### SECTION 23 1313 - UNDERGROUND STORAGE TANKS (UST)

This section is a partial spec noting a Special Product Requirement for MAA. Designer shall complete the specification with information applicable to the project.

#### PART 1 – GENERAL

#### SUMMARY

1. Section Includes:

#### ACTION SUBMITTALS

#### INFORMATION SUBMITTALS

#### CLOSEOUT SUBMITTALS

1. Operation and Maintenance Data.

#### QUALITY ASSURANCE

1. Installer Qualifications: Trained and certified by tank manufacturer.
2. Underground Fuel-Oil Storage Tanks: Comply with requirements of the EPA, State of Maryland, and local authorities having jurisdiction, including recording fuel-oil storage tanks.

#### DELIVERY, HANDLING, AND STORAGE

1. Lift and support fuel-oil storage tanks only at designated lifting or support points, as shown on Shop Drawings. Do not move or lift tanks unless empty.

#### CONFORMANCE WITH REGULATIONS, CODES, STANDARDS, AND SPECIFICATIONS

1. Underground Fuel Storage Tanks (UST) containing fuels or chemicals designated hazardous by the United States Environmental Protection Agency (U.S. EPA) or by the applicable codes and standards, shall have approved secondary containment systems and shall be in strict conformance with the latest applicable regulations, manufacturer’s recommendations, codes, and standards.
2. U.S. EPA Final Rule; Federal Regulations: Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks. Title 40, Code of Federal Regulations, Part 280 (40 CFR Part 280).
3. State of Maryland, Department of the Environment, Title; 26, Subtitle 10, Oil Pollution and Tank Management (COMAR 26.10).
4. State of Maryland, Department of Public Safety and Correctional Services, Title; 12, Subtitle 03, Fire Prevention Commission (COMAR 12.03).
5. National Fire Prevention Association (NFPA) Standards:
	* + - 1. NFPA 30: Flammable and Combustible Liquids Code.
				2. NFPA 30A: Motor Fuel Dispensing Facilities and Repair Garage.
				3. NFPA 31: Standard for Installation of Oil-Burning Equipment.
				4. NFPA 70: National Electric Code.
6. Petroleum Equipment Institute (PEI) Recommended Practice (RP) For the Installation of Underground Liquid Storage Systems (PEI/RP 100-05).
7. American Petroleum Institute (API) Recommended Practice (RP) For the Installation of Underground Petroleum Storage Systems (API/RP 1615).
8. American Petroleum Institute (API) Standard 2000, Venting Atmospheric and Low-Pressure Tanks.
9. Listing and Labeling: Provide equipment and accessories that are listed and labeled as defined in the National Electric Code (NEC), Article 100.

#### PART 2 – PRODUCTS

#### 2.1 UNDERGROUND FUEL STORAGE TANK REQUIREMENTS

1. Underground storage tanks shall be warranted by the Manufacturer for 30 years against failure due to internal/external corrosion and when properly installed, against structural failure.
2. Affix standards organization’s code stamp.
3. Aboveground vent lines must be schedule 40 steel, protected from traffic, and properly anchored. Additionally, venting for flammable liquids must be 12’ above ground, 2’ above any buildings, and 5’ from any building openings. Venting for flammable liquids must also posses a pressure vacuum vent cap. Venting for combustible liquid storage must be 3’ above the ground or greater.
4. Underground storage tanks shall be UL listed of one of the following type:
	1. Fiberglass Reinforced Polyester UST
		* + 1. The underground storage tank shall be double-walled, fiberglass reinforced polyester (FRP) with one (1) manway and appropriate hold-down straps, lifting lugs, and interstitial space (UL 1316).
				2. Tank shall be manufactured with 100% resin and glass-fiber reinforcement. Tank shall include an integral fiberglass-reinforced polyester (FRP) secondary containment.
				3. The tank shall be double wall construction for containment of leaks with interstitial space between primary (internal) and secondary (external) tank walls to allow for free flow of all leaked product from the primary tank. The entire tank system shall be fabricated as a single unit and delivered to the job site as a complete assembly.
				4. Both the primary storage tanks and secondary containment shall be UL approved for their use and shall be compatible with gasoline, gasohol, ethanol, E85, methanol, oxygenated fuels, jet fuel, av-gas, kerosene, diesel fuel, bio-diesel, and motor oil (new or used) at ambient underground temperature or fuel oil stored at temperatures not to exceed 100˚ F. Tanks shall be chemically inert to petroleum products.
				5. Tank shall be designed with one 4-inch fitting that will access the tank bottom between the primary and secondary walls (annular space).
				6. Tanks with a 6-foot diameter or larger shall have an UL approved, integrally mounted reservoir installed on the tank for hydrostatic monitoring of the interstitial space. The reservoir shall be constructed of fiberglass reinforced plastic materials and warranted by the manufacturer for 30 years against failure due to internal/external corrosion and when properly installed, against structural failure (same as tank warranty).
				7. The annular space of the tank shall be filled with a Brine Antifreeze solution provided by the tank manufacturer.
				8. The tank shall have one (1) 22-inch I. D. flanged manway complete with UL listed gaskets, bolts, extension collar (as necessary), and cover and appropriate hold-down straps and lifting lugs.
				9. Each tank shall be provided with glass fiber reinforced plastic anchor straps for each tank. The number and location of straps shall be as specified by manufacturer. Each strap shall be capable of withstanding a maximum load for each tank diameter per the manufacturer’s specifications. Straps shall be standard as supplied by the tank manufacturer.
				10. Precast concrete deadman anchors or poured-in-place concrete hold down slab shall be compatible with the manufacturers anchor straps. The concrete deadmen or hold down slab and anchor straps shall prevent the fiberglass tank from floating out of the ground when the tank installation in an area of high groundwater or saturated soil conditions.
				11. The tank shall support accessory equipment such as ladders, submersible pumps, containment sumps, drop tubes, etc. when properly installed.
				12. Threaded fittings and optional equipment shall be consistent for use as approved by the Engineer.
				13. Striker plates shall be installed under each service fitting and manway opening.
				14. The UL label shall be permanently affixed to each tank.
				15. Provide lifting lug(s) on all tanks. Lifting lug system shall be capable of withstanding weight of tank with a sufficient safety factor.
				16. The tank shall withstand surface H-20 axle loads when properly installed according to manufacturer’s installation instructions. The tank shall withstand aircraft loading if the proposed location requires such loading.
	2. HMW Polymer Extruded Double-wall Steel UST
5. The underground storage tank shall be double-walled steel with a primary steel storage tank contained in a 360˚, air-pressure testable and unbreakable jacket, bonded together and sealed off at the fittings. The secondary containment tank wall shall be made of high molecular weight (HMW) polymer extruded and applied at the tank factory. The tank shall be designed with one (1) 22-inch I. D. flanged manway complete with UL listed gaskets, bolts, and cover, and appropriate hold-down straps and lifting lugs.
6. The tank shall be double wall construction for containment of leaks with interstitial space between primary (internal) and secondary (external) tank walls to allow for free flow of all leaked product from the primary tank.
7. Tank shall be designed with one 2-inch fitting that will provide access to the tank bottom between the primary and secondary walls (annular space).
8. The tank shall withstand surface H-20 axle loads when properly installed according to manufacturer’s installation instructions. The tank shall withstand aircraft loading if the proposed location requires such loading.
9. The tank shall be shipped, delivered, installed and 75% backfilled while maintaining a constant vacuum (minimum 12 inches of mercury vacuum) on the interstitial space to assure integrity of both the primary storage tank and secondary containment tank wall simultaneously.
10. Each tank shall be provided with appropriate anchor straps, per the manufacturer’s recommendations. The number and location of straps shall be as specified by manufacturer. Each strap shall be capable of withstanding a maximum load for each tank diameter per the manufacturer’s specifications. Straps shall be standard as supplied by the tank manufacturer.
11. Precast concrete deadman anchors or poured-in-place concrete hold down slab shall be compatible with the manufacturers anchor straps. The concrete deadmen or hold down slab and anchor straps shall prevent the tank from floating out of the ground when the tank installation in an area of high groundwater or saturated soil conditions.
12. The tank shall support accessory equipment such as ladders, submersible pumps, containment sumps, drop tubes, etc. when properly installed.
13. Threaded fittings and optional equipment shall be consistent for use as approved by the Engineer.
14. Striker plates shall be installed under each service fitting and manway opening.
15. The Underwriters Laboratories (UL) label shall be permanently affixed to each tank.
16. Provide lifting lug(s) on all tanks. Lifting lug system shall be capable of withstanding weight of tank with a sufficient safety factor.
	1. Double-wall Polyurethane-coated Steel UST
		* + 1. The underground storage tank shall be double-walled steel, externally

 protected with 75 mils thick of the Polyurethane Coating System per

 corrosion control system specifications, and built in accordance with UL

 58 Type I Construction criteria.

* + - * 1. The corrosion control system shall have a minimum of 30-year Manufacturer’s warranty against failure due to exterior corrosion and internal corrosion when used with compatible petroleum products. The tank will not require sacrificial anodes and therefore will not require cathodic monitoring.
				2. The tank shall be double wall construction for containment of leaks with interstitial space between primary (internal) and secondary (external) tank walls to allow for free flow of all leaked product from the primary tank.
				3. Tank shall be designed with one 2-inch fitting that will provide access to the tank bottom between the primary and secondary walls (annular space).
				4. The tank shall withstand surface H-20 axle loads when properly installed

 according to manufacturer’s installation instructions. The tank shall

 withstand aircraft loading if the proposed location requires such loading.

* + - * 1. The tank shall be shipped, delivered, installed and 75% backfilled while maintaining a constant vacuum (minimum 12 inches of mercury vacuum) on the interstitial space to assure integrity of both the primary storage tank and secondary containment tank wall simultaneously.
				2. Each tank shall be provided with appropriate anchor straps, per the manufacturer’s recommendations. The number and location of straps shall be as specified by manufacturer. Each strap shall be capable of withstanding a maximum load for each tank diameter per the manufacturer’s specifications. Straps shall be standard as supplied by the tank manufacturer.

h. Precast concrete deadman anchors or poured-in-place concrete hold down slab shall be compatible with the manufacturers anchor straps. The concrete deadmen or hold down slab anchor straps shall prevent the tank from floating out of the ground when the tank installation in an area of high groundwater or saturated soil conditions.

i. The tank shall support accessory equipment such as ladders, submersible pumps, containment sumps, drop tubes, etc. when properly installed.

j. Threaded fittings and optional equipment shall be consistent for use as directed by the Engineer.

k. Striker plates shall be installed under each service fitting and manway opening.

l. The Underwriters Laboratories (UL) 58 Type I Construction label shall be permanently affixed to the tank.

m. Provide lifting lug(s) on all tanks. Lifting lug system shall be capable of withstanding weight of tank with a sufficient safety factor.

1. Product Certification

Manufacturer shall provide documentation for the tank, with all of the standards and codes listed herein.

1. Underwriters Laboratories Inc. (UL) listing required – UL 58 – Standard for Safety for Steel Underground Storage Tanks for Flammable and Combustible Liquids (Steel Tanks Only).
2. Underwriters Laboratories Inc. (UL) listing required – UL 1746 – External Corrosion Protection Systems for Steel Underground Storage Tanks (Steel Tanks Only).
3. Underwriters Laboratories Inc. (UL) listing required – UL 1316 – Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures (Fiberglass Tanks Only).
4. American Standards for Testing Materials (ASTM) – ASTM Specifications. D4021-86 – Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks (Fiberglass Tanks Only).
5. General Services Administration, Public Building Service Guide Specifications, PBS: 1568 (Fiberglass Tanks Only).
6. Guarantee
7. The underground storage tank manufacturer shall provide a thirty (30) year warranty for the tank. In addition, the Contractor shall warranty the tank installation for a period of one (1) year. The warranty period shall begin upon Contractor receipt of written acceptance from the owner of the tank system following completion of startup.

2.2 UNDERGROUND STORAGE TANK PIPING

1. All product piping that is buried underground shall be made of non-ferrous materials and shall be designed as double containment components.

2.3 DOUBLE-WALL FLEXIBLE PLASTIC

1. Underground piping shall be 1-inch – 1.5-inch diameter Flexible, Double-Containment Piping and MUST comply with UL 971 (2004).
2. Ducting for flexible double wall pipe shall be 4” nominal diameter HDPE duct utilized as a carrier for double wall pipe to allow ease of replacement of double wall pipe if leakage is detected. Duct shall be a minimum SDR of 11 with a wall thickness of 0.409 inch”. Bends within the duct shall be limited to a bend radius that is greater than or equal to the bend radius of the flexible double containment product piping. Ducting shall be cut to the appropriate length to eliminate excessive bends.
3. Flexible plastic piping systems shall not be utilized as direct fill lines, vent lines, stage II vapor recovery lines or aboveground / above grade.
4. An automatic line leak detector must be installed on each fuel supply line that conveys product under pressure.

2.4 COAXIAL FIBERGLASS PIPE

1. Rigid, Double Wall FRP Piping must comply with latest UL 971 (~~2004~~).
2. Double wall FRP piping shall be manufactured as an integral unit (coaxial pipe). The primary piping shall consist of a filament-wound fiberglass reinforced epoxy plastic resin covered with a porous layer of glass beads secured in place with adhesive backed tape that provides an interstitial space. The containment layer shall be comprised of the same material as the primary piping and shall be wound over the primary and porous layers. Piping system shall be manufactured in compliance with ASTM D2310 and D2996.
3. Fittings for primary pipe shall be solid 1-piece compression molded or firmament-wound fiberglass reinforced epoxy FRP system. Joints shall be tapered and firmly bonded within fittings using UL listed adhesive. Secondary containment pipe fittings shall be molded 2-piece “clam-shell” type, with glued and bolted split flange connections. Fittings shall provide for continuity of secondary containment system, and shall allow passage of liquid to sump should a leak enter the secondary containment system.
4. FRP piping shall be UL listed for underground petroleum service. Piping shall be chemically inert to petroleum product. Resins/plastics shall be selected to ensure 100% compatibility ~~(for 30 years~~) with gasoline, diesel fuel, reformulated gasoline, alcohol blended gasoline (with up to 100% methanol or ethanol), oxygenated fuel (up to 20% MTBE), motor oil (new or used), and kerosene. Piping shall be capable of conveying these liquids without degradation.
5. Primary product piping having a 2-inch nominal pipe size shall have the following ratings at 150°F: 300 psig pressure; full vacuum.
6. Plastic to Steel Pipe Transition Fittings: Factory-fabricated fittings with plastic end matching or compatible with carrier piping, and steel pipe end complying with ASTM A53/A53M, black steel, Schedule 40, Type E or S, Grade B.
7. An automatic line leak detector must be provided for each fuel supply line that conveys product under pressure.
8. FRP piping shall not be utilized as direct fill lines or aboveground.

PART 3 - EXECUTION

#### 3.1 SPECIAL REQUIREMENTS

1. UST installations shall be conducted under the supervision of a Maryland Department of the Environment (MDE)-certified UST Technician. Before starting the work, submit written documentation of such certification to the Engineer. Certified UST Technicians shall be onsite (at each site) full time during the installation of a UST.
2. At the completion of work, submit to the Engineer a copy of a completed UST Notification Form for each site is available from MDE. Contractor shall sign each form, certifying compliance with State of Maryland UST regulations. Contractor shall prompt Administration to register each tank with MDE using the UST Notification Form.
3. At the completion of work, precision test the UST system. Precision testing equipment and procedures shall be of a type approved by the ~~Maryland Department of the Environment (~~MDE~~)~~.

#### 3.2 TANK HANDLING

1. Each underground storage tank shall be inspected when they are first delivered on the site and before they are installed to verify that they are not visibly damaged and that their coatings are intact.
2. New tanks shall be temporally stored on-site in accordance with the manufacturer’s recommendations.
3. During temporary storage the tank shall be set of smooth level ground. Do not store or place tank on sharp objects or debris. Use nonabrasive cushion-type chock (i.e., rubber tires or sand bags) to prevent tank movement during storage. If high wind conditions are anticipated, the tank should be tied down using nonmetallic straps.

#### 3.3 TANK INTERIOR CONDITION

1. Storage tank shall be delivered with the tank interior clean and ready for product. the Manufacturer shall be responsible for ensuring this condition.

#### 3.4 INSTALLATION

1. The tank system, including accessories, shall be installed in strict accordance with the approved shop drawings, manufacturer’s recommendations and applicable codes, standards and regulations. State and local permits shall be obtained by the Contractor prior to installation.
2. All work and materials shall be in accordance with requirements of all applicable state and local codes, regulations and ordinances, the National Electric Code, International Building Code (IBC), Uniform Plumbing Code, Uniform Mechanical Code and International Fire Code, National Fire Codes, and the rules and regulations of all other federal, state, and local authorities having jurisdiction.
3. Equipment used to off-load the tank shall be of adequate capacity to prevent dragging or dropping of the tank system. The tank shall be carefully lifted and lowered into the excavation with cables or chains of adequate length attached to the lifting lugs provided. A spreader bar shall be used where necessary. Do not use slings, chains or cable around the tank to lift it. Do not drop, roll, or drag tank.
4. Underground storage tanks (primary and secondary) shall be tested as per the manufacturer’s written instructions after installation and prior to commissioning. Additionally, the primary and secondary tanks shall also be vacuum tested by tank manufacturer to assure structural integrity. Results of all tank tests shall be provided to the Engineer in writing.
5. ~~At the Engineer’s request,~~ The Contractor shall install each tank on concrete base or deadman anchor in accordance with Manufacturer’s written installation instructions. Tanks shall be mechanically anchored to the concrete anchor pad or deadman anchor with the manufacturer-approved anchor straps.
6. The tank shall be installed plumb and level, firmly anchored in locations indicated. Maintain manufacturer’s recommended clearances. Orient tank to provide accessibility to controls and devices requiring service. If tank will be required to store aviation fuels PEI/RP1300 recommended practices are to be followed,
7. The Contractor is responsible for providing all necessary shoring to facilitate tank installation.
8. In areas with high groundwater, ballasting the tank may be necessary. When water is used as the ballast material, it shall only be potable water and shall not remain in the tank longer than sixty (60) days. Do not place ballast materials (water / product) in the tank until after the backfill is even with tank top. If petroleum products are used to ballast a tank, ensure that the tank is adequately vented.
9. The Contractor shall adhere to the manufacturers recommendations related to maximum burial depth, tank spacing, clearances, backfilling, and cover.

#### 3.5 BEDDING AND BACKFILLING

1. Tank bedding and backfill materials shall be consistent with manufacturer’s recommendations. Keep backfill dry and free of ice in freezing conditions.
2. The tank excavation shall be free from material that may cause damage to the tank. Care shall be taken during installation that foreign matter is not introduced into excavation or backfill.
3. The bottom of the excavation shall be covered with a minimum of 12-inches of bedding, suitably graded and leveled. Bedding shall be carefully prepared so that the tank will be true to line and grade (slope piping as indicated). Compact to maximum possible density (do not use water to increase density).
4. The remainder of the backfill shall be placed, uniformly spread, and compacted to maximum possible density (do not use water to increase density). Backfill material shall completely surround tanks tops, sides and ends as indicated. Hand-shovel and tamp under ends and bottom quadrant of tanks for maximum support.

#### 3.6 PIPING

1. An automatic line leak detector must be installed on each fuel supply line that conveys product under pressure.
2. Rigid double containment piping shall be directly buried underground. A pipe duct shall not be utilized for this piping.

PART 4 – METHOD OF MEASUREMENT

Consultant shall insert appropriate language specific to the project

PART 5 – METHOD OF PAYMENT

Consultant shall insert appropriate language specific to the project.

END SECTION 23 1313