

GP 05-01-02	Additional Requirements for Special Criteria Pressure Vessels	March 2005
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Additional Requirements for Special Criteria Pressure Vessels

GP 05-01-02

Scope

- 1) This Global Practice covers additional requirements governing the design, fabrication, examination, and testing of unfired pressure vessels that meet any one of the following special criteria:
 - a) Wall thickness is in excess of 2 in. (50 mm) and up to 6 in. (150 mm).
 - b) Material of construction is ferritic alloy steel (Cr-Mo, Mn-Mo, etc.).
 - c) Material of construction is Quenched and Tempered (Q&T) steel.
 - d) Material of construction has a specified yield strength that exceeds 52,200 psi (360 MPa).
 - e) Vessel is in cyclic service.
- 2) [I] The Examination Methods and Testing Criteria section of [GP 05-01-01](#) is replaced in its entirety by that section in this Practice. All other requirements are in addition to those in [GP 05-01-01](#).

[I] An asterisk (*) indicates that a decision by the Purchaser is required, or that additional information is furnished by the Purchaser.
- 4) * [I] Additional requirements for pressure vessels having a thickness in excess of 6 in. (150 mm) will be specified.

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1. Required References

[I] The Practices and Standards in this section shall be used with this Global Practice to supplement the References sections of [GP 05-01-01](#). Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 05-01-01	Pressure Vessels
GP 18-07-01	Welding Procedures
GP 18-10-01	Additional Requirements for Materials

1.2. ASTM–American Society for Testing and Materials

ASTM A 388/A 388M	Standard Practice for Ultrasonic Examination of Heavy Steel Forgings
ASTM A 578/A 578M	Standard Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications
ASTM A 745/A 745M	Standard Practice for Ultrasonic Examination of Austenitic Steel Forgings
ASTM E 94	Standard Guide for Radiographic Examination

2. Additional Requirements

[I] The following Practices and Standards shall be used with this Practice as specified by the Owner's Engineer.

2.1. ASME–American Society of Mechanical Engineers

ASME 2235-6	Use of Ultrasonic Examination in Lieu of Radiography Section I and Section VIII, Divisions 1 and 2
ASME SEC VIII D1	BPVC Section VIII - Rules for Construction of Pressure Vessels - Division 1
ASME SEC VIII D2	BPVC Section VIII - Rules for Construction of Pressure Vessels - Division 2 Alternative Rules
ASME SEC IX	BPVC Section IX - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators

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2.2. BSI–British Standards Institute

BSI BS EN 13445	Unfired Pressure Vessels
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3. Definitions

Term	[I] Description
Cyclic Service	A vessel is in cyclic service if - an assessment of the vessel according to ASME SEC VIII D2, AD-160 indicates that a fatigue analysis is required, or * the vessel is designated as a cyclic service vessel by Owner's Engineer.
MAWP	Maximum Allowable Working Pressure (MAWP) is the maximum allowable pressure at the design temperature in the corroded condition. MAWP is determined by calculation using the actual thickness less the corrosion allowance in accordance with ASME SEC VIII D1, Paragraph UG-98.

4. Documentation

[I] The mill test reports for low-alloy or impact-tested pressure components shall be submitted to the Owner for review as soon as they are available, but prior to start of fabrication.

5. Design

5.1. Analysis

- [R] Thermal Stress—When thermal gradients exceed 150°F (80°C) in a distance equal to $\sqrt{Rt}$, where R and t are the mean radius and nominal thickness of the vessel component in question, a thermal stress analysis shall be performed in accordance with the applicable design code. If the design code used does not contain procedures for thermal analysis, the procedures of ASME SEC VIII D2 may be used.
- [R] An acceptable method for determining the need for a fatigue analysis is contained in ASME SEC VIII D2, Paragraph AD-160. When a fatigue analysis is required, the procedures of ASME SEC VIII D2 may be used for the analysis.
- [R] For vessels in cyclic service operation, all butt-welds, both inside and outside, on pressure-retaining parts shall be ground smooth and flush unless the fatigue analysis includes the appropriate

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