SECTION 23 1323 - ABOVE GROUND STORAGE TANKS

PART 1 – GENERAL

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

1.1 CONFORMANCE WITH REGULATIONS, CODES, STANDARDS, AND SPECIFICATIONS

Aboveground Storage Tanks (AST) containing fuels or chemicals designated hazardous by the U.S. EPA or by the applicable codes and standards, shall have approved secondary containment systems and shall be in strict conformance with the most recent applicable regulations, manufacturer’s recommendations, codes, and standards.

1. U. S. EPA Spill Prevention Control and Countermeasure Plans. Title 40, Code of Federal Regulations, Part 112 (40 CFR Part 112) as approved by MAA, Manger of Environmental Compliance.
2. State of Maryland, Department of Public Safety and Correctional Services, Title; 12, Subtitle 03, Fire Prevention Commission (COMAR 12.03).
3. State of Maryland, Department of the Environment (MDE), Title; 26, Subtitle 10, Oil Pollution and Tank Management (COMAR 26.10).
4. National Fire Prevention Association (NFPA) Standards:
5. NFPA 1: Fire Code
6. NFPA 30: Flammable and Combustible Liquids Code.
7. NFPA 30A: Motor Fuel Dispensing Facilities and Repair Garage.
8. NFPA 31: Standard for Installation of Oil-Burning Equipment.
9. NFPA 58: Liquefied Petroleum Gas Code.
10. NFPA 59: Utility LP-Gas Code.
11. NFPA 59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG).
12. NFPA 70: National Electric Code.
13. NFPA 385: Standard for Tank Vehicles for Flammable and Combustible Liquids.
14. NFPA 395: Standard for the Storage of Flammable and Combustible Liquids at Farms and Isolated Sites.
15. NFPA 704: Standard System for Identification of Hazards of Materials for Emergency Response
16. NFPA 780: Lightning Protection System – Grounding Requirements.
17. Petroleum Equipment Institute (PEI) Recommended Practice (RP) For the Installation of Aboveground Storage Systems for Motor-Vehicle Fueling (PEI/RP 200-03).
18. Underwriters Laboratories Inc. (UL) listing required – UL 142 – Standards for Steel Aboveground Tanks for Flammable and Combustible Liquids.
19. Underwriters Laboratories Inc. (UL) listing required – UL 2085 – Standards for Protected Aboveground Tanks for Flammable and Combustible Liquids.
20. American Petroleum Institute (API) Standard 2000, Venting Atmospheric and Low-Pressure Storage Tanks.
21. Steel Tank Institute (STI), Shop Fabricated Atmospheric Tank Documents.
22. Quality Assurance
23. EPA Compliance: Comply with EPA, State of Maryland, and local authorities having jurisdiction. Include recording of fuel-oil storage tanks and monitoring of tanks.
24. Steel Support Welding Qualifications: Qualify procedure and personnel according to AWS D1.1/D1.1M, “Structural Welding Code – Steel”.

PART 2 – PRODUCTS

#### 2.1 ABOVEGROUND FUEL STORAGE TANK REQUIREMENTS

1. Storage Tanks shall be warranted by the Manufacturer for 30 years against failure due to internal/external corrosion and against structural failure ~~when properly installed,~~.
2. Affix standards organization’s code stamps.
3. Aboveground storage tanks shall be UL-2085 or UL-142 listed and shall be equipped with the following design parameters:
	* 1. “Protected” Aboveground Storage Tank System (UL-2085)
4. The storage tank shall be a UL-2085 thermally insulated double-walled, steel aboveground storage tank designed for the storage of flammable and combustible liquids at atmospheric pressure. The tank shall include steel primary tank, integral steel secondary containment and thermal insulation that provides a minimum two-hour fire rating. The entire tank system shall be factory fabricated as a single unit and delivered to the job site as a complete assembly. Secondary containment shall be a minimum 110% of the primary containment volume. The tank shall be designed for possible relocation at a future date.
5. Inner and outer tank shall be manufactured in accordance with UL-142 Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids. Entire tank shall be labeled for Underwriters Laboratories (UL) 2085 Standard for Insulated Secondary Containment Aboveground Tank for Flammable Liquids. The tank design shall comply with UL 2085 "Protected" Tank standard and shall be tested for Ballistics, Impact, Hose Stream, and Pool Fire UL-2085 performance standards. Each tank shall be delivered as a complete UL-listed assembly.
6. Tank shall be manufactured and labeled per NFPA 704 for type of hazardous material stored and in strict accordance with Steel Tank Institute (STI) Fireguard® Thermally Insulated, Double Wall Steel Aboveground Storage Tank standards as applied by a licensee of the STI. Tanks shall be subject to STI’s Quality Assurance program and backed by the STI 30-year limited warranty.
7. Tank shall be fabricated per UL-142 of mild carbon steel with shell seams of continuous lap weld construction. Tank shall be of double wall construction and provide complete secondary containment of the primary storage tank’s contents by an impervious steel outer wall. A minimum of 3-inches of porous, lightweight monolithic thermal insulation material shall be installed at the factory within the interstitial space between the inner and outer wall. The thermal insulating material shall be in accordance with American Society of Testing Materials (ASTM) Standards C-332 and C-495. The thermal insulating material shall allow liquid to migrate through it to the monitoring point. The Thermal insulating material 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).
	* 1. Aboveground Storage Tank System (UL-142)
8. The storage tank shall be a UL 142 double-walled, steel aboveground storage tank designed for the storage of flammable and combustible liquids at atmospheric pressure. The tank shall include steel primary tank and integral steel secondary containment. The entire tank system shall be factory fabricated as a single unit and delivered to the job site as a complete assembly. Secondary containment shall be a minimum 110% of the primary containment volume. The tank shall be designed for possible relocation at a future date.
9. Inner and Outer Tank shall be manufactured in accordance with UL-142 Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids. Each tank shall be delivered as a complete UL-listed assembly.
10. Tank shall be fabricated per UL-142 of mild carbon steel with shell seams of continuous lap weld construction. Tank shall be of double wall construction and provide complete secondary containment of the primary storage tank’s contents by an impervious steel outer wall.
	* 1. Each tank shall be designed for possible relocation at a future date. Concrete encased tank designs shall not be provided.
		2. Each tank shall be equipped with OSHA approved stairs and platforms with handrails, supplied by the manufacturer. For tanks without remote fill assemblies, stairs shall be located at same end of tank as fill pipe, fill pipe shall be fully accessible to fuel delivery operator.
		3. Lifting lugs shall be provided at balancing points to facilitate handling and installation of the tank.
		4. Exterior protective coatings shall be applied per manufacturer’s recommendations.
		5. The interstitial space between tanks must be able to be monitored for leaks.
		6. Tank Appurtenances – At a minimum each tank shall be equipped with the following. Any deviations from this requirement must be approved by the Engineer in writing. All tank appurtenances must meet the requirements of NFPA 30, NFPA 30A.
11. Normal vent;
12. Emergency vent(s);
13. Spill catchment basin;
14. Site gauge capable of providing the level of liquid within the tank to the nearest inch (minimum);
15. Overfill prevention valve;
16. Striker plates;
17. Vent whistle / high level alarm;
18. Fire valve;
19. Ball valve(s);
20. Antisiphon valve / solenoid valve that will prevent the release of liquid from the tank by siphon flow; and
21. Annular space leak detection gauge that will alert facility personnel to the presence of liquid within the annular space.
22. Minimum 30”diameter flanged manway access at top centerline of tank for tanks over 5,000 gallon capacity.
23. Line leak detector, when applicable
24. Spare tank bung with metallic plug to complete manual tank guaging
	* 1. The tank’s primary and secondary containments must be tested for tightness in the factory and in the field (following installation of all components) before commissioning.
25. Product Certification

The Manufacturer shall provide documentation for tank, with all standards and codes listed herein:

* + 1. UL Standard 142 – Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids.
		2. UL Standard 2085 – Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids.
1. Guarantee

The aboveground storage tank manufacturer shall provide a thirty (30) year warranty for the tank. The Contractor shall warranty the tank installation for a period of one (1) year. The warranty period shall begin on the date of final acceptance (i.e. start-up).

#### 2.2 ABOVEGROUND STORAGE TANK PIPING

1. Aboveground piping shall be minimum Schedule 40 carbon steel or approved piping compatible with product being stored. Galvanized piping shall not be used for diesel and aviation fuels. Underground product piping shall be one of the following: UL approved double-wall fiberglass, or UL approved double-wall corrosion resistant flexible petroleum fuel piping including polyethylene conduit, ~~or equal~~, including the installation of product containment sumps for dispensing units and transition points from aboveground to underground piping.
2. Piping affiliated with aboveground storage tanks ~~where~~ subject to external corrosion shall be fabricated from non-corrosive materials, coated, or provided with corrosion protection. Dissimilar metallic parts that promote galvanic action shall not be joined.
3. Piping systems of aboveground storage tanks shall contain a sufficient number of manual control valves and check valves to operate the system properly and to protect the immediate environment under normal and emergency conditions.
4. Piping identification labels shall be provided and be semi rigid type. Labels shall include flow directional arrows. Color coding, letter size, and marker length shall be in accordance with ANSI A13.1 and OSHA requirements. Labels shall be constructed of UV resistant material
5. Piping systems of aboveground storage tanks in connection with pumps shall contain a sufficient number of control valves and check valves to control the flow of liquids properly in normal operation and in the event of physical damage or fire exposure.
6. Piping systems affiliated with aboveground storage tanks shall be protected and supported in a way that it will be protected from physical damage and excessive stresses arising from settlement, vibration, expansion, contraction, or exposure to fire.
7. The pipe joints of piping systems shall be liquid tight. Also, they shall be welded, flanged. Threaded connections are not preferred. Flanged joints shall fit tightly by using approved methods and materials for the type of joint.
8. Flex connectors shall be used to prevent damage to the piping from hydraulic shock.
9. Aboveground product supply piping shall be equipped with the following components, which shall be installed in the following order moving downstream from the tank (unless otherwise specified by the Engineer in writing):
	* 1. Block valve / ball valve – capable of isolating the tank from the piping.
		2. Fire / emergency valve – capable of automatically closing and isolating the tank and piping in the event of a fire. The fire / emergency valve shall be constructed of steel or nodular iron to prevent failure under fire conditions.
		3. Anti-siphon valve / solenoid valve – capable of preventing gravity-discharge / siphon flow of product from damaged piping. The anti-siphon valve may be electrically operated solenoid valves or mechanical check valves that open or close simultaneously with the operation of the pump motor. Anti-siphon valves are only required on tanks where the liquid level in the tank (at any point) is higher than the supply piping or dispensing unit. Where permitted, mechanical anti-siphon valves shall be installed in lieu of electric solenoid valves.

.2.3 FILL PIPING/LINES

1. Fill piping for aboveground storage tanks shall be provided with a means for making a direct connection to the delivery vehicle’s dispensing hose, so that the delivery of fuel is not exposed to ~~the direct~~ air during filling operations.
2. Aboveground storage tank fill pipes shall be provided with check valves or block valves for automatic protection against backflow where the piping is arranged in such a way that backflow from the system is possible.
3. Locate fill pipe such that the delivery operator can perform tank fueling without climbing or walking on tank.
4. Means shall be provided to prevent overfilling by either sounding an alarm when the liquid level in the tank reaches 90 percent of capacity or by automatically stopping the delivery to the tank when the liquid level in the tank reaches 95 percent of capacity. Overfill prevention equipment must not interfere with the proper operation of either normal or emergency tank vents.
5. Fill pipes that enter the top of the tank shall terminate within six (6) inches of the bottom of the tank.
6. All tanks storing flammable liquids shall have a drop tube installed on the fill line that terminates within six (6) inches of the bottom of the tank.
7. Fill lines shall not drop below the top of the tank, unless they are connected to a remote fill assembly.
8. All tank-top fill connections shall be made within a spill catchment basin.
9. All fill lines on aboveground storage tanks shall be fitted with a quick-connect adaptor that provides a positive locking connection between the delivery hose and fill connection.
10. All fill lines shall have a liquid-tight cap, which shall be properly identified, closed, and/or locked when not in use.
11. Means shall be provided to determine the level of liquid in the tank. This means shall be accessible to the delivery operator.

#### 2.4 REMOTE FILL ASSEMBLIES

1. In the event a remote fill assembly is required, it shall be installed in a convenient grade-level access to the tank delivery point.
2. The remote fill assembly shall consist of a liquid-tight spill container capable of contacting any drips or spill that occur during the fuel delivery process. A manual pump or other means shall be provided to transfer any released product back into the tank. A manual drain must also be located in the bottom of the remote fill assembly to permit manual draining of liquids, if necessary.
3. The delivery hose connection must be positioned so that that is maintained at a lower elevation than the discharge hose on the delivery truck.
4. The delivery hose connection point shall be equipped with a quick-connect adaptor, check valve (to prevent backflow), and a block vale / ball valve. If space is limited, the check valve and block valve may be located outside the spill container, but must be as close to the quick-connect adaptor as possible.

2.5 COLLISION PROTECTION

1. Where a tank, piping, or dispensing unit might be exposed to vehicular impact, protection shall be provided to prevent damage to the equipment.
2. For all permanent aboveground storage tanks, pipe bollards shall be provided around all sides of the tank from which traffic could possibly approach. All bollards installed at BWI Marshall and Martin State Airports shall be concrete filled galvanized schedule 40 pipe not less than six (6) inches in diameter, painted yellow. Bollards shall be covered with a yellow, 1/8” thick HDPE bollard post. Space bollards at intervals not greater than four (4) feet on center. Pipe bollards shall be installed in accordance with NFPA 30A, section 4.3.7.2.
3. Dispensing devices shall be mounted on a concrete island or shall be otherwise protected against collision damage.
4. For aboveground piping installed near roof lines, piping shall be protected from damage caused by falling ice.

PART 3 – EXECUTION

#### 3.1 SPECIAL REQUIREMENTS

At the completion of work, tightness test the AST system (Tanks and lines). Testing equipment and procedures shall be of a type approved by the tank/piping manufacturer.

#### 3.2 TANK HANDLING

1. Each aboveground 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.

#### 3.3 TANK INTERIOR CONDITION

1. Storage tank shall be delivered with the tank interior clean and ready for product. Manufacturer shall be responsible for ensuring this condition.
2. Aboveground Storage Tank Supports
	* 1. Aboveground storage tanks shall be installed so that each tank is elevated four (4) to six (6) inches off the ground to allow for routine visual inspections of the tank's underside. In no circumstance should the tank be in direct contact with the ground.
		2. Tanks with a capacity of 500-gallon or less shall be installed with skids.
		3. ASTs with a capacity greater than 500-gallons shall be installed with saddle supports.

#### 3.4 ABOVEGROUND STORAGE TANK VENTING (NORMAL VENTS)

1. Storage tank shall be adequately vented to prevent the development of pressure or vacuum that can damage the tank or exceed the tank’s design pressure during filling or emptying of the tank. Each compartment of the primary tank shall be equipped with a normal venting device sized and installed in accordance with the requirements of NFPA 30, NFPA 30A, and API Standard 2000.
2. The normal vent shall be at least as large as the largest filling or withdrawal connection but shall not be less than 1.25-inches nominal inside diameter.
3. The normal vent for an AST system storing a flammable liquid shall extend a minimum of twelve (12) feet above the ground. The normal vent for an AST system storing a combustible liquid shall extend a minimum of three (3) feet above the top of the tank.
4. The venting device(s) shall be installed so vapors exhaust upward. Vent outlets shall be installed so that vapors will not be trapped by eaves or other obstructions, all vent outlets shall be a minimum of five (5) feet from building openings and air intakes.
5. Tank vents that are installed within or attached to a canopy shall extend a minimum of five (5) feet above the highest projection of the canopy.
6. Normal vents shall not be installed on any compartment of the tank that does not routinely contain petroleum products (i.e. interstitial spaces, closed portions of closed-top diked tanks).
7. Ball float vent checks shall not be used with an AST system.

#### 3.5 ABOVEGROUND STORAGE TANK VENTING (EMERGENCY VENTS)

1. Every aboveground storage tank shall have emergency relief venting (either through construction or devices(s)) that will relieve excessive pressure caused by exposure to fire. This applies to every compartment of the primary tank, the interstitial space of the secondary tank, and the enclosed space of tanks of closed-top dike construction.
2. The necessary emergency relief venting capacity for a tank system shall be in accordance with NFPA 30, NFPA 30A, and the manufacturer’s recommendations.
3. Emergency venting devices shall be installed in accordance with NFPA 30, NFPA 30A, and the manufacturer’s recommendations.
4. The use of long-bolt manways must be authorized, in writing, by the Engineer.

####  3.6 ABOVEGROUND STORAGE TANK PIPING

1. All underground product piping connected to an aboveground tank shall be installed in a manner that allows for precision testing of the underground lines or will comply with MDE regulations as specified in an Oil Operations Permit.
2. Aboveground product supply piping shall be equipped with the following components, which shall be installed in the following order moving downstream from the tank (unless otherwise specified by the Engineer in writing):
	* 1. Block valve / ball valve – capable of isolating the tank from the piping.
		2. Fire / emergency valve – capable of automatically closing and isolating the tank and piping in the event of a fire. The fire / emergency valve shall be constructed of steel or nodular iron to prevent failure under fire conditions.
		3. Anti-siphon valve / solenoid valve – capable of preventing gravity-discharge / siphon flow of product from damaged piping. The anti-siphon valve may be electrically operated solenoid valves or mechanical check valves that open or close simultaneously with the operation of the pump motor. Anti-siphon valves are only required on tanks where the liquid level in the tank (at any point) is higher than the supply piping or dispensing unit. Where permitted, mechanical anti-siphon valves shall be installed in lieu of electric solenoid valves.

#### 3.7 REMOTE FILL ASSEMBLIES

Remote fill assembly shall be installed in a convenient grade-level access to the tank delivery point.

#### 3.8 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. Work and materials shall be in accordance with requirements of applicable federal, state and local codes, regulations and ordinances, the National Electric Code, IBC, Uniform Plumbing Code, Uniform Mechanical Code and Uniform Fire Code, National Fire Codes, and the rules and regulations of all other authorities having jurisdiction. Work shall be performed either by or under the direct supervision of a Maryland State certified tank technician.
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. Aboveground storage tanks (primary and secondary tanks) shall be tested as per manufacturer’s written instructions prior to installation. Additionally, the primary and secondary tanks shall also be tested by tank manufacturer to assure structural integrity. Results of all tank tests shall be provided to the Engineer in writing.
5. 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.
6. The Contractor shall adhere to NFPA requirements related to tank locations, tank spacing, clearances, and access.
7. The Contractor shall provide a concrete foundation pad for all aboveground storage tanks. Concrete shall be as specified in the contract documents. Provide a concrete foundation under all legs or supports of stairs associated with aboveground storage tanks.
8. Stairs and tanks shall be firmly secured to the concrete pad with suitably sized concrete anchor bolts.
9. Install the necessary grounding wire and grounding electrode to ensure that the tank is properly grounded. The grounding electrode must be installed in accordance with Article 250 of NFPA 70 (NEC).

#### 3.10 FIELD TIGHTNESS TEST

1. Contractor shall test the aboveground storage tank after it has arrived on site but before any piping connections are made, and following installation of the tank, piping, and all tank-top components.
2. Testing shall be conducted in accordance with the Manufacturer’s recommendations and as required by the Engineer.

#### 3.11 GENERAL SAFETY, SIGNS, AND DECALS

1. Tank shall be marked on all sides with decals that identify the product stored and the capacity of the tank.
2. Tank shall be marked on all sides with the following warning signs/decals:
	* 1. “COMBUSTIBLE” (diesel, heating oil, used oil), or “FLAMMABLE” (gasohol)
		2. “NO SMOKING”
3. Tanks shall be marked on all sides with a sign or marking that meets the requirements of NFPA 704 (Standard System for the Identification of the Hazardous Materials for Emergency response), or an equivalent system.
4. Tanks shall be marked with any additional signs, labels, and/or markings as required by applicable codes/regulations.

#### 3.12 ELECTRICAL REQUIREMENTS

1. Electrical work shall be in accordance with applicable codes and shall be rated for hazardous area as required. Electric service for dispensing pumps shall include an emergency shutoff switch located per code requirements. Tanks shall be electrically grounded in accordance with NFPA 780 (Lightning Protection System) and NFPA 70 (National Electrical Code).

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 1323