ASME BPV Code, Section VIII, Division 2 Design and Fabrication of Pressure Vessels Training Course

Professional Development Training Course Outline

Category	Structural Engineering	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The **ASME BPV Code, Section VIII, Division 2** is a crucial standard for the design and fabrication of **high-integrity pressure vessels**, providing an alternative set of rules that allow for more advanced analysis methods and potentially significant material savings compared to Division 1. This intensive training program delves into the sophisticated **Design by Analysis (DBA)** approach, empowering engineers to create safer, more economical, and technologically advanced pressure vessels. Participants will gain a comprehensive understanding of the code's principles, including its enhanced requirements for materials, fabrication, and quality assurance, ensuring compliance with global best practices and regulatory mandates.

ASME BPV Code, Section VIII, Division 2 Design and Fabrication of Pressure Vessels Training Course is meticulously designed to bridge the gap between theoretical code knowledge and practical application. By focusing on real-world scenarios and a methodical approach to complex calculations, we equip participants with the skills to confidently apply **ASME Division 2 rules** in their daily professional roles. The curriculum covers key concepts such as **stress categorization**, **fatigue analysis**, and the use of **Finite Element Analysis (FEA)** for design validation, providing a strategic advantage in the competitive landscape of modern pressure vessel engineering.

Programme Curriculum

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Course Duration

5 days

Course Objectives

Upon completion of this course, participants will be able to:

- Comprehend and apply the core principles of the ASME BPV Code, Section VIII, Division 2.
- Differentiate between the rules of Division 1 and Division 2 for optimal project selection.
- Master the Design by Analysis (DBA) methodology, including stress linearization and plastic collapse.
- Perform detailed calculations for various pressure vessel components using design-by-rule methods.
- Conduct and interpret fatigue analysis for cyclic loading applications.
- Utilize Finite Element Analysis (FEA) as a tool for design validation and stress evaluation.
- Evaluate material toughness and brittle fracture requirements under the code.
- Specify and review User?ÇÖs Design Specifications (UDS) and Manufacturer?ÇÖs Design Reports (MDR).
- Identify and apply fabrication, welding, and Post-Weld Heat Treatment (PWHT) requirements.
- Implement effective Non-Destructive Examination (NDE) techniques and acceptance criteria.
- Ensure compliance with pressure testing (hydrostatic/pneumatic) and overpressure protection rules.
- Manage the certification and stamping processes for Division 2 vessels.
- Troubleshoot common design and fabrication challenges using a code-compliant approach.

Organizational Benefits

Investing in this training provides significant benefits for organizations, including:

- Optimize material usage and reduce thickness by leveraging the lower safety factor in Division 2, leading to substantial cost reductions in fabrication.
- Improve the integrity and reliability of pressure vessels by applying rigorous design and analysis methodologies, minimizing the risk of catastrophic failures.
- Accelerate design cycles by using advanced analysis tools and a more flexible, technology-driven code.
- Position your company as a leader in high-end pressure vessel design and fabrication, capable of handling complex projects with superior efficiency and safety.

- Ensure projects meet stringent global regulatory requirements and industry standards, reducing legal liabilities and project delays.
- Upskill your engineering team with the latest knowledge and tools, fostering innovation and professional growth.

Target Audience

- Mechanical & Structural Engineers
- Pressure Vessel Designers
- QA/QC & Inspection Engineers
- Project Managers involved in pressure equipment.
- Fabricators & Manufacturers of pressure vessels.
- Plant & Maintenance Engineers in process industries.
- Authorized Inspectors seeking advanced knowledge.
- Engineering Students or recent graduates specializing in this field.

Course Outline

Module 1: Introduction to ASME VIII, Div. 2 & General Requirements

- Scope and Applicability: Understanding when to use Division 2 and its relationship with Division 1.
- Roles & Responsibilities: Defining the duties of the User, Manufacturer, and Registered Professional Engineer (RPE).
- Structure & Organization: Navigating the nine parts of the code and its informative annexes.
- Design Basis: A deep dive into the allowable stress basis, safety factors, and failure modes.
- **Case Study**: Analyzing a project to determine the suitability of using ASME VIII, Division 2 versus Division 1, considering factors like material cost, design complexity, and operational pressures.

Module 2: Materials & Design-by-Rule (DBR) Requirements

- Material Selection: Permitted materials, material properties, and their use in calculations.
- Material Toughness: Brittle fracture prevention and impact testing requirements.
- DBR for Components: Calculating thicknesses for shells, heads, and nozzles under pressure.
- Weld Joints: Understanding weld joint categories, types, and joint efficiency factors.
- **Case Study**: A practical exercise in designing a cylindrical shell and torispherical head for a reactor vessel, calculating thicknesses based on internal pressure using Part 4 rules.

Module 3: Design-by-Analysis (DBA) & Stress Categorization

- FEA Fundamentals: Introduction to the principles of using Finite Element Analysis for pressure vessel design.
- Stress Definitions: Distinguishing between primary, secondary, and peak stresses.
- Stress Categorization: The Hopper Diagram and its application in classifying stresses from FEA results.
- Protection against Plastic Collapse: The Elastic Stress Analysis Method and Limit Load Analysis.
- **Case Study**: Using a simplified FEA model of a nozzle-to-shell junction to perform stress linearization and categorize the stresses according to Part 5 of the code.

Module 4: Fatigue Analysis & Cyclic Service

- Introduction to Fatigue: Understanding fatigue failure modes in pressure vessels.
- Fatigue Screening: Methods to determine if a full fatigue analysis is required.
- Fatigue Assessment: Applying the Design Fatigue Curves for welded and non-welded components.

- Cycle Counting: Methods for evaluating the cumulative damage from multiple loading cycles.
- **Case Study**: A scenario involving a heat exchanger subjected to frequent temperature and pressure cycles. Participants will perform a fatigue analysis to determine its remaining service life.

Module 5: Fabrication, Welding & Heat Treatment

- Fabrication Requirements: Tolerances, forming of pressure parts, and alignment.
- Welding Procedures: Essential variables, qualifications (WPS/PQR), and welder performance qualifications.
- Post-Weld Heat Treatment (PWHT): When PWHT is required, and its procedures.
- Inspection of Welds: Visual inspection and surface NDE methods.
- **Case Study**: A review of a fabrication shop's quality control system to ensure compliance with the code's welding and heat treatment requirements, identifying potential non-conformities.

Module 6: Non-Destructive Examination (NDE)

- NDE Methods: Radiographic Testing (RT), Ultrasonic Testing (UT), Magnetic Particle Testing (MT), and Liquid Penetrant Testing (PT).
- Examination Groups: Applying the code's rules for NDE based on vessel class and joint type.
- Acceptance Criteria: Interpreting NDE results and comparing them against code-specified acceptance standards.
- NDE Personnel: Understanding the qualification and certification of NDE personnel.
- **Case Study**: Analyzing a radiograph of a circumferential weld to identify and evaluate defects against the code's acceptance criteria.

Module 7: Pressure Testing & Overpressure Protection

- Hydrostatic Testing: Procedures, test pressure calculation, and safety precautions.
- Pneumatic Testing: When and how to perform pneumatic tests, and the associated risks.
- Alternative Tests: Exploring alternative proof testing methods.
- Pressure Relief Devices: Sizing and selecting safety valves and bursting discs.
- **Case Study**: A problem-based scenario where participants must calculate the required hydrostatic test pressure and verify the overpressure protection system for a newly fabricated vessel.

Module 8: Certification, Documentation & Code Cases

- **Manufacturer?ÇÖs Data Report (MDR)**: The content and importance of the MDR.
- **User?ÇÖs Design Specification (UDS)**: The user's role in specifying design requirements.
- **Stamping & Nameplate**: Requirements for marking the vessel to certify compliance.
- **Code Cases & Interpretations**: Navigating and applying the official rulings of the ASME committee.
- **Case Study**: A final project where participants act as an RPE, reviewing a full set of UDS, MDR, and test reports to ensure all aspects of the design and fabrication are compliant with ASME VIII, Division 2 before stamping.

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.

- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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