

MC147

Pressure Vessel Design from Concept to Construction Using ASME BPV Code, Section VIII, Division 1

Day 1

- **Module 1: General Material Requirements**

- Acceptable Material
- Purchasing
- Receipt
- Reconciliations
- Identification and Traceability
- Interaction with the PED
- New Materials
- Review questions
- **Exercise:** *Reviewing a Material Test Report*
- **Exercise:** *Resolving Material issues*

- **Module 2: General Design Requirements**

- Use of Code Case 2695
- Applying Code Formulas
- Formula Input Variables
- Allowable Stress Values
- Joint Efficiencies
- RT Designators
- Review questions
- **Exercise:** *Perform a shell and head calculation using a set of hypothetical user design requirements*
- **Exercise:** *Add nozzles to the shell and head, and verify the adequacy of their opening reinforcement, weld sizing, and weld strength*

- **Module 3: Using the Design Appendices**

- Custom Bolted Flanges (Appendix 2 & Y)
- Jacketed Vessels (Appendix 9)
- Noncircular Vessels (Appendix 13)
- Dimpled Jackets (Appendix 17)
- Review questions
- **Exercise:** *Prepare an Appendix 2 flange calculation*

Day 2

- **Module 4: General Fabrication Requirements**

- Forming and Cutting
- Forming Tolerances
- Post Forming Stress Relief
- Review questions

- **Exercise:** Evaluate a formed head for extreme fiber elongation and determine if post forming stress relieving is required.
- **Exercise:** Evaluating a formed head for shape tolerances, determining corrective actions

- **Module 5: Requirements for Welded Construction**
 - Weld joint alignment/offsets
 - Inspection of weld joint fit-up
 - WPS Qualifications
 - Welder Qualifications
 - NDE requirements
 - RT vs UT
 - Visual Inspection of welds
 - Review questions
 - **Exercise:** Determine the allowable offset and whether tapered transition requirements apply on a hypothetical head to shell fit-up.
 - **Exercise:** Requirements for applying UT in lieu of RT

- **Module 6: Toughness and Testing Requirements**
 - UG-84 Testing Rules
 - Part UCS Testing and Exemption
 - Governing Thickness
 - Exemption Curves
 - Part UHA Testing and Exemption
 - Part UNF Testing and Exemption
 - Part UHT Testing and Exemption
 - Review questions
 - **Exercise:** Evaluate a hypothetical carbon steel vessel design for toughness requirements
 - **Exercise:** Evaluate a hypothetical stainless steel vessel design for toughness requirements

Day 3

- **Module 7: Pre-heat and Post-weld Heat Treatment Requirements**
 - Part UCS
 - Part UHA
 - Part UNF
 - Part UHT
 - Review questions
 - **Exercise:** Apply PART UW and Part UCS rules for PWHT to a hypothetical vessel design and write a PWHT procedure

- **Module 8: General Testing and Certification Requirements**
 - Hydro Testing
 - Pneumatic Testing
 - Proof Testing
 - Test Temperature
 - Test Gages
 - Review questions
 - **Exercise:** Apply the rules of UG-99 to a pressure vessel for a normal and “New and Cold” pressure test

- **Module 9: Overpressure Protection**
 - Types of Pressure Relieving Devices
 - Design and Material Requirements
 - Set Pressure Requirements
 - Installation Requirements
 - Device Certification
 - Review questions

- **Module 10: Applying the Code Mark and Preparing the Manufacturer’s Data Report**
 - Nameplate/Stamping Arrangement
 - Manufacturer’s Data Report Prep and Certification
 - Review questions
 - **Exercise:** Prepare a Manufacturers Data Report for a single chamber pressure vessel. Exercise 10-1: Prepare a Manufacturers Data Report for a U-Tube Heat Exchanger.