • Thickness Calculation per Code
0830 – 0930	Corrosion & Mill Tolerance Allowances Typical Corrosion Allowance Values • Mill Tolerance (12.5% Rule) • Erosion versus Corrosion Effects • Design-for-Life Considerations
0930 – 0945	Break
0945 – 1100	Fittings & Branch Reinforcement Calculations Branch Connection Types • Area Replacement Method • Reinforcement Pad Requirements • Integrally Reinforced Fittings
1100 – 1215	Flange Rating & Pressure-Temperature Relationship ASME B16.5 and B16.47 Classes (150–2500) • Pressure-Temperature Derating • Gasket Selection Basics • Bolting Stress Control
1215 – 1230	Break
1230 – 1330	Valve Selection & Pressure Class Matching 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	Line Sizing & Velocity Calculations Gas and Liquid Velocity Limits • Pressure Drop Calculation • Erosion Velocity Concept • Economic Pipe Diameter Principles
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: Wednesday, 04th of November 2026

0730 – 0830	Carbon Steel & Alloy Steels (B31.3) ASTM A106, A53, A333, A335 • Temperature Limitations • Low-Temperature Service Requirements • Impact Testing Requirements
0830 – 0930	Stainless Steels & Specialty Alloys Austenitic versus Duplex Stainless Steel • Corrosion Resistance & Pitting • High-Temperature Alloy Selection • NACE & Sour Service Material Requirements
0930 – 0945	Break



0945 – 1100	Non-Metallic & Lined Piping FRP, HDPE, PVC, PTFE Lined Piping • Temperature & Pressure Limits • Chemical Compatibility • Support and Expansion Behavior
1100 – 1215	Piping Components Standards 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	Gaskets, Bolts & Sealing Technology Spiral Wound, RTJ, Flat, Ring Gaskets • ASTM Bolting Grades (A193 / A194) • Bolt Torque Principles • Leak Prevention Methods
1330 – 1420	Special Piping Components Expansion Joints & Bellows • Steam Traps & Strainers • Pressure Relief Valves (PRV) • Inline Mixers / Orifice Plates
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: Thursday, 05th of November 2026

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

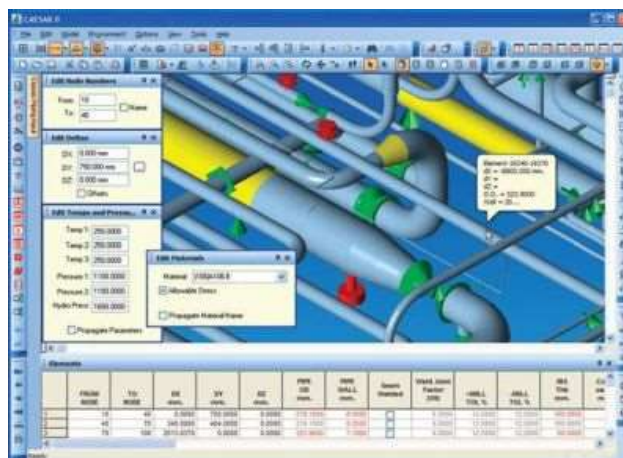


Day 5: Friday, 06th of November 2026

0730 – 0830	B31.3 Compliance & Documentation Design Calculations Documentation • Required Code Statements • Material Traceability • Design Verification Reports
0830 – 0930	Review of Isometrics & MTO Generation Checking Elevations & Slopes • Clash Detection Basics • Material Take-Off Process • Fabrication Drawing Coordination
0930 – 0945	Break
0945 – 1100	Stress Review & Practical Interpretation Allowable Stress versus Calculated Stress • Overstress Indicators • Support Re-Adjustment Methods • Design Modification Options
1100 – 1215	Constructability & Site Considerations Welding Access and NDT Requirements • Lifting and Erection Planning • Field Fit & Tolerance Allowance • Cold Alignment Issues
1215 – 1230	Break
1230 – 1300	Failure Case Studies & Lessons Learned Pipe Rupture Incidents • Flange Leak Failures • Thermal Stress Cracks • Poor Support Examples
1300 - 1345	Capstone Design Workshop Mini-Project: Process Unit Piping Design • Apply B31.3 Rules • Prepare P&ID + Iso + Calc + Support Plan • Group Review and Feedback
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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