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Atmospheric Storage Tanks

GP 09-04-01

Scope

- 1) [I] This Global Practice (GP) covers the design, fabrication, erection, inspection and testing of above ground atmospheric storage tanks fabricated of carbon steel and austenitic stainless steel in accordance with API STD 650. The requirements given herein supplement and modify those of API STD 650.

If tanks are designed to other standards, the Owner's Engineer shall specify which Sections of this GP shall apply.

- 2) [I] An asterisk (*) indicates that a decision by Purchaser is required or that additional information is furnished by Purchaser.
- 3) [R] Tanks within the scope of API STD 650 Appendix A or Appendix J may be entirely designed, fabricated, erected, and inspected per API STD 650 except:
 - a) All horizontal shell joints shall be complete penetration and complete fusion welds.
 - b) * Proposals to use pneumatic testing per API STD 650 Appendix J shall be submitted to the Purchaser for approval by the Owner's Engineer.
 - c) The gap between the bottom shell ring and the lap bottom plates at the radial weld location shall be a maximum of $\frac{1}{8}$ in. (3 mm).

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1. Required References

[I] This Section lists Practices and Standards that are generically referenced and assumed to be a part of this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 03-16-01	Flanged Joints, Gaskets, and Bolting
GP 09-07-01	Accessories for Atmospheric Storage Tanks
GP 18-07-01	Welding Procedures
GP 18-10-01	Additional Requirements for Materials
GP 20-01-01	Inspection of Equipment and Materials
GP 20-01-03	Quality Programs

1.2. API–American Petroleum Institute

API RP 2003	Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents
API RP 2Z	Recommended Practice for Preproduction Qualification for Steel Plates for Offshore Structures
API STD 650	Welded Steel Tanks for Oil Storage

1.3. ASME–American Society of Mechanical Engineers

ASME SEC VIII D1	BPVC Section VIII - Rules for Construction of Pressure Vessels - Division 1
ASME SEC IX	BPVC Section IX - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators

2. Additional Requirements

[R] Where local regulations require atmospheric storage tanks to be designed to API STD 650, the more stringent requirements of API STD 650 or this GP shall be used.

* [I] The following Practices and Standards shall be used with this GP as specified by Purchaser.

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2.1. Global Practices–ExxonMobil Engineering Practices

GP 03-05-01	Fill and Discharge Lines and Auxiliary Piping for Storage Tanks and Vessels
GP 03-18-01	Piping Fabrication Shop or Field
GP 04-01-03	Design Loads for Structures
GP 04-08-01	Tank Foundations
GP 09-07-03	Vents for Fixed Roof Atmospheric Storage Tanks
GP 09-07-04	Internal Floating Roofs for Atmospheric Storage Tanks
GP 14-03-01	Fireproofing
GP 18-04-01	Postweld Heat Treatment of Equipment Handling Alkaline Solutions
GP 18-12-01	Positive Material Identification
GP 19-01-01	Paint and Protective Coatings

2.2. API–American Petroleum Institute

API SPEC 5L	Specification for Line Pipe
API STD 2000	Venting Atmospheric and Low-Pressure Storage Tanks Nonrefrigerated and Refrigerated

2.3. ASCE–American Society of Civil Engineers

ASCE 7	Minimum Design Loads for Buildings and Other Structures
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2.4. ASTM–American Society for Testing and Materials

ASTM A 53/A 53M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 106	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A 123/A 123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 193/A 193M	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A 307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength

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ASTM A 333/A 333M	Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service
ASTM A 573/A 573M	Standard Specification for Structural Carbon Steel Plates of Improved Toughness
ASTM B 29	Standard Specification for Refined Lead
ASTM C 279	Standard Specification for Chemical-Resistant Masonry Units
ASTM C 386	Standard Practice for Use of Chemical-Resistant Sulfur Mortar
ASTM C 397	Standard Practice for Use of Chemically Setting Chemical-Resistant Silicate and Silica Mortars
ASTM C 399	Standard Practice for Use of Chemical-Resistant Resin Mortars
ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials

2.5. CSA–Canadian Standards Association

CSA G40.20/G40.21-98	General Requirements for Rolled or Welded Structural Quality Steel; General Instruction No 1-2
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2.6. NACE–National Association of Corrosion Engineers

NACE RP0294	Design, Fabrication, and Inspection of Tanks for the Storage of Concentrated Sulfuric Acid and Oleum at Ambient Temperatures
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2.7. NFPA–National Fire Protection Agency

NFPA 11	Standard for Low-, Medium-, and High Expansion Foam
NFPA 30	Flammable and Combustible Liquids Code (National Fire Codes, vol. 1)

3. Definitions

Term	[I] Description
Low Strength Tank Steels	Steels having a specified minimum yield strength equal to or less than 43000 psi (296 MPa) and a specified maximum tensile strength equal to or less than 85000 psi (586 MPa).
High Strength Tank Steels	Steels having a specified minimum yield strength greater than 43000 psi (296 MPa) and a specified maximum tensile strength equal to or less than 100,000 psi (689 MPa).

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Term	[I] Description
"Fully Stiffened" Pontoons	Floating roof pontoons having top and bottom plates reinforced such that the entire pontoon cross section is effective in carrying transmitted loads from the center deck.
"Partially Stiffened" Pontoons	Floating roof pontoons having top and bottom plates reinforced such that only part of the pontoon cross section is effective in carrying transmitted loads from the center deck.
Production Impact Test Plates	Defined by ASME SEC VIII D1, Boiler and Pressure Vessel Codes, Paragraph UG 84 except that they are to be made of the actual materials to be used for the item to be fabricated or manufactured. The welding procedure for any given test plates shall be identical to that used or to be used for the corresponding construction weld. The purpose of these plates is to provide the required impact test specimens for the weld metal and heat affected zones in the finished item.
Inspector	As used in this GP, refers to Owner's Representative.
Critical Exposure Temperature For Atmospheric Storage Tanks	Defined as the lower of: a. The lowest one-day mean atmospheric temperature plus 15°F (8°C). b. The hydrostatic test temperature. The term critical exposure temperature shall be used in place of the term "minimum design metal temperature" per API STD 650.

4. Materials

- 1) [R] Annular plates per Table 1 shall be of the same material group per API STD 650 as the lowest shell course.
- 2) [S] For tanks with shell thickness greater than 1/2 in. (13 mm), and critical exposure temperature less than 32°F (0°C), the lowest two shell courses and annular plates shall be constructed from fully killed carbon steels manufactured to fine grain practice and normalized or quenched and tempered.
- 3) * [S] Tank materials of construction, including welding consumables, shall meet the impact requirements given in API STD 650 for the applicable combination of type of steel, thickness, and Critical Exposure Temperature. For materials with minimum yield strength greater than 55000 psi (379 MPa), transverse impacts with values per API STD 650 are required in addition to the longitudinal impacts.
- 4) [R] The use of CSA G40.20/G40.21-98, Grade G40.21 plate with a V content > 0.02wt% but < 0.10 wt%, Nb content of < 0.02 weight percent and carbon equivalent (CE) per [GP 18-10-01](#) is acceptable provided a minimum preheat of 150°F (65°C) is maintained during welding and root pass and final pass of all welds are magnetic particle inspected. The preheat shall be maintained during the root pass inspection and until the weld is complete. The final weld pass to be magnetic particle inspected 48 hours after completion of the weld.
- 5) * [R] Carbon steel material shall be per API STD 650 unless otherwise specified.

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