**SECTION 33 56 13**

**ABOVE GROUND FUEL STORAGE TANKS**

**BASED ON DFD MASTER SPECIFICATION DATED 10/01/2012**

***Note to the designer: This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.***

**P A R T I - G E N E R A L**

**SCOPE**

The work under this section shall consist of providing all materials, labor, equipment, and supervision necessary to install ***(quantity, sizes)*** gallon double-walled aboveground petroleum storage tank***(s)*** with appropriate openings and appurtenances to meet the needs of the system required in these specifications and on the drawings. The finished product of the work shall comply with all applicable administrative regulatory codes. ***(Note to the designer: Include brief description of the work and locations, if necessary).*** Included are the following topics:

 PART 1 - GENERAL

Scope
Related Work
Reference

Reference Standards
Quality Assurance
Protection of Existing Work and Facilities

Provisions for Future Work
Construction Limits

Notification/Permits
Shop Drawings

Operation and Maintenance Data

Record Drawings

 PART 2 - MATERIALS

General
State-Furnished Materials

Aboveground Tanks

Foundation Slab

Dispensers and Pumps
Piping and Fittings
Leak Monitoring System

Automatic Tank Gauging System

Power Cutoff Switch

Overfill Protection

Emergency Equipment

Collision Protection

 PART 3 - EXECUTION

General
Barricades and Warning Devices

Site Demolition

Installation

Testing and Guarantee
Site Restoration

Construction Verification Items

Functional Performance Testing

Agency Training

**RELATED WORK**

Section 01 91 01 or 01 91 02 – Commissioning Process

Division 3 - Concrete

Division 26 – Electrical

Division 31 – Earthwork

Section 33 08 00 – Commissioning of Utilities

**REFERENCE**

Applicable provisions of Division 1 shall govern work of this section.

**REFERENCE STANDARDS**

Work shall conform to procedures and practices in the following regulatory guidelines and industry standards:

WI Admin. Code COM 10, “Flammable and Combustible Liquids”.

National Fire Protection Association, NFPA 30, “Flammable and Combustible Liquids Code”.

National Fire Protection Association, NFPA 30A, “Automotive and Marine Service Station Code”.

National Fire Protection Association, NFPA 31, “Standard for the Installation of Oil-Burning Equipment”.

Underwriters Laboratories, Inc., UL Standard 142, “Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids”.

Underwriters Laboratories, Inc., UL Standard 2085, “Standard for Insulated Secondary Containment Aboveground Tanks for Flammable and Combustible Liquids”.

**QUALITY ASSURANCE**

Comply with applicable rules, regulations, codes, and ordinances of local, State, and Federal authorities and regulations of public utility companies having jurisdiction over the work.

Only qualified persons certified by the Department of Commerce shall perform tank testing and installation.

Obtain and pay for necessary permits, licenses and certificates required.

Obtain and pay for necessary permits and certificates required and give proper notices for and during performance of site demolition and tank installation work.

Comply with local Fire Department requirements.

**PROTECTION OF EXISTING WORK AND FACILITIES**

Verify the locations of, and protect, any signs, paved surfaces, buildings, structures, sidewalks, landscaping, streetlights, hydrants, data transmission, utilities, and all other such facilities and improvements that may be encountered or interfered with during the progress of the work, both inside and outside the construction limits.

Take all measures necessary to safeguard all existing work and facilities which are outside the limits of the work or items which are within the construction limits but are intended to remain.

Provide and maintain adequate catch platforms, warning lights, barricades, guards, weather protection, dust protection, fences, planking, bracing, shoring, piling, signs, and other items required for proper protection of work.

Provide protection for workmen, public, adjacent construction, and occupants of existing building(s).

Burning of debris on property not permitted.

Provide adequate fire protection.

Explosives shall not be used.

Provide protection for adjacent private property.

Proper erosion control practices shall be employed to minimize surface runoff to adjacent properties, nearby streams, or other surface waters. Erosion control shall comply with the Wisconsin Construction Site Management Practices Handbook ***(Also see Specifications Section \_\_\_\_ - Erosion Control, that may be used to reinforce this requirement if needed.)***

Be responsible for any public sidewalk, curb, gutter or street paving damaged by any operation under this contract, and be responsible for the repair of all damage in compliance with local municipality rules and regulations at no additional expense to the State.

Make repairs or provide new replacement of all damage which is not part of the work on project site or to adjacent property to Architect/Engineer or user agency's satisfaction.

**PROVISIONS FOR FUTURE WORK**

***(Note to the designer: in this subsection explain what future extensions, options, or additions to the currently proposed work needed to be observed by the Contractor in this work.)***

The Contractor shall coordinate hiswork and site access requirements to the site with the DFD Project Representative and user agency prior to start of work to avoid conflicts with other site activities or future work.

Coordinate work and access to the site with the work and access requirements of all other Contractors prior to the start of work -- especially when such work will connect to, or be connected to, other work.

**CONSTRUCTION LIMITS**

The work of this Section shall be confined to the Construction Limits as indicated on the drawings. In the absence of such a designation on the drawings, the work shall be confined to the minimum area reasonably necessary to undertake the work as determined by the Engineer. All areas disturbed by the site demolition, excavation, and tank removal work, plus such additional areas as are disturbed by construction related activities including construction access and storage shall be considered the "Construction Area."

**NOTIFICATION/ PERMITS**

Notify in writing the local fire department chief, the local WI Department of Commerce authorized agent and the Project Engineer of installation schedule at least 15 days prior to beginning tank installation work. Obtain permits, coordinate with local fire officials, and comply with local ordinances governing aboveground tank installations.

**SHOP DRAWINGS**

Submit manufacturer's pre-production (shop) drawings showing details of construction and materials for aboveground tank systems to the Engineer for approval prior to the start of installation.

# OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

***Delete the following if there are no additional requirements.***

In addition to the general content specified under GENERAL REQUIREMENTS, supply the following additional documentation:

1. ***[A/E and commissioning provider to define detailed operation and maintenance data requirements for equipment specifications added to this section.]***

**RECORD DRAWINGS**

Refer to Section GR - General Requirements.

Maintain record drawings of all aboveground tank installations, piping and dispenser connections, electrical power and instrumentation routing, and other points of connection made as part of this project and for future connections on original drawings prepared by the installing Contractor/subcontractor. Include copies of record drawings with the Operating and Maintenance instructions.

**P A R T II - M A T E R I A L S**

***(Note to the designer: bold text usually indicates an opportunity for the designer to choose between two or more specifications.)***

**GENERAL**

Conform all materials to the size and type shown on the plans or as called for in the specifications and to applicable Laws, Codes, and Ordinances.

All products and materials are to be new, undamaged, clean, and in good condition. Existing products and materials are not to be reused unless specifically indicated.

Be responsible for the safe storage and handling of all materials utilized in the work -- including any materials furnished by the owner. Store all materials in areas designated by the Construction Representative in cooperation with the user agency. Store and/or handle materials so as to not adversely affect traffic, drainage, fire protection, or public safety. Inconveniences to the general public from the storage and handling of materials shall be kept to a minimum.

Perform all work in accordance with any applicable manufacturer's instructions.

**STATE-FURNISHED MATERIALS**

***(This article is intended to alert the Contractor that the State will be furnishing some equipment or materials that will have to be received, stored, installed and/or which will need final connection for the completed project. In some cases, it may be appropriate to refer to other sections for a more complete description of the equipment being furnished or the work involved in installation.)***

**ABOVEGROUND TANKS**

***(Note to the designer: Due to the ever-increasing number of aboveground storage tank products introduced to the market annually, the following listing of tank options is far from exhaustive. The designer is encouraged to insert a suitable recommended alternate product, as long as the needs of the user facility are met, all applicable product standards enumerated below are satisfied, and the product meets all requirements of the regulatory codes in effect at the time of construction.)***

The aboveground tank system shall include:

* -gallon spill containment basin
* 2-inch standard vent with weatherproof vent cap
* 6-inch emergency vent with weatherproof vent cover
* 18-inch minimum top manway
* Interstitial leak monitoring system
* Top-entry float gauge in addition to any other appurtenances required for the system
* All appurtenances shall meet requirements set forth in COM 10.415.
* Connected ladder, stairway, or rungs to gain access to top of tank.

The dimensions of the tank shall not exceed ***(specify maximum)*** inches diameter or ***(specify maximum)*** feet in length, without prior approval of the Engineer.

Steel Double Wall Tanks:

The ***(type of fuel)*** tank shall be made of steel in accordance with NFPA 30 Chapter 2 and COM 10.415 for use with ***(type of fuel)*** product.

The tank***(s)*** shall be built in accordance with recognized standards of design. The tank***(s)*** shall be built and installed within the scope of the Standards for Steel Aboveground Tanks for Flammable and Combustible Liquids, and UL 142 or UL 2085. The tank***(s)*** shall bear either the UL 142 label or the UL 2085 label specifying aboveground flammable liquid use.

The UL listed steel storage tank***(s)*** shall be no less than 1/4-inch thick, enclosed completely within a secondary containment tank of steel no less than 3/16-inch thick on supporting steel saddles.

Spill/overfill containment: The tank system shall include a minimum 7-gallon spill/overfill container surrounding the fill pipe. The fill pipe shall be recessed into the container so that it is the lowest opening on the tank. The spill/overfill container shall include a normally closed valve to release spilled product into the main tank. The fill pipe shall be equipped with a lockable cover.

The tank***(s)*** shall be primed and painted white for outside use. The tank***(s)*** shall be labeled in accordance with COM 10.35.

Concrete Vaulted Tanks:

Primary tank shall be constructed of a minimum 10 gauge carbon steel approved per UL Standard 142 and shall meet NFPA 30 requirements. The size of the tank shall be ***(specify volumetric containment)*** gallons. Tanks shall have a 30-year manufacturer’s warranty.

Concrete encasement shall be 6 inches thick with a minimum design strength of 3,000 pounds per square inch (psi). The concrete design shall include the following for long-term durability: air entrainment, water-reducing admixture, fibermesh reinforcement, and steel mesh reinforcement. Concrete placement shall be monolithic, and placement methods shall ensure the absence of voids beneath the steel tank. The steel tank shall be prestressed by air pressure at 5 psi during concrete encasement to provide long-term crack resistance.

Fire resistance: The tank system shall be designed and tested to provide 2-hour fire protection for the primary tank. No steel members shall penetrate the walls or floor of the concrete encasement to assure isolation from pool fire heat. The fire resistance of the tank shall be tested in accordance with the procedure established in U.L. 2085 at a certified fire testing facility.

Corrosion protection: The tank construction shall include insulation equivalent to 0.25 inches of polystyrene to protect against corrosion by isolating the steel tank from the concrete.

Secondary containment with leak monitoring: The tank system shall include an impervious barrier of polyethylene to contain leaks from the primary tank. A leak detection access tube shall be located between the inner tank and secondary barrier. In the event of leak, a positive space shall be available to permit leaked fluid to flow to the detection tube.

Spill/overfill containment: The tank system shall include a minimum 7-gallon spill/overfill container surrounding the fill pipe. The fill pipe shall be recessed into the container so that it is the lowest opening on the tank. The spill/overfill container shall include a normally closed valve to release spilled product into the main tank. The fill pipe shall be equipped with a lockable cover.

The exterior of the concrete tank vaults shall be coated with a white epoxy exterior coating on the top and sides to resist weather and reflect sunlight. The tanks shall be labeled in accordance with COM 10.35.

**FOUNDATION SLAB**

The tanks shall be installed on a concrete slab cast in place by the contractor, and appropriately sized for the dimensions of the tank, as shown in the drawings. The foundation slab shall be cast on a prepared subsurface in the location shown on the drawings. The slab shall be cast in a manner to ensure the tanks are level when placed in their final position. The slab shall be \_\_\_ inches thick with #4 reinforcing bars spaced 12 inches each way. See also Section 03 - Concrete.

**DISPENSERS AND PUMPS**

Each product dispenser unit shall include U.L.-listed 15 gpm minimum pump with flow meter, reset register, totalizer, 12’ x 3/4” hose, and shear valve. Each pump shall be equipped with a filter, auto shut-off nozzle, safety sever valve, and anti-siphon valve.

If dispenser pumps are not integrated to the aboveground tank unit, the Contractor shall provide a liquid tight dispenser containment pan, to be installed under the product dispenser to prevent any leaks or spills from escaping into the environment. Dispenser containment pans shall be installed in accordance with the manufacturer’ current installation instructions.

Each product dispenser shall be equipped with a remotely located emergency power shutoff control switch which conforms to the requirements for fuel dispensing systems as specified by NFPA 30A, Sections 4-1.2 and 8-5.3.

**PIPING AND FITTINGS**

Piping, valves, and fittings shall comply with Chapter 3 of NFPA 30.

All aboveground piping shall be of steel and coated to inhibit corrosion.

All underground piping shall be UL-rated fiberglass reinforced epoxy piping for petroleum products in sizes as shown on the design drawings and manufactured by Ciba-Geigy or A.O. Smith-Inland, or equivalent as approved by the Engineer. All underground iron or steel fittings shall be coated with Black Asphaltum coating. All pipe shall be sloped toward the tank to prevent air pockets.

**LEAK MONITORING SYSTEM**

The supplied unit shall detect the presence of hydrocarbons in the interstitial space of the aboveground storage tank and any appurtenant double wall piping.

A system monitoring unit shall be installed to provide a leak detection access tube located in the interstitial space between the inner tank and the secondary barrier. In the event of a leak from the primary tank, the leaked fuel will flow to the detection tube and be detected by an electronic liquid petro-sensor installed within the tube. The petro-sensor probe shall be connected to the tank monitoring panel to provide a warning signal in the event the sensor probe detects leaked product within the secondary containment interstitial space. The unit shall be capable of performing a test of overall system operation and integrity.

**AUTOMATIC TANK GAUGING SYSTEM**

The monitoring system shall include an automatic tank gauge for measuring and recording product inventory for each tank from the panel location in ***[specify location]***. The monitoring panel shall have a printer, and be programmed to provide a daily inventory of tank product volume. The gauging system shall include liquid level sensing equipment that measures product level to a resolution of 0.001 inches. The monitoring panel shall also be configured to monitor the petro-sensor probe within the interstitial space of the secondary containment for each tank. The system must also be capable of measuring water level on the bottom of the tank to the nearest 1/8 inch. The monitoring system shall be as manufactured by Gilbarco, EMCO Wheaton, or approved equal (as approved by the Engineer).

**POWER CUTOFF SWITCH**

A standard power on/off control switch for each dispenser pump shall be located in close proximity to the monitoring panel, as indicated in the drawings. Switches shall supply or cut off power to each dispensing pump to facilitate fueling activities. Power feeds between the dispensing pumps and the on/off control switches shall be on dedicated lines and will be independent of the power feeds to the dispensing system and monitoring panel for the purposes of leak detection and automatic tank gauging.

**OVERFILL PROTECTION**

Overfill protection shall be provided by the following methods:

 (a.) A direct reading level gauge on the tank, visible from the fill pipe access; and

(b.) A 95% valve installed in the fill line which reacts to high levels of product in the tank by

closing off the fill line to prevent further product introduction.

**EMERGENCY EQUIPMENT**

Provide a fire extinguisher with a 20BC rating for each tank. Extinguishers shall be installed in the locations indicated on the drawings. Extinguishers shall be installed in a manner that will protect them from adverse weather conditions and will maintain the extinguishers in good working condition.

**COLLISION PROTECTION**

The tanks shall be surrounded by collision protection devices on the sides which are exposed to vehicular traffic. Collision protection shall be provided through the use of precast concrete barriers. Construction and placement of the precast concrete barriers must meet all specifications as detailed herein and as shown on the drawings. Final configuration of collision protection shall be subject to plan review by the local tank inspector and or Wisconsin Department of Commerce.

Precast concrete barriers shall:

 (a.) extend a minimum of 36 inches above finished grade;

 (b.) be set into the concrete slab a minimum of 36 inches; and

 (c.) shall be spaced at intervals as shown on the drawings.

**P A R T III - E X E C U T I O N**

**GENERAL**

The tank system including appurtenances shall be installed in strict accordance with the manufacturer’s recommendations and applicable fire and environmental codes. State and local permits shall be obtained prior to installation.

Tanks and systems shall be installed by certified installers in accordance with COM 10.91.

**BARRICADES AND WARNING DEVICES**

Refer to Section \_\_\_\_\_\_ - Temporary Construction Site Barriers.

**SITE DEMOLITION**

Refer to Section \_\_\_\_\_\_ - Underground Storage Tank Removal

**INSTALLATION**

The tank system including appurtenances shall be installed in strict accordance with the manufacturer’s recommendations and applicable fire and environmental codes. State and local permits shall be obtained prior to installation.

Tanks and systems shall be installed by certified installers in accordance with COM 10.91.

TANKS:

Tanks shall be installed in accordance with the requirements for aggregate storage capacity at the site, setbacks, vehicle collision protection, labeling, and all other installation requirements not indicated in the contract documents but specified in COM 10.415.

Tanks shall be installed on a reinforced concrete base slab designed to support the fully loaded tank. Protective concrete barriers shall be installed on sides exposed to vehicular traffic. Location of protective concrete barriers shall be in accordance with State and local codes. Paint protective concrete barriers to match tank color.

Tanks shall be marked on all sides with warning signs: ***(“FLAMMABLE” or “COMBUSTIBLE”, as appropriate for the intended contents)***, product identification, and other signs as required by the applicable codes.

FUEL DISPENSERS AND PUMPS:

If not integral to the aboveground storage tank units, the product dispensers shall be installed on the concrete pad at the locations indicated on the drawings.

The dispensers shall be installed and wired, and attached to the piping by a qualified installer and in accordance with Division 26 - Electrical.

PIPING AND FITTINGS:

All underground piping shall be buried a minimum of 30 inches beneath finished grade as shown on the design drawings.

Underground piping shall be installed on a firm smooth bedding layer at the bottom of the trench, free from sudden changes in elevation. Large stones and rocks shall be removed and shall not come in contact with the pipe. Backfill shall be free of sharp stones and large chunks of materials which could stress the pipe during backfill operations.

Upon completion of their installation, the pipelines shall be pressure tested to four times the anticipated operating pressure and maintained within accepted limits for one hour.

ELECTRICAL:

Electrical work shall be in accordance with applicable codes and shall be rated for hazardous area as required. Electrical system for dispenser pumps shall include an emergency shutoff switch located per code requirements. Tanks shall be electrically grounded in accordance with NFPA 78 and as shown on the drawings. Refer to Division 26 - Electrical.

The tank system installations shall be inspected and approved by the system supplier or its certified contractor. The system supplier shall submit a comprehensive checklist of quality and safety items critical to the system and verify that the installation has been performed in accordance with these standards applicable fire and environmental codes.

State and local permit applications shall be completed using the correct forms. **System installation shall not start before obtaining the required State and local permits and approvals.**

**TESTING AND GUARANTEE**

Test all newly installed equipment for compliance with requirements of local, state, and federal regulations and to determine that the system is operating properly.

Upon completion of the installation work, submit to the Construction Representative a submittal packet which includes an as-built drawing and copies of all state and local government required paperwork and plan reviews, as well as manufacturers descriptions and specifications for all components of the system that were installed as part of the contract. In addition, provide a copy of the start-up test for the automatic tank gauge and monitoring panel.

Furnish copies of an updated Aboveground Petroleum Product Tank Registration Form (SBD-8731) and the Checklist for Aboveground Tank Installation (SBD-9658) to the Wisconsin Department of Commerce - Safety and Buildings Division, Bureau of Petroleum Inspection and Fire Protection, P.O. Box 7969, Madison, Wisconsin 53707, and to the Construction Representative.

Furnish the local fire department with a copy of a location drawing which includes a description of the updated aboveground storage tank and fuel dispensing system.

**SITE RESTORATION**

Unless otherwise specified or noted on the drawings, fully and completely restore the surface of all disturbed areas to a like condition of the surface prior to the work. Sawcut all pavements to straight and neat lines and repair with like materials to the full depth of the pavement as existed prior to the work. Topsoil, fertilize, seed, and mulch (or sod) all disturbed landscaped areas with a minimum of four (4) inches of topsoil, fertilizer, seed, and mulch (or sod), or provide for the restoration of other landscaping materials as necessary.

Level off all waste disposal areas and clean up all areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment.

Burning is not permitted.

**CONSTRUCTION VERIFICATION**

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 33 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

# AGENCY TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 01 91 01 or 01 91 02.

Contractor to provide factory authorized representative and/or field personnel knowledgeable with the operations, maintenance and troubleshooting of the system and/or components defined within this section for a minimum period of one hour. Training session must also include instructions on leak detection and record keeping as required by the Wisconsin Department of Commerce. Guidance must also be given as to how to respond in the event the monitoring panel indicates a leak in the system.

END OF SECTION