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Course: Understanding the Codes: ASME Boiler & Pressure Vessel Code, and B31 Pressure Piping Codes

Code	City	Hotel	Start	End	Price	Language - Hours
143	Auckland (New Zealand)	Hotel Meeting Room	2025-12-08	2025-12-12	5950 €	En - 25

The Course

Pressure equipment such as boilers, pressure vessels, heat exchangers, pressure piping and associated safety equipment are widely used in many industries (e.g., hydrocarbon processing, chemical, power, pharmaceutical, and manufacturing). Pressure vessels and piping store energy and potentially hazardous fluids and thus have inherent safety risks. Pressure equipment designs is performed in compliance with applicable Regulations, Codes, and Standards and follow sound engineering practices to ensure structural integrity and safeguard public safety. The design covers material selection, stress analysis, fabrication, testing, inspection, operation and failure analysis, codes, standards and regulations.

Regulations dictate the standards to be applied and refer to specific codes and standards. Failure to comply not only jeopardizes safety and the environment but also carries penalties such as fines and possibly imprisonment. The International Boiler and Pressure Vessel (BPV) Code and the B31 Piping Codes establish rules of safety governing the design, fabrication, and inspection of boilers, pressure vessels and piping during construction. The objective of the rules is to provide a margin for deterioration in service. Advancements in design and material and the evidence of experience are constantly being added.

Highlights of the course include:

- This course is designed to explain what, where, when and how to use various ASME codes.
- It provides overviews of ASME Boiler and Pressure Vessel Code (BPVC) Sections I, II, V, VIII and IX with particular emphasis on the widely used Section VIII Division 1.
- It provides overviews of ASME B31 Code for Pressure Piping books B31.1, B31.3, B31.4, B31.8, B31.8S and B31G with particular emphasis on B31.3 – Process Piping.
- Highlights of the standards referenced in the codes such as the B16 series will also be covered.
- Workshops comprised of worked sample problems and case studies are included to enforce the learnings.

The Goals

- To provide a clear understanding of the intent and requirements of the codes, including terminology and interpretations.
- To show how and where the codes are to be applied.
- To explain the code applications for different industries and who is responsible for selecting the appropriate code.
- To ensure the understanding that Codes developed by standards committees, such as the ASME, rely on the use of sound engineering practices by knowledgeable engineers.
- To provide an understanding of Due Diligence in design i.e. ‘to be seen to be doing the right thing’.

The Process

The course combines presentations and discussions of topics covered with numerous relevant practical examples. It focuses on understanding the Intent, requirements and application of the ASME BPV and Piping Codes. It combines sound engineering and

economic principles, methodologies, and best industry practices and enforces the learnings with workshops that include worked examples and Case Studies to maximize the benefits to the participants.

The Benefits

Delegates will:

- Understand the scope, intent, requirements, and application of the various ASME Codes for the design of pressure vessels and piping systems.
- Become aware that the Codes are necessary but not sufficient. They are not design handbooks and do not cover all details for all applications and that it is the designer’s responsibility to use good engineering judgment for the details of design and construction.
- Gain clear overall understanding and hands-on application of the methodologies and procedures for the mechanical design of pressure vessels and piping and will be prepared to use this knowledge in their jobs.
- Improve their understanding of materials of construction and the factors involved in their selection.
- Enhance their competence and performance level by making value added contributions to their organizations through improved pressure equipment integrity and failure prevention.

The Results

Organization will:

- Construct reliable and cost-effective new pressure vessels and piping using current codes and standards and best industry practices.
- Achieve improved pressure equipment and piping integrity leading to reduced failures and improved business performance.

- Improved safety performance by avoidance of catastrophic failures.
- Achieve lower life cycle costs through compliance with codes, standards and regulatory requirements.
- More knowledgeable, competent and motivated technical staff who can make more value added contributions.

The Programme Content

Overview of Pressure Equipment and Piping and Related Codes and Standards

- Review of General Engineering Principles
  - Design conditions and specifications
  - Basic stress and strain calculations
  - Hoop and radial stresses in vessels and piping
- Welding processes
- Importance of codes and standards
- Codes and standards organizations – ASME, ASTM, ISO, API, ANSI, EN
- Development of codes and standards – consensus
- Limitations of codes and standards – they are not design handbooks
- ASME history and general policies
- BPV Code
- B31 Piping Code
- Referenced Standards – B16, API 510, API 570, etc.
- Background
- PCC-1 - 2010 Guidelines for Pressure Boundary Bolted Flange Joint Assembly
- PCC-2 - 2008 Repair of Pressure Equipment and Piping
- PCC-3 - 2007 Inspection Planning Using Risk-Based Methods
- Primary factors that influence material selection for pressure vessels
- Maximum allowable material stresses specified by the ASME Code
- ASME Code and Brittle-Fracture Evaluation
- Introduction to the ASME Codes and Standards

- ASME Post Construction Standards
- Materials of Construction

ASME Boiler and Pressure Vessel Code – Service Sections

- ASME BPV Code Service Sections – II, V, and IX
- ASME Section II – Materials
- Part A - Ferrous Material Specifications
    - Part B - Nonferrous Material Specifications
    - Part C - Specification For Welding Rods, Electrodes, And Filler Metals
    - Part D – Properties
- ASME Section V – Nondestructive Examination – Scope and Structure
- Scope
- Description of the types of NDE specified in the code
- Where and when each type is to be used
- Examples
- Personnel Qualification
- Authorized inspectors
- Interpretation of results
- Reporting and corrective action
- Case studies
- Basic Coverage
- Development Background
- Review of Article I
- Review of Article IV
- WPS Preparation and Review
- PQR Preparation and Review
- WPS Illustrative Example
- ASME Section V – Nondestructive Examination
- ASME Section IX – Welding and Brazing Qualifications
- ASME Section IX – Welding and Brazing Qualifications

ASME Boiler and Pressure Vessel Code- Design and Fabrication per Section VIII Div 1

- ASME Section VIII Division 1
  - Scope
  - Structure of Section 8 Division 1 – Subsections A, B, and C; mandatory and nonmandatory appendices
- Design
- Design Conditions and Loadings
- Weld Joint Efficiency and Corrosion Allowance
- Design for Internal Pressure
- Design for external pressure and compressive stresses
- Design of nozzles, flanges, and reinforcement of openings
- Other design considerations – supports, external local loads, vessel internals
- Pressure Vessel Materials
- Acceptable welding details
- Post-weld heat treatment requirements
- Fabrication –
- Inspection and testing requirements
- Workshop 1 – typical pressure vessel design procedure and methodology and worked examples

ASME B31 Code for Pressure Piping - Part 1

- Overview of ASME B31 Code for Pressure Piping
  - Background
  - Scope
- Overview of B31.1
- Overview of B31.3
- Overview of B31.4
- Overview of B31.8

- Selecting applicable piping code – Responsibility
- Overpressure protection
- Workshop 2 – Worked examples – oil and gas pipeline thickness calculations

ASME B31 Code for Pressure Piping – Piping Design per B31.3

- Piping Design Methodology, Procedures and Guidelines
  - Pressure integrity – internal and external pressure
  - Mechanical integrity – static and dynamic loads
- Specification and Selection of Piping Components – Flanges, Valves
- Expansion, Flexibility, Supports and Restraints
- Piping Stress Analysis
- Workshop 3
- Worked examples – pipe thickness calculations
- Simplified flexibility analysis methods
- Demonstration of computer-assisted piping flexibility analysis

The Scandinavian Academy for Training and Development employs modern methods in training and skills development, enhancing the efficiency of human resource development. We follow these practices:

- **Theoretical Lectures:**
  - We deliver knowledge through advanced presentations such as PowerPoint and visual materials, including videos and short films.
- **Scientific Assessment:**
  - We evaluate trainees skills before and after the course to ensure their progress.
- **Brainstorming and Interaction:**
  - We encourage active participation through brainstorming sessions and applying concepts through role play.
- **Practical Cases:**
  - We provide practical cases that align with the scientific content and the participants specific needs.
- **Examinations:**
  - Tests are conducted at the end of the program to assess knowledge retention.
- **Educational Materials:**
  - We provide both printed and digital scientific and practical materials to participants.
- **Attendance and Final Result Reports:**
  - We prepare detailed attendance reports for participants and offer a comprehensive program evaluation.
- **Professionals and Experts:**
  - The programs scientific content is prepared by the best professors and trainers in various fields.
- **Professional Completion Certificate:**
  - Participants receive a professional completion certificate issued by the Scandinavian Academy for Training and Development in the Kingdom of Sweden, with the option for international authentication.
- **Program Timings:**
  - Training programs are held from 10:00 AM to 2:00 PM and include coffee break sessions during lectures.