

ASME Code, Section VIII, Division 1: DESIGN AND FABRICATION OF PRESSURE VESSELS

Presenter: Fahim Shadid

ABOUT THE PRESENTER: FAHIM SHADID



Fahim Shadid, P.E has a BS degree in Mechanical Engineering and MS degree in Engineering Mechanics. He is a member of Tau Beta PI, Engineering honorary society.

Over the years and with his association with ASME he has attained expert knowledge of the ASME codes Sections VIII Divisions 1 and 2 and Sections II A and D, NBIC, API 510, API 579, PD5500, AS1210, API, AWWA, ASTM, ASCE and ANSI standards. He holds three US patents.

Fahim did extensive development work to provide in-house tools including tools for the new ASME Section VIII Division 2. This included area replacement, buckling and NDE. He prepared documents for code recertification including the User's design specification. As a professional Engineer, he has certified many ASME Division 2 vessels prior to and after 2007.

Number of days: 3

Cost: \$2550

CPD Points: 3

AIM OF COURSE

Based on the rules for pressure vessel design and construction, this course is a comprehensive introduction to the requirements of Section VIII, Division 1 including background, organization, design, materials, fabrication, inspection, testing and documentation of pressure vessels. The more commonly used subsections and paragraphs will be covered, and a discussion of individual problems or situations will be included. This course is intended for beginners, as well as experienced vessel designers who would like to update their knowledge of the Code.

Upon completion of this course you will be able

- Understand the background of the Code rules
- Apply the Code rules to more common design and fabrication situations
- Perform calculations for some of the loadings and situations not addresses by the Code

Prepare design specifications, design reports, Data Reports, and other documentation

SPECIAL FEATURES

An overview of code organization, editions and addenda will be given, and participants will learn how to prepare and submit an inquiry to the Code Committee for Code Interpretation, Code Cases or Code revision. It is suggested (but not required) that you bring the latest Edition of the ASME Code Section VIII, Division 1, Pressure Vessels

WHO SHOULD ATTEND

- Individuals involved with the purchase, design, fabrication, or inspection of pressure vessels.
- Some degree of technical background will be helpful, but such individuals are not required to have an Engineering degree or previous work experience in the subject matter.



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ASME CODE SECTION VIII DIVISION 1 DESIGN AND FABRICATION OF PRESSURE VESSELS Cont...



COURSE OUTLINE

Code rules, scope and jurisdiction

- Introduction to the ASME Code
- Code Editions and Addenda
- Interpretations and Code cases
- Code boundaries
- Jurisdiction
- Authorized Inspector
- Responsibilities of the User/Owner, Manufacturer and the Authorized Inspector

General requirements related to materials

- Carbon steel, Low alloy steel, materials with tensile properties enhanced by heat treatment, High alloy stainless steel
- Code allowed material
- Certification of other material to be used as code material
- Materials fabricated by other than the manufacturer
- Traceability

Material toughness and impact testing requirements

- Minimum Design metal temperature (MDMT)
- Evaluation of material for toughness and brittle failure
- Impact testing of material

Welding requirements and Joint efficiency

- Types of welds and Joint categories
- Design joint efficiency as related to radiography
- Design of welded joints
- Service restriction
- Welding procedures
- Impact testing of welds and production test plates
- Non Destructive testing
- Tolerance requirements

Design Requirements

- Design of Cylindrical shells
- Design of spherical, torispherical and elliptical heads
- Design of cones
- Design of flat heads
- Design of Supports (uniform or discrete)
- Design of reinforcement for openings

Design loadings, design criteria and allowable stresses

- Loadings to be considered to design a pressure vessel including wind and seismic
- Maximum stress theory for Division 1 versus the Von Mises stress theory used for Division 2
- Allowable stresses associated with the loads



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COURSE OUTLINE

Formulas for internal pressure and tensile loading

- Formulas for hoop stress for cylindrical shells, cones and heads
- Formulas for longitudinal stresses for cylindrical shells and heads

Openings and reinforcement

- Present rules is to replace the area removed
- Normal limit
- Parallel limit
- Large openings
- Permissible new rules using the criteria of ASME Section VIII Division 2

Procedures for external pressure (vacuum) and compressive loads

- Design rules for Cylindrical and conical shells
- Design rules for spherical, torispherical and elliptical heads
- Design rules for axial loads on the skirt support
- Design rules for external stiffeners
- Alternative buckling rules: Code case 2286

Hydrostatic and pneumatic testing

- Hydrostatic Test pressure based on the MAWP
- Hydrostatic Test pressure based on the MAP
- Pneumatic Test pressure based on reduced ratio and more NDE.

Procedures for Post Weld Heat Treatment

- PWHT soak band
- Thickness used for determining the need for PWHT
- PWHT for service conditions
- Heating and cooling rates

General requirements related to stamping and reports

- Pressure relief Devices
- Data Report for overall vessel: Forms U-1, U-2, U-3 and U-4
- Name plate
- Pressure vessel booklet

Example design problems and solutions and open discussions of design problems

- Cylindrical shells and formed heads
- Seismic loading on vertical vessels
- Nozzle reinforcements
- Other special components
- External pressure and stiffening rings
- Reinforced openings and ligament efficiency

INSPECTION, REPAIRS, AND ALTERATIONS OF PRESSURE VESSELS

ABOUT THE PRESENTER: FAHIM SHADID



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2 Days
Cost: \$1700
2 CPD points

This inspection and repair course is run alongside the ASME Section VIII Div 1 course. Delegates may attend either or both courses.

This course is a comprehensive introduction to the requirements of various codes and standards, regarding inspection, repairs and alterations of pressure equipment, and in particular pressure vessels. The requirements of the National Board Inspection Code and the API-510 will be covered in detail. A brief introduction to API-579, Fitness for Service will also be included. Simple flaw evaluation procedures will be evaluated. The activities of ASME's Post Construction Committee will be explained and documents published by this Committee will be discussed.

WHO SHOULD ATTEND

Individuals from users, manufacturers, repair organizations, inspection agencies and other organizations involved with maintenance and repair of pressure equipment. This course is intended for beginners, as well as experienced personnel wishing to update their knowledge.

SPECIAL FEATURES

- Learn about the latest developments in the rapidly advancing field of pressure equipment inspection and repairs.
- Receive an overview of the work being performed by API, ASME, and PVRC, in the related areas.



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INSPECTION, REPAIRS & ALTERATIONS OF PRESSURE VESSELS Cont...



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COURSE OUTLINE

Introduction to post construction codes

- Post Construction: Safety of pressure equipment after put into service
- Inspection: Minimum frequency of inspection and evaluation of results of inspections
- National Board Inspection Code (NBIC) and API 510
- Evaluation of detected flaws
- API-579-1 is used to supplement the rules of NBIC and API 510

Introduction to NBIC and API 510

- Sections VIII, as well as other codes, contain rules for new construction only.
- Post-construction documents: National Board Inspection Code (NBIC) and API-510
- References to original code rules
- Jurisdictional Laws summarized in an API document
- Deviation from rules for new construction
- Authorized Inspector
- National Board Stamp
- Vessels moved from one jurisdiction to another

Introduction to other documents

- API-579-1, "Fitness for Service", has rules for evaluation of various flaws
- API-579-2 example problems
- ASME PCC2: Detailed repair procedures
- ASME PCC-3: Methods of establishing inspection periods

API-510

- Alternative to NBIC by most Jurisdictions. (rules are similar)
- Requires involvement of the Authorized Inspector (A.I)
- Applies to vessels built to Section VIII and other recognized codes
- References ASME/API-579 for Fitness For Service (FFS) evaluation methods
- In-service inspection
- Toughness requirements
- Repair/alteration
- Rerating activities for pressure vessels
- Pressure relieving devices
- Major differences between API-510 and the NBIC
- Flaws can be evaluated by API 579
- Definition of Risk
- Inspection period as related to the risk associated with the equipment.
- Testing
- Formal Data Report for documenting repairsRecords



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COURSE OUTLINE

National Board Inspection Code (NBIC)

- Editions and Interpretations
- Jurisdictional rules
- Consist of three separate volumes: Part 1 – Installation, Part 2 – Inspection and Part 3 – Repairs/Alterations
- Explanation of the responsibilities of the users, manufacturers, regulatory agencies/Jurisdictions and authorized inspectors
- How to obtain National Board stamp
- Examples of repairs and alterations and the documentation requirements for each
- Difference between repair and alteration
- U.S. Customary units and SI units
- Authorized Inspection Agencies
- Evaluation of flaws and damage mechanisms
- Required inspection period
- Inspection methods (internal or external): NDE, testing or leak testing.
- Toughness requirements
- Installation, provides requirements and guidance to assure all pressure equipment are properly installed and function properly
- Requirements for pressure relief devices
- Pre-inspection activities
- Inspection: Information and guidance for performing and documenting inspections
- Safety requirements for preparation for inspection
- Remaining life and Risk based assessment
- PWHT requirements
- Pressure testing and the approval of the A.I and jurisdiction
- Data Reports forms for documentation of repairs and alterations: R-1, R-2, R-3 and R-4
- Name plate
- Records

An introduction to API-579, Fitness for Service

- Evaluation of corroded areas
- Evaluation of pitted areas and other flaws
- Brittle failure assessment
- Evaluation of misalignments and other geometric flaws
- Remaining life assessment
- Assessments: Levels 1 (conservative screening), Level 2 (More detailed evaluation and Level 3 (Intended to provide the most detailed evaluation)
- Examples demonstrating the application of the rules

Overview of work being performed by API, ASME and PVRC related to post construction issues

About 2KG Training

Leading engineering training firm 2KG Training has provided expert training to South African industry for almost a decade. Drawing on our international network of experienced professionals, 2KG Training provides training to the most exacting requirements in an exacting field.

2KG Training launched in 2005 with a focus on pumps, valves, and related systems. After establishing our presence in the field, we expanded our core offering of courses in order to meet demand from clients looking for our expert training in other aspects of the mechanical engineering discipline.

Managing Director Harry Rosen is a past chairman of the South African Institution of Mechanical Engineering (SAIMechE) and an internationally-recognised expert on UNIDO Energy Efficiency projects. Mr Rosen embodies 2KG Training's insistence on experience and expertise in all aspects of our business.

About Oryx Engineering Solutions

Oryx Engineering Solutions (Oryx) is a progressive and newly established Qatari engineering services provider located in Ras Laffan Industrial City. Through Oryx's state-of-the-art facility or on-site teams they provide expertise in a number of technology areas: rotating & static equipment including pumps & valves, seals, welding and fabrication, and machining.

Oryx works directly or through a number of strategic joint ventures and partnerships with leading companies, including: ABB Oryx Motors & Generators Service – motors and generators, Aesseal Oryx for mechanical seals, Stork Oryx Turbo Machinery Services for turbines, gearboxes, control systems and the supply of associated auxiliary parts, and Furmanite for leak-sealing and on-site machining. Through this breadth of work Oryx recognises the importance of achieving maximum reliability and efficiency in the operation of these systems. This extends to the need for highest quality training and development for the industry.

Our Training Offering

In striving to deliver new value to the industry in Qatar, Oryx has now partnered with 2KG Training to bring world class engineering training to the country.

Our reputation for comprehensive expertise is due to the stringent evaluation criteria used in selecting our trainers. Trainers are picked from a field of international experts, all of whom have at least twenty years of relevant experience. All our expert trainers have published books and journal articles in their disciplines, are affiliated with the relevant international associations and are actively involved with the standards committees.

We currently offer the following accredited courses:

- Pump Operation and Maintenance
- Pump Efficiency Workshop
- Pumping Systems
- ASME B31.3 Process Piping
- ASME B31.1 Power Piping
- ASME Section VIII Div 1 Design, Fabrication, Inspection and Repairs of Pressure Vessels,
- ASME Section VIII Div 2 Design and Fabrication of Pressure Vessels
- ASME Section IX Welding and Brazing Qualifications
- Valves, Selection, Installation and Operations
- Piping Systems
- Compressors: Design, Operation and Maintenance
- Electricity for Mechanicals
- Bearings
- Mechanical Seals
- Flow Control Measurement
- API Advanced Storage Tanks: API650 & API653 Design, Maintenance and Inspection
- API 579-1 ASME FFS1 Fitness for Service
- Power Generation: Steam and Gas Turbines
- Variable Speed Drives
- Vibration Analysis 1
- Condition Monitoring and Reliability

Number of days: 3 ASME PRESSURE VESSELS SECTION VIII DIVISION 1
Cost: \$2550 CPD Points: 3

Number of days: 2 INSPECTION, REPAIRS, AND ALTERATIONS OF PRESSURE VESSELS
Cost: \$1700 CPD Points: 2

How to register for the course:

1. Complete this registration form and fax it to Grace Villamar: Tel: +974 4015 9809 Fax: +974 4015-9899
Email: Grace.Villamar@oes.com.qa
2. Acknowledgement will be emailed to you.
3. Final confirmation and details will be faxed or emailed to you approximately 7 days before the commencement of the seminar.

Conditions of entry:

1. Cancellations are accepted in writing and without penalty, up to 14 working days prior to commencement of the seminar.
2. Cancellations in writing less than 14 working days prior to the seminar will be liable to pay 50% cancellation fee.
3. Less than 7 days, defaulter will be liable to pay 100% cancellation fee.
4. In case of insufficient applications for the workshop 2KG/Oryx Engineering reserves the right to cancel the seminar. Applicants will be Informed and all fees will be refunded immediately.

Delegate information:

Title: _____ Surname: _____ Name: _____

Full Company name: _____ Job Title: _____

Postal Address (to which invoice must be sent): _____

Code: _____ VAT number: _____

Tel: () _____ fax: () _____

Cell: _____ Email: _____

Contact/ Accounts information:

Title: _____ Surname: _____ Name: _____

Tel: () _____ fax: () _____

Cell: _____ Email: _____

Dietary Requirements: Normal Vegetarian Halaal

Accommodation Requirements: Yes No

Please tick the course that you would like to attend: Qatar, Doha **2015 dates to be confirmed**

ASME Div 1 (3 days) Inspection and Repair (2 Days) attend both (5days)

I have read and agreed to all the conditions of registration as stipulated in this brochure.

Signature

Date

For more info and to register contact Grace Villamar on tel: +974 40159-888 Ext : 809 and email: Grace.Villamar@oes.com.qa