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Horizontal Cylindrical Thermally Insulated Double-Wall Steel

Fireguard® Aboveground Storage Tank Guide Specification

**with Highland Tank Overfill Protection (OP) System**

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* as described in *The Project Resource Manual—CSI Manual of Practice, Current Edition.*

The architect or engineer must carefully review and edit this section to meet the project's requirements and the local building code. Coordinate this section with other specification sections and the Drawings. **Delete all “Specifier Notes” after editing these sections.**

Section numbers are from *MasterFormat 2020 Edition*.

SECTION 23 13 23.23

INSULATED, STEEL, ABOVEGROUND FUEL-OIL, STORAGE TANK(S)

Specifier Notes: This section covers Highland Tank LLC. thermally insulated steel, aboveground fuel-oil, storage tankwith integral overfill protection system **Model 04000FGOPCYLHZMF64CSI Fireguard® OP** for **Motor Vehicle Fuel Dispensing.** Consult Highland Tank LLC., Inc. for assistance editing this section for the specific application.

PART 1 GENERAL

1.1 SECTION INCLUDES

1. Fireguard**®** OPhorizontal cylindrical thermally insulated double-wall steel aboveground storage tank(s); UL 2085 compliant “protected” tank with integral overfill protection system.

1.2 RELATED REQUIREMENTS

Specifier Notes: Edit the following list of related sections as required. Delete related sections not required. List other sections with work directly related to this section.

A. Section 03 15 19 - Cast-In Concrete Anchors (Anchor Bolts for Saddles)

B. Section 03 30 00 - Cast-in-Place Concrete (Concrete for Reinforced Concrete Slab)

C. Section 05 05 19 - Post-Installed Concrete Anchors

D. Section 09 96 00 - High-Performance Coatings

1.3 REFERENCE STANDARDS

Specifier Notes: List reference standards mentioned in this section, complete with designations, titles, and latest edition. Delete reference standards not included in this edited section. This article does not require compliance with reference standards but lists those used.

A. AAMP - The Association for Materials Protection and Performance (FKA SSPC -Steel

 Structures Painting Council/NACE - National Association of Corrosion Engineers)

• SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning

• SSPC-SP 10/NACE No. 2, Near-White Blast Cleaning

B. ANSI – American National Standards Institute

C. ASTM - American Society for Testing and Materials

* ASTM D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction
* ASTM Standard Specification for Carbon Structural Steel

D. AWS - American Welding Society

* Structural Welding Code – Steel

E. CARB - California Air Resources Board.

* Standing Loss Control Testing Requirements for Air Emissions

F. ICC- International Code Council, Inc.

* 1. IBC - International Building Code
	2. IFC – International Fire Code
* Chapter 57 Flammable and Combustible Liquid

G. NEC – National Electric Code

H. NEMA – National Electric Manufacturers Association

I. NFPA - National Fire Protection Association

* NFPA 30, Flammable and Combustible Liquids Code
* NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages
* NFPA 31: Standard for the Installation of Oil-Burning Equipment
* NFPA 70: National Electric Code (NEC)

J. OSHA - U. S. Department of Labor, Occupational Safety and Health Administration.

* OSHA 29 CFR 1910.146, Occupational Safety and Health Standards, particularly Flammable and Combustible Liquids

K. PEI - Petroleum Equipment Institute.

* RP 200, Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling

L. STI - Steel Tank Institute.

* STI-F941, Standard for Fireguard® Thermally Insulated Aboveground Storage Tanks
* STI-R942, Installation & Testing Instructions for Thermally Insulated, Lightweight, Double-Wall Fireguard® Aboveground Storage Tanks
* STI-SP001-00, Standard for Inspection of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids

M. UFC - Uniform Fire Code, Uniform Fire Code Association

* Protected Aboveground Tanks for Motor Vehicle Fuel-Dispensing Stations Outside Buildings

N. UBC - Uniform Building Code, International Conference of Building Officials.

O. UL - Underwriters Laboratories, Inc.

* UL 2085, Standard for Protected Aboveground Storage Tanks for Flammable and Combustible Liquids
* UL 142, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids

P. US EPA – United States Environmental Protection Agency

* Spill Prevention, Control, and Countermeasure (SPCC) regulation (40 CFR 112)

Q. Applicable state and local regulations and ordinances.

Specifier Notes: In case of differences between building codes, state laws, local ordinances, utility company regulations, and contract documents, the most stringent shall govern. The codes and standards listed are the latest as of this publication. Codes and standards are continuously updated. The Contractor shall confirm the construction standard edition enforced by the authority having jurisdiction.

1.4 SUBMITTALS

Specifier Notes: Edit submittal requirements as required. Delete submittals that are not required.

A. Comply with Section 01 33 00 – Submittal Procedures.

B. Shop Drawings: Submit shop drawings of the tank(s) by the tank manufacturer showing all fittings' principal dimensions and location.

C. Product Data: Submit the manufacturer’s product data, including installation instructions.

D. Quality Control: The submittal package shall include quality control, inspection procedures, and reports.

E. Manufacturer’s Certification: Submit the manufacturer’s certification that the insulated, steel, aboveground fuel storage tank(s) comply with specified requirements and are suitable for the intended application.

F. Warranty Documentation: Submit the manufacturer’s standard warranty.

Specifier Notes: The number of submittals for the specified storage tank shall be limited. If the tank is not “Approved” or “Approved as Noted” on the second submittal for approval, the engineer reserves the right to refuse further submittals from the same manufacturer and may require the contractor to submit for approval for a different manufacturer’s product.

1.5 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: The manufacturer regularly engaged, for the past ten years, in manufacturing insulated, steel, aboveground fuel storage tank(s) of a similar type to that specified.

B. Installer's Qualifications:

1. The installer has regularly engaged, for the past five years, in installing insulated, steel, aboveground fuel storage tank(s) like that specified.

2. Employ persons trained to install insulated, steel, aboveground fuel storage tank(s).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle insulated, steel, aboveground fuel storage tank(s) following manufacturer’s instructions.

B. Protect insulated, steel, aboveground fuel storage tank(s) during delivery, storage, handling, and installation to prevent damage.

1.7 WARRANTY

A. Warranty Period: 30 years.

1. Warrant insulated, steel, aboveground fuel storage tank(s) against failure due to exterior and interior corrosion when used with petroleum products or alcohol.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Highland Tank LLC.

 One Highland Road

 Stoystown, PA 15563

 Phone 814-893-5701

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 E-mail info@highlandtank.com

 Website [www.highlandtank.com](http://www.highlandtank.com)

* 1. INSULATED, STEEL, ABOVEGROUND FUEL-OIL STORAGE TANK(S)
1. Horizontal, Cylindrical Thermally Insulated Double-Wall Steel Aboveground Storage Tank(s) with Integral Overfill Protection System: Fireguard**®** OP cylindrical aboveground storage tank(s) (U.S. Patent No. 5,381,923) for the storage of petroleum product(s) at near atmospheric pressure.
* Tank to be equipped with an overfill protection system and integral overfill chambers sized to store 20% minimum of the total tank compartment’s volume to comply with the facility's Spill Prevention Control and Countermeasures (SPCC) plan requirements. The sizing of the overfill chamber is consistent with industry protocols for complying with the minimum spill regulations; therefore, a chamber of smaller volume is not permissible.

Specifier Notes: Specify quantity and nominal tank capacity, inside diameter, and inside length. Nominal tank capacities range from 500 to 30,000 gallons.

1. Quantity: \_\_\_\_\_

2. Nominal Tank Capacity: 4,000-gallons, as indicated on the drawings.

3. Nominal Overfill Chambers Capacity (20%): 800-gallons, as indicated on the drawings.

4. Nominal Dimensions:

a. Primary Tank

* Inside Diameter: 5-feet, 4-inches, as indicated on the drawings.
* Outside Diameter: 5-feet, 10-inches, as indicated on the drawings.
* Inside Length: 24-feet, 0-inches, as indicated on the drawings.

b. Overfill Chamber

* Inside Diameter: 5-feet, 4-inches, as indicated on the drawings.
* Outside Diameter: 5-feet, 10-inches, as indicated on the drawings.
* Inside Length: 4-feet, 10-inches, as indicated on the drawings.

c. Secondary Tank

* Inside Length: 28-feet, 10-inches, as indicated on the drawings.
* Outside Length: 29-feet, 5-inches, as indicated on the drawings.

d. Approximate Height (including Saddles): 7- feet, 2-inches, as indicated

 on the drawings.

5. Minimum Steel Thickness:

 Head Shell

 a. Primary Tank: 7 GA 7 GA

 b. Secondary Tank: 7 GA 7 GA

6. Conformance: UL 2085, Protected Aboveground Storage Tanks for Flammable and Combustible Liquids.

a. The inner and Outer Tanks shall be manufactured following Underwriters Laboratories UL 142 Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids and labeled for UL 2085 Standard for Insulated Secondary Containment Aboveground Tank for Flammable Liquids. The UL 2085 label will be fastened directly to the tank(s).

b. The tank design shall be UL 2085 listed as both "Protected" and "Fire-Resistant" including:

* Two-Hour Full Scale Fire Test
* Ballistics/Projectile Test,
* Vehicle Impact Test,
* Hose Stream Test,
* Pool Fire Test, and
* Interstitial Communication Test

c. The tank system design shall be the subject of a Blast Effects Analysis (BEA) for resistance and performance under three blast threat scenarios:

* a 50-pound man-portable improvised explosive device (MPIED),
* a 500-pound vehicle-born improvised explosive device (VBIED), and
* a vapor cloud explosion (VCE) with a load of 10 psi.

 The BEA shall conclude that the tank system shall resist and remain intact without failure of the primary tank.

d. The tank shall include integral steel secondary containment and lightweight thermal insulation with a minimum fire rating of two hours.

e. Tank shall comply with the National Fire Protection Association NFPA 30 Flammable and Combustible Liquids Code. The tank's secondary containment must be tested for tightness in the factory and the field before commissioning. The tank shall be supplied with emergency venting for the primary and the secondary containment tanks (emergency venting by "form of construction" will NOT be permitted)

f. The tank shall be designed for relocation at a future date (heavy, concrete-encased designs will NOT be permitted).

g. The tank shall be manufactured and labeled in strict accordance with Steel Tank Institute (STI) STI F941, Standards for Fireguard® Thermally Insulated Aboveground Storage Tanks, as applied by an STI licensee. The tank shall be subject to the STI's Quality Assurance program and backed by the STI 30-year warranty.

7. Construction

a. Tank shall be fabricated per UL-142 of mild carbon steel with shell seams of continuous lap weld construction.

b. The tank shall be of double-wall construction and complete secondary containment of the primary storage tank's contents shall be provided through an impervious steel outer wall.

c. The primary storage tank and secondary containment shall be compatible with the fuel (including biodiesel and ethanol) and any chemical additives.

d. A minimum of 3" of porous, lightweight monolithic thermal insulation material shall be installed at the factory within the interstitial space between the inner and outer walls. Thermal insulating material:
• shall be following the American Society of Testing Materials (ASTM)

 Standards C-332 and C-495.
• shall allow liquid to migrate through it to the monitoring point.
• shall not be exposed to weathering and shall be protected by the steel secondary
  containment outer wall (an exterior concrete wall or vault exposed to the elements
  will NOT be permitted)

e. The design and construction of the tank shall allow for any accumulated water to migrate unimpeded to the bottom low point for complete removal. (Internal supports allow water to collect on the tank bottom, resulting in microbial growth. They impede maintenance and will NOT be permitted.)

f. The tank shall be supplied with an integral overfill chamber (“OP”) to capture and store overfills resulting from accidents or equipment failures during filling operations.

* The “OP” Chamber shall contain at least 20% of the primary tank’s storage volume.
* The “OP” Chamber must be separated from the primary tank by a solid bulkhead extending from the bottom to the top. The bulkhead shall be constructed so there is no overflow or leakage from the primary tank to the overfill chamber. (Overflow by an internal baffle weir, transfer pipe, or bulkhead penetration shall not be permitted as a tank installed off-level and out of plumb will not operate as intended.)
* The “OP” Chamber must be capable of tightness testing (i.e., the primary tank must be air pressure tested separately from the “OP” Chamber). The inability to prove that the primary tank and “OP” Chamber are separate and non-continuous shall result in product rejection.
* The “OP” Chamber must be designed so that it cannot be activated until the positive shut-off fill limiter is fully engaged (the product level reaches 95% of tank capacity) or the storage tank is full (the product level reaches 100% of tank capacity).
* The “OP” Chamber shall have top gauge, vent, and access fittings.
* The “OP” Chamber shall be connected to the primary tank through the Overfill Protector chute, which shall include one emergency vent appropriately sized for the entire volume of the primary vessel and the “OP” Chamber.
	+ Appropriately sized “OP” ports shall facilitate product transfer through the Overfill Protector Chute during inadvertent primary tank overfilling.
	+ The “OP” ports shall be positioned to allow for the free flow of product into the “OP” Chamber without backup.
	+ The “OP” ports shall be accessible and capable of plugging into the primary tank and “OP” Chamber pressure testing.
* The primary tank and the “OP” Chamber shall each be supplied with a

normal vent nozzle.

g. A means of grounding the tank shall be provided.

Specifier Notes: Specify the quantity of threaded NPT fittings.

8. Threaded NPT Fittings: Threaded fittings with thread protectors shall be supplied as follows (all fittings must be located on the tank top per UL) (Refer to drawings for details):

a. 2-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Interstitial Monitoring

b. 2-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Electronic Liquid Level Sensor, “OP” Chamber

c. 2, 3-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Normal Vent, “OP” Chamber

d. 3, 4, or 6-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Pump-out Port with Plug, “OP” Chamber

e. 2, 3-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Normal Vent, Primary Tank

f. 4, 6, or 8-Inch Diameter: \_\_\_\_\_\_\_\_\_\_\_ Emergency Vent, Primary Tank

g. 2-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Electronic Liquid Level Sensor

h. 2, 3-Inch Diameter: \_\_\_\_\_\_\_\_\_\_\_ Product Pump or Supply

i. 2-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Liquid Level Gauge

j. 4, 6-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Product Fill

k. 2-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Product Pump or Supply

l. 2-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Auxiliary (Spare)

m. 4-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Stage 1 Vapor Recovery, Electronic Level Gauge, or Auxiliary

n. \_\_\_\_\_\_\_\_\_\_-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Spare(s)

 o. Located as indicated on the Drawings.

Specifier Notes: Specify the size of 150-pound flanges, if required.

9. 150-Pound Flanges:

a. \_\_\_\_\_\_-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Interstitial Emergency Vent

b. \_\_\_\_\_\_-Inch Diameter: \_\_\_\_\_\_\_\_\_\_ Emergency Vent, Primary Tank, and “OP” Chamber

10. Manhole: Manholes shall conform to UL 142 standards for construction, bolts, and gaskets.

Specifier Notes: Tank system(s) shall include one (1) manway hatch for each tank/compartment with a minimum diameter of 76”. The minimum nominal diameter of the opening shall be not less than 18”. Specify manhole diameter.

a. Diameter: 24-inches.

b. Lid: Nuts, bolts, and gasket.

c. Location: Refer to drawings.

Specifier Notes: Specify the appropriate exterior protective coating.

11. Exterior Protective Coating:

 a. Surface Preparation: Grit blast - SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning

 b. Coating: White finish paint system, 5-7 mils DFT on the shell and heads.

or

12. Exterior Protective Coating for Storm-Related Saline/Salt Spray Exposure:
a. Surface Preparation: Grit blast - SSPC-SP 10/NACE No. 2, Near-White Blast Cleaning

 b. Three (3) Coat System for Aggressive Environments:

* Zinc-rich primer (2-3 mils DFT)
* Epoxy primer intermediate coat (4-8 mils DFT)
* Polyurethane topcoat (2-3 mils DFT), White Gloss Finish

Specifier Notes: An internal coating system protects steel tanks from corrosion or product from contamination. The appropriate coating system selection, proper surface preparation, and correct application depend on the fuel being stored and job-specific specifications (e.g., MIL-SPECS). Tank system(s) to be provided with interior coating must have one (1) additional manway for egress.

 13. Interior Protective Polyurethane Coating

 a. Interior weld and a minimum of one additional 24-inch manway.

 b. Surface Preparation: Grit blast - SSPC-SP 10/NACE No. 2, Near-White Blast Cleaning

 c. Coating: Internal Polyurethane Tank Lining (10-15 mils DFT)

Specifier Notes: Evaluate the installation site to identify any potential hazards, i.e. flood, tornado, earthquake, etc. If supplemental anchoring or other special provisions are required, contact manufacturer for assistance with requirements to remedy these situations.

14. Steel Saddles: Tank(s) shall be delivered as a complete UL-listed assembly with two factory-supplied, welded-on saddles. Saddles are to be set at a level on a solid foundation. Proper anchoring is required for tanks designed to withstand seismic and wind forces and blast overpressures.

a. Quantity: two (2) Saddles,

b. Location: Refer to drawings.

15. Lifting lugs: Lifting lugs shall be provided at balancing points to facilitate handling and installation.

16. Emergency Venting for Primary Tank and “OP” Chamber: The tank system(s) shall include one (1) emergency vent for each primary tank or primary tank compartment and the “OP” Chamber, which is UL listed. The Emergency Vent shall be located on the “Overfill Protector” Chute. Refer to the drawings.

a. The tank configuration shall determine vent size, the primary tank capacity, “OP” chamber Capacity, and the product stored.

b. Emergency venting shall comply with provisions of NFPA 30A, NFPA 30, and UFC

17. Emergency Venting for Secondary Tank: The tank system(s) shall include one (1) emergency vent for each secondary containment tank interstice, which must be UL-listed.

a. The tank configuration, secondary tank capacity, and stored product determine the venting capacity.

b. Emergency venting shall comply with NFPA 30A, NFPA 30, and UFC provisions.

c. Vents shall be located as close to the center of the tank as possible.

Specifier Notes: Specify Optional Equipment

B. Steel Aboveground Storage Tank Options/Accessories:

1. Normal Venting for Primary Tank and “OP” Chamber: Tank system(s) shall include two (2) normal atmospheric or pressure/vacuum vents, one for the primary tank(s) and one for the “OP” Chamber.

a. Capacity of the vent shall be sized according to Table 2-8, NFPA 30.

b. Vent riser piping shall be a minimum 2” diameter, Schedule 40 steel pipe, pre-cut for field assembly, and conform to ANSI B31.3 or ASTM A53; A106 or A135. The length of the pipe shall be such that the point of vent discharge is a minimum of twelve feet above grade.

c. Vent installation shall comply with applicable sections of the fire and mechanical codes, including, but not limited to, NFPA 30A and NFPA 30.

2. Spill Container: Tank system(s) shall include one (1) spill container to contain product spills from the fill hose. The spill container shall be painted or plated steel, with a 14-gauge minimum thickness. A hinged lockable metal rainproof lid shall be provided. Spill containment shall comply with UFC and NFPA codes.

 a. Fill pipe spill container shall have a capacity of not less than five gallons.

3. Fill Assembly: Tank system(s) shall include top-fill assembly, inclusive of:

 a. One (1) lockable fill cap [2-4” in size] with a liquid-tight seal and positive mechanical

 locking mechanism.

 b. One (1) fill pipe adapter [2-4” in size] with a threaded fitting with cam-and-groove or

 a bayonet-style lip that provides a fill hose connection that will not expose fuel to air

 during delivery.

 c. One (1) drop tube (fill pipe) constructed of corrosion-resistant metal [2-4” nominal

 diameter]. The fill pipe shall terminate within 6” of the inside bottom of the tank. A striker plate will be provided at the bottom of the fill pipe.

 d. Comply with provisions of NFPA 30 and UFC Article 79.

4. Overfill Prevention: Tank system(s) shall include overfill prevention equipment that complies with the requirements of NFPA 30A and which incorporates the following:

a. Overfill Prevention Valve: This shall be installed on the fill port and designed to prevent tank overfilling by providing a positive shut-off during a pressurized fill. The valve will stop the liquid flow into the tank when the product level reaches 95% of the tank capacity. The fill limiting device shall be rated to accept the fill flow rate and pressures up to 100 psi and must be UL-listed.

b. An audible alarm that will sound when the product level in the tank has reached 90% of tank capacity. The alarm system is to be UL-Listed as an electric type. Electric-type systems shall use intrinsically safe tank-mounted magnetic float probes, suitable for use in Class I, Div. II, Group D locations, and a monitoring console, suitable for use in Class I, Div. II, Group D locations or located more than ten feet from a tank shell.]

5. Liquid Level Gauge: Tank system(s) shall include a means for determining the liquid level in the tank, which is visible to the delivery operator, following NFPA 30, NFPA 30A, and UFC Article 79. Acceptable means:

a. Float-type mechanism with a “clock gauge” that displays the liquid level in the tank. The gauge shall be visible from the point of fill.

6. Interstitial Leak Detection: Tank system(s) shall include electronic leak detection for each tank interstice to monitor the primary and secondary containment tanks continuously.

 a. An electric monitoring system with console and tank-mounted sensors or probes is needed.

 The console may be installed in the field. Probes shall be factory-installed in the

 interstitial space with the probe at the bottom of the secondary tank. Electric interstitial leak detection system shall be UL-Listed. Systems shall use intrinsically safe tank-mounted probes, suitable for use in Class I, Div. II, Group D locations, and a monitoring console, suitable for use in Class I, Div. II, Group D locations or located

 more than ten feet from a tank shell.

7. Tank shall be supplied with a High-LINK® LevelShield Series P, Level Management

 System that includes:

 a. One (1) Magnetostrictive probe for continuous monitoring of product and water levels,

 and product temperature (provides temperature-compensated volume monitoring).

* Probe Specs:
	+ Probe length: 59″ - Additional probe length required \_\_\_\_\_\_\_\_\_\_″ (Available in 10″ increments)
* Communication cable 78″ (included) - Additional cable length required \_\_\_\_\_\_\_\_\_\_″
* RS-485 Communication
* 2 floats – (1) for product level, (1) for water level
* Thermocouple for product temperature measurement
* Measuring accuracy up to +/- 0.02″
* Resolution +/- .004″
* 316 Stainless Steel Shaft
* Polypropylene float material
* Explosion-proof head
* ¾" compression fitting
* ¾" x 2” NPT reducer bushing supplied (minimum 2″ opening required)
* Compatible with gasoline and diesel (Contact Highland Tank for another chemical/product compatibility)
1. CommBox transmits data from connected sensors/probes to the cloud-based HIGH-LINK® software platform.
* CommBox specs: Note: Maximum of two (2) probes per CommBox.
* NEMA 4 Enclosure
* 120VAC with terminals for electrical landing
* 5A 120VAC breaker
* Active barrier
* 12VDC power converter
* Terminal blocks for probe wire landing
* 4G cellular technology
* Two (2) Integrated LED/Horn combinations with dry contacts for audible/visual alarms.
1. High-LINK® Cloud-Based Software Platform

Specifier Notes: Ladders, Stairs, Platforms, Catwalks, Walkways, and Handrails. Access is required for convenient and safe inspection and maintenance. Design and fabrication of all ladders (interior or exterior), stairs, platforms, catwalks, walkways, and handrails shall follow applicable OSHA safety regulations, pertinent building codes, and acceptable engineering practices. Stairs, Platforms, Catwalks, and Walkways shall have anti-slip fiberglass treads and walking surfaces. Personal Fall Arrest Systems consisting of a full-body harness, a deceleration device, a lanyard, and an anchor point shall be supplied where required.

8. Exterior Ladders: Ladders shall be fabricated of [coated] [galvanized] carbon steel or

 stainless steel and designed following OSHA standards and acceptable

 engineering practices.

a. Sides: 2-inch steel angle.

b. Rungs: 1-inch diameter, 12-inches on center.

c. Location: Refer to drawings.

9. Stairs, Platforms, Catwalks, and Walkways shall be fabricated of [coated], [galvanized] carbon steel with anti-slip fiberglass treads and walking surfaces.

 a. Stairs: Provide external stairs to allow access to the top of the tank for filling and/or

 maintenance. Stairs must comply with applicable OSHA standards (treads, risers,

 handrails, etc.) and building codes.

b. Platforms, Catwalks, and Walkways shall be of steel construction with (fiberglass) (galvanized steel) decking and designed following OSHA standards and acceptable engineering practices.

c. Location: Refer to drawings.

10. Signage: Recognized UL component Marking and Labeling system must be affixed to the side of the tank following state and local codes:

 a. "No Smoking"

 b. Identification of product by name or NFPA coding

 c. The statement "Follow Installation Instructions"

12. Optional Equipment

 a. Pump Mounts(s) for Top Mount, Side Mount, or Free-Standing Pumps and Dispensers on Standard or Split Tanks.

 b. “Spill-mate" for remote fills.
c. Internal Ladder(s).
d. Equipment Packages:

* Standard Gasoline Package
* Standard Diesel Package
* Emergency Generator Package
* Waste Oil Package
* Consult Factory for Aviation Fuel (Avgas, Jet-A, or Jet A-1) Package

C. General Safety Provisions

 1. Provide [concrete barriers] ["U" shaped steel pipe guards] [bollards] around aboveground tanks and piping to protect against vehicular collision following fire regulations and building codes.

 2. Provide [quantity] [size] diameter ["U" shaped steel pipe guards] [bollards] to be placed at the ends of the pump island, primed, and painted.

 3. Provide portable Class ABC [20 pounds] [40 pounds] fire extinguisher(s) and weatherproof cabinet(s) at dispenser island(s) and [other locations] following applicable fire codes.

PART 3 EXECUTION

3.1 GENERAL

A. The tank shall be installed on a reinforced concrete base constructed by the owner. Installation and testing shall strictly follow Steel Tank Institute STI R942, Installation and Testing Instructions for Thermally Insulated Double-Wall Steel Fireguard® Aboveground Storage Tanks.

B. Familiarity with the Site.

 1, The contractor shall familiarize himself with the location of all public utility facilities

 and structures that may be found in the vicinity of the construction.

 2. The Contractor shall conduct his operation to avoid damage to the utilities or structures.

 Should any damage occur due to the Contractor's operations, repairs shall be

 made at the Contractor's expense in a manner acceptable to the Owner.

 3. The Contractor is responsible for meeting all the requirements established by the agencies

 for utility work, as well as work affecting utilities and other government

 agencies.

3.2 SITE PREPARATION

A. The site shall be prepared to ensure adequate support for the tank system and surface water drainage. The foundation and tank supports shall support the tank's weight and associated equipment when full. The foundation may be comprised of concrete, asphalt, gravel, or other stable material designed to prevent tank movement and must be rated for the specific seismic zone for each tank.

B. Tanks located in areas subject to flooding must be protected against floatation.

C. Secondary Containment Diking may be required for aboveground storage tanks.

 1. Regional and local fire code authorities shall be consulted for local requirements.

 2. Notify the Engineer of any local requirements not incorporated into the system as

 designed.

 D. Maintain legal separation distances from property lines, buildings, public ways, dispensers,

 vehicles being fueled and other storage tanks.

 1. Caution: Distance requirements vary significantly between jurisdictions.

 2. National standards dealing with setback and separation distances are included in NFPA 30A and UFC Article 79.

E. Provide a chain-link fence at least six feet high, separated from the tanks by at least 10 feet, and have a gate adequately secured against unauthorized entry per NFPA 30A.

 1. Regional and local fire code authorities shall be consulted for local requirements. NFPA does not require fencing at the tank area if the property on which the tanks are located is secured with a perimeter security fence.]

3.3 TANK HANDLING, STORAGE, AND INSTALLATION

A. Tanks shall be handled, lifted, stored, and secured following the manufacturer's instructions.

B. Unload with equipment having sufficient lifting capacity to avoid damage to the tank. Securely store the tank at the job site.

C. The tank and associated equipment shall be installed following the fire safety codes, regulations, standards, and manufacturer’s instructions, including:

 1. Federal, state, and local fire safety, occupational health, and environmental regulations.

 2. Steel Tank Institute installation instructions for Fireguard® aboveground storage tanks (STI R942, Installation and Testing Instructions for Thermally Insulated Lightweight

 Double-Wall Steel Fireguard® Aboveground Storage Tanks).

 3. The installation instructions of other system component manufacturers.

 4. The Construction Documents and associated Drawings.

 5. Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling, PEI/RP 200, Petroleum Equipment Institute.

D. Advise the Owner of any shipping or handling damage encountered.

E. No modifications shall be made to any tank without the prior written approval of the

 manufacturer and the Engineer. This includes any welding on tank shells, adding penetrations

 to the tank structure, or repairing the damage that might affect the integrity of the inner or

 outer tank.

3.4 CORROSION PROTECTION

A. Any portion of the fueling system in contact with the soil shall be protected from corrosion following sound engineering practice and following NFPA 30A.

B. Protect aboveground piping and equipment from corrosion by painting or wrapping it with a coating compatible with the product stored and the exposure conditions.

3.5 EQUIPMENT INSTALLATION

A. Contractor shall install tank(s), dispensers(s), piping, and equipment (anti-siphon devices, overfill shut-offs, emergency vents, vents, gauges, etc.) following the manufacturers' installation instructions, industry-standard recommended practices, and federal, state, and local regulations.

B. Calibration and start-up of equipment shall be performed by factory-trained and qualified personnel.

3.6 ELECTRICAL

A. Installation of all electrical components, including (Electric level and leak monitoring systems, alarms, etc.):

B. Installation shall follow manufacturers' instructions and conform to state and local electrical codes, with special attention to compliance with requirements for work in classified areas.

C. Provide explosion-proof electrical junction boxes, conduits, and seal-offs specified in Article 500 514 of the National Electrical Code.

D. Contractor shall provide wiring and seal-offs for all conduits.

3.7 CONCRETE

A. Before setting the tanks in place, provide a grading plan showing final elevations and the proposed location of control and expansion joints as a shop drawing.

B. [In addition to the seismic-rated concrete foundation footings for the storage tank,] Contractor shall provide [6] [8] [10] -inch reinforced concrete paving for [tank] [fuel island area] pad as shown in the drawings.

 1. [Provide 6 x 6 #6 WWF reinforcement] [Fiber mesh reinforcement].

 2. Miter all corners of the pad.

C. Provide an air-entrained concrete mix design, including a plasticizer that will provide [2,000] [3,000] [4,000] psi strength after twenty-eight days, based on Department of Transportation standards for aggregate, mixing, testing, hardness, etc. The concrete mix is to be approved by the Owner before paving.

D. Provide compacted backfill and concrete to match existing grades and surfaces.

E. The use of additives for cold weather work must be described in the mix design and subject to the owner's approval.

3.8 ASPHALTIC PAVING

A. Asphalt pavement shall be replaced to a full depth of [4] [6] [8] inches.

B. The existing asphalt pavement shall be saw cut for the entire depth and length of the new construction where full-depth asphalt pavement is to be placed.

C. Materials

 1. Full-depth asphalt material shall consist of two courses of [2] [3] [4] -inches each for a total depth of [4] [6] [8]-inches.

 2. The bottom course shall be a binder-type material as described in the DOT specifications. This course may be laid entirely on compacted backfill and mechanically compacted and rolled.

 3. The top course shall be a surface-type mix put down and mechanically compacted or rolled in equal separate layers of 2 inches maximum each.

 4. All sub-grade areas receiving asphalt pavement, full-depth or resurfacing, shall be covered with a bituminous material prime coat as specified by DOT.

3.9 TESTING

 A. The Contractor is responsible for testing all installed systems for liquid tightness and proper operation, including:

 1. Pre-installation inspection of all materials.

 2. Product, containment, and vent piping during construction.

 3. Containment sump integrity.

 4. System tightness test after all work, including paving, is completed and before the system is placed in service.

 5. Post-installation inspection and testing eleven months after substantial completion of all work and approval of the Owner.

B. Test each system component for calibration, tightness, and proper operation following the component manufacturer's instructions.

C. Testing shall be documented by the Contractor and witnessed by the Engineer.

 1. Record the date and time of the test, the name of the tester and his affiliation with the project, and the names of everyone witnessing the test.

 2. Record the test method, duration, and results.

 3. Provide the Owner a record of the testing during system start-up.

D. The Owner shall witness testing.

 1. The Owner shall witness tank delivery and setting in place, anchoring, piping tests, final precision testing, and system start-up.

 2. The Owner shall indicate approval of all testing witnessed in writing.

E. Tests shall conform with the manufacturers' instructions, state laws, and the quoted industry standards, particularly PEI/RP200.

 1. The most stringent test shall be performed if a conflict exists between the test protocols.

 2. Any conflict that affects manufacturers’ warranties must be resolved before beginning construction.

 3. The Contractor shall document all tests in writing, signed by the individuals who performed and witnessed the test.

 F. The Contractor shall demonstrate to the Owner the operation of all systems during the final start-up test.

 1. Provide one day of instruction on properly operating and maintaining all components.

 2. Demonstrations shall include, but are not limited to, pump operation, monitoring and gauging systems, fuel filter replacement, and leak detection.

3.10 TESTING PRIMARY AND SECONDARY TANKS

A. Air pressure testing of the primary inner tank, “OP” Chamber, and secondary containment tank shall be conducted on-site, in the presence of the Engineer, before placing the tank in service. Interstitial vacuum testing may be used for field tightness testing of cylindrical horizontal tanks.

B. Refer to Publication No. R942 for complete procedural details.

C. Other integrity tests may be required by the local authority having jurisdiction.

3.11 TESTING PRODUCT AND VENT PIPING

1. Test product and vent piping following manufacturer's instructions and quoted industry

 standards, particularly PEI/RP-100.

3.12 TEST DOCUMENTATION AND REPORTING

 A. The Contractor shall document all testing and provide copies to the Owner and authorities having jurisdiction. Test records shall include:

 1. Date and time of the test.

 2. Name of the tester.

 3. Names of any inspectors present.

 4. Test procedure followed.

 5. Test results.

 B. Provide documentation for all testing with contract closeout documentation to the Owner.

 C. The Contractor shall ensure that future testing is not impaired. The Contractor may be requested to demonstrate the tests as a part of the final approval process.

3.13 TANK INSPECTION AND MAINTENANCE

A. The tank operator should perform periodic walk-around inspections to identify and repair areas of damage to the tank or the coating and check for proper drainage around the tank area.

B. The tank exterior must be inspected periodically to ensure that the integrity of the coating is maintained. The frequency of periodic repainting will be based on environmental factors in the geographic area where the tank is located. Special consideration should be given to the paint selection, surface preparation, and coating application. The coating selected should be of industrial quality and suitable for use with the current coating.

C. Proper site preparation and maintenance are vital to ensure surface water drainage. Should ground conditions change or settlement occur, take the appropriate steps to maintain proper drainage and prevent standing water near or under the tank area.

D. The primary tank shall be inspected monthly for water at the lowest possible points inside the primary tank. Remove any water found. Water and sediment in fuel can cause the plugging of filters. Also, bacterial growth originating from the fuel can cause corrosion of tanks and lines. For procedures to check for the presence and removal of water, refer to API Recommended Practice 1621, Appendix D, and API Standard 2610.

E. This tank must be removed from service if damaged by fire exposure, other physical means, or misuse.

F. Failure to adhere to these maintenance instructions may void the warranty.

G. Tank relocation requirements: Aboveground storage tanks are often relocated. When this occurs, the following instructions must be followed: All steps must be documented, and the documentation must be kept for the life of the tank.

1. The hazards associated with the cleaning, entry, inspection, testing, maintenance, or other aspects of ASTs are significant. Safety considerations and controls should be established before physical activities associated with ASTs. Cleaning of tanks must be per state and local authority requirements.

2. For requirements concerning tank inspections, refer to the STI Standard SP001, “Standard for the Inspection of Aboveground Storage Tanks.” These standards detail inspection requirements based on the tank installation and age. A tank must undergo the appropriate inspection before relocation.

3. The tank must also be subjected to a pressure (or vacuum) test as detailed in paragraph 3.2 above, except an inert gas, such as nitrogen, should be used for tanks that previously held fuel.

END OF SECTION