

## SECTION 15176

POL WASTE STORAGE IN ABOVEGROUND TANKS  
02/98

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN PETROLEUM INSTITUTE (API)

API Spec 5L (1995) Line Pipe

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53 (1996) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

ASTM A 105 (1997) Forgings, Carbon Steel, for Piping Components

ASTM A 167 (1996) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

ASTM A 181 (1995b) Forgings, Carbon Steel, for General-Purpose Piping

ASTM A 182 (1996) Forged or Rolled Alloy-Steel Pipe Flanges, Forged fittings, and Valves and Parts for High-Temperature Service

ASTM A 234 (1996b) Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures

ASTM A 307 (1994) Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength

ASTM A 733 (1993) Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples

ASTM B 117 (1995) Salt Spray (Fog) Testing

ASTM B 345 (1995) Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube for Gas and Oil Transmission and Distribution Piping Systems

ASTM B 687 (1995) Brass, Copper, and Chromium-Plated Pipe Nipples

ASTM D 229 (1991) Rigid Sheet and Plate Materials Used for Electrical Insulation

ASTM D 714 (1987; R 1994) Method for Evaluating Degree of Blistering of Paints

ASTM D 1654 (1992) Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B16.3 (1992) Malleable Iron Threaded Fittings, Classes 150 and 300

ASME B16.5 (1996) Pipe Flanges and Flange Fittings

ASME B16.9 (1993) Factory-Made Wrought Steel Buttwelding Fittings

ASME B16.11 (1993) Forged Steel Fittings, Socket-Welding and Threaded

ASME B16.21 (1992) Nonmetallic Flat Gaskets for Pipe Flanges

ASME BPV IX (1995; Addenda Dec 1995) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

## AMERICAN WELDING SOCIETY (AWS)

AWS A5.1 (1991) Covered Carbon Steel Arc Welding Electrodes

AWS A5.4 (1992) Covered Corrosion-Resisting Chromium and Chromium-Nickel Steel Welding Electrodes

## FEDERAL SPECIFICATIONS (FS)

FS SS-S-200 (Rev E; Am 2) Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold-Applied, for Portland Cement Concrete Pavement

## MILITARY SPECIFICATIONS (MS)

MS MIL-P-29206 (Rev A; Am 2) Pipe and Pipe Fittings, Glass Fiber Reinforced Plastic, for Petroleum Lines

## MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-70 (1990) Cast Iron Gate Valves, Flange and Threaded Ends

MSS SP-71	(1990) Cast Iron Swing Check Valves, Flange and Threaded Ends
MSS SP-80	(1997) Bronze Gate and Check Valves
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)	
NEMA 250	(1991) Enclosures for Electrical Equipment (1000 Volts Maximum)
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 30	(1993) Flammable and Combustible Liquids
NFPA 30A	(1993) Automotive and Marine Service Station
NFPA 70	(1996) National Electrical Code
SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)	
SAE AMS 3275A	(1994) Acrylonitrile Butadiene Rubber Non-Asbestos Fiber, Fuel and Oil Resistant
UNDERWRITERS LABORATORIES (UL)	
UL 87	(1995) Power-Operated Dispensing Devices for Petroleum Products
UL 142	(1993; Rev Apr 1995) Steel Aboveground Tanks for Flammable and Combustible Liquids
UL 330	(1978; Rev thru Feb 1984) Gasoline Hose
UL 567	(1992) Pipe Connectors for Flammable and Combustible Liquids and LP-Gas
UL 842	(1993; Rev Aug 95) Valves for Flammable Fluids
UL 2085	(1994) Insulated Aboveground Tanks For Flammable and Combustible Liquids

#### #.1 SYSTEM DESCRIPTION

This specification section defines the provisions necessary for a complete and totally functional waste storage system for various waste products from vehicles. The specification addresses aboveground storage tanks up to 12,000 gallons maximum per tank (see drawings for actual sizes), storage tank components, accessories, and necessary piping components.

#### 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-01 Data

## Manufacturer's Catalog Data; FIO

Manufacturer's standard catalog data giving the brand names and catalog numbers for the aboveground tanks, storage tank components, monitoring/leak detection systems, and piping components in sufficient detail to demonstrate complete specification compliance.

## Permitting; FIO

Six copies of required federal, state, and local permits. Contractor shall obtain and pay for all permits required for installation. Contractor shall obtain permit forms to operate waste storage system (completed and paid by user/operator)

## Registration; FIO

Required tank registration forms, 30 days after receipt of notice to proceed, in order for the Contracting Officer (CO) to submit the forms to the regulatory agencies.

## Spare Parts Data; FIO

Spare parts data for each different item of equipment specified, after approval of detail drawings and not later than 2 months prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply, a recommended spare parts list for one year of operation, and a list of the parts recommended by the manufacturer to be replaced after 1 and 3 year(s) of service. The data shall include a completed checklist for all equipment upon completion of the installation. Each element in the checklist shall be dated and signed.

## SD-04 Drawings

## Waste System; FIO

Detail drawings including a complete list of equipment and materials. Detail drawings shall contain:

- a. Complete piping and wiring drawings and schematic diagrams of the overall system.
- b. Equipment layout and anchorage.
- c. Clearances required for maintenance and operation.
- d. Any other details required to demonstrate that the system has been coordinated and will properly function as a unit.

## Monitoring/Leak Detection System; FIO

Detail drawings of the entire monitoring/leak detection system including a complete list of equipment and materials. Drawings shall contain:

- a. An overview drawing detailing the monitoring/leak detection system's operation.

- b. Wiring schematics for each part of the waste system. The schematics shall indicate each operating devices along with their normal ranges of operating valves (including pressures, temperatures, voltages, currents, speeds, etc.).
- c. Single line diagrams of the system.
- d. Alarm layout along with mounting and support details.
- e. Diagram showing the sequence of operation for the interface of the overflow prevention devices on the storage tanks and the explosion proof solenoid valves for the diaphragm air pumps located in the maintenance pit and the corrective actions to restore the waste system back to operation.

#### SD-06 Instructions

Installation; FIO

The manufacturer's installation instructions and procedures for the aboveground storage tanks, storage tank components, accessories, and piping components.

Framed Instructions; FIO

Framed instructions for posting, at least 2 weeks prior to construction completion.

Monitoring/Leak Detection System; FIO

Monitoring/leak detection system diagrams for posting, at least 2 weeks prior to construction completion, which include markings such that alarm indications can be correlated to leak location. Explanation of alarm conditions and the corrective action to be taken. The diagrams shall include a piping and wiring display map with schematic diagrams from the leak detection system manufacturer. The diagrams shall be framed under glass or laminated plastic and be posted where indicated by the CO.

#### SD-07 Schedules

Tests; FIO

A letter, at least 10 working days in advance of each test, advising the CO of the test. Individual letters shall be submitted for each aboveground storage tank tests, the piping tests, the system performance tests, the overflow alarm test, and the alarm leak detection test.

Inspections; FIO

A letter, at least 10 working days in advance of each inspection required by any regulatory agency and inspections as required within this specification, advising the CO of the inspection. Individual letters shall be submitted for each inspection required.

Demonstrations; FIO

A letter, at least 14 working days prior to the proposed training date, scheduling a proposed date for conducting the on-site training.

## SD-08 Statements

## Welding; FIO

A letter listing the qualifying procedure for each welder. The letter shall include all supporting data such as test procedures used, what was tested to, etc. and a list of names of all qualified welders and their identification symbols.

## Verification of Dimensions; FIO

A letter stating the date the site was visited and a listing of all discrepancies found.

## SD-09 Reports

## Tests; FIO

Six copies of each test containing the information described below in bound 8-1/2 by 11-inch booklets. Individual reports shall be submitted for each aboveground storage tank tests, the piping tests, the system performance tests, the external overflow alarm test, high water alarm at the console, and the external system alarm leak test. Drawings shall be folded blue lines or Autocad plots, with the title block visible.

- a. The date the tests were performed.
- b. A list of all equipment used along with calibration certifications.
- c. A list of all measurements taken.
- d. The parameters to be verified.
- e. The condition specified for the parameter.
- f. The inspection results, signed, dated, and certified by the installer. The certification shall state that all required procedures were accomplished, that the procedures were conducted in compliance with the plans and specifications.
- g. A description of each system adjustment performed.

## SD-13 Certificates

## Experience; FIO

Evidence of the installation contractor's experience, training and licensing. Aboveground Storage Tank; FIO: Certification from the storage tank manufacturer that the integrity of both the inner and outer tank walls of the storage tanks are leak free prior to shipment. The certification shall be based on a factory performed tank tightness test.

## Fiberglass Installation; FIO

A letter listing installers who have been trained by the fiberglass pipe manufacturer. The letter shall be provided by the pipe manufacturer prior to the installation of any fiberglass pipe.

## SD-19 Operation and Maintenance Manuals

#### Operation Manuals;FIO

Six complete copies, at least 2 weeks prior to the demonstrations, of operation manuals in bound 8-1/2 by 11-inch booklets listing step-by-step procedures required for system startup, operation, corrective actions to be taken under alarm conditions, and shutdown. The manuals shall include the manufacturer's name, model number, service manual, a brief description of each piece of equipment, and the basic operating features of each piece of equipment. The manuals shall include any procedures necessary for annual tightness testing of the storage tank and secondary containment piping.

#### Maintenance Manuals;FIO

Six complete copies, at least 2 weeks prior to the demonstrations, of maintenance manuals in bound 8-1/2 by 11-inch booklets listing routine maintenance procedures, possible breakdowns and repairs, and a trouble shooting guide. The manuals shall include piping, equipment layouts, and simplified wiring and control diagrams of the system as installed.

### 1.4 QUALIFICATIONS

#### 1.4.1 Experience

The installation Contractor shall have successfully completed manufacturer's training courses on the installation of storage tanks, piping, leak detection, and tank management systems; have experience in the installation of waste storage systems; and meet the licensing requirements for the State of California.

#### 1.4.2 Welding

Welding shall be in accordance with qualifying procedures using performance qualified welders and welding operators. Welding tests shall be performed at the work site. Procedures and welders shall be qualified in accordance with ASME 17. Each welder or welding operator shall apply his assigned symbol near each weld he makes as a permanent record.

### #.1 REGULATORY REQUIREMENTS

The design, fabrication, and installation of the entire waste storage system shall be in accordance with this specification as well as meet all federal, state, and local code requirements.

#### #.1 Permitting

Contractor shall obtain necessary permits in conjunction with the installation of each aboveground storage tank as required by federal, state, or local authority. Contractor shall obtain and pay for all permits required for installation. Contractor shall obtain permit forms to operate waste storage system (completed and paid by user/owner).

#### #.1 Registration

Contractor shall obtain and complete any aboveground storage tank registration forms required for the installation and operation of the waste storage system from federal, state, and local authorities.

## #.1 SAFETY REQUIREMENTS

Exposed moving parts, parts that produce high operating temperatures, pressures, parts which may be electrically energized, and parts that may be a hazard to operating personnel shall be insulated, fully enclosed, guarded, or fitted with other types of safety devices. Safety devices shall be installed so that proper operation of equipment is not impaired.

## #.1 DELIVERY, STORAGE, AND HANDLING

Stored items shall be protected from the weather and contamination. Proper protection and care of material before, during, and after installation is the Contractor's responsibility. Any materials found to be damaged shall be replaced at the Contractor's expense. During installation, piping and similar openings shall be capped to keep out dirt and other foreign matter.

## #.1 PROJECT/SITE CONDITIONS

### #.1 Verification of Dimensions

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and advise the CO of any discrepancy before performing any work.

### #.1 Testing and Flushing

Products required for the testing and flushing of materials, equipment, temporary piping, meters, pumps, instruments, vehicles, personnel, supplies, etc. as specified in this section shall be provided and disposed of by the Contractor.

## PART 2 PRODUCTS

### 2.1 STANDARD PRODUCTS

System components shall be environmentally suitable for the locations shown and be the manufacturer's standard as offered in catalogs for commercial or industrial use. Any non-standard product or component and the reason for its use shall be specifically identified by the Contractor in any required submittal. The completed installation shall conform to the applicable requirements of NFPA 30 and NFPA 30A.

### 2.2 NAMEPLATES

Each major component shall have a nameplate to list the manufacturer's name, address, component type or style, model or serial number, and catalog number on a plate secured to the equipment. Plates shall be durable and legible throughout equipment life and made of anodized aluminum or stainless steel. Plates shall be fixed in prominent locations with nonferrous screws or bolts.

### 2.3 ELECTRICAL WORK

Electrical equipment and wiring shall be in accordance with SPECIFICATION SECTION 16345 WORK, INTERIOR. Switches and devices necessary for controlling any electrical equipment shall be provided. Any pumps that are required shall be completely wired and ready for connection to the power circuit.

## #.1 MATERIALS

## #.1 Waste

Each aboveground storage tank, storage tank accessories, and piping components shall be resistant to water and the waste product being stored

## #.1 Gaskets

Gaskets shall be factory cut from one piece of material.

## #.1 Nitrile Butadiene (Buna-N)

Buna-N material shall be in accordance with SAE AMS 3275.

## #.1 Acrylonitrile Butadiene Rubber (NBR)

NBR material shall be made of material conforming to MS MIL-G-1086 and SAE AMS 3275.

## #.1 Electrically Isolating Gaskets for Flanges

Flanges shall be provided with an electrical insulating material of 1000-ohms minimum resistance conforming to ASTM D 229. The material shall be resistant to the effects of the type of waste products to be handled. Gaskets shall be full face. Flanges shall have a 0.03-inch thick, mylar insulating sleeve between the bolts and the holes. Bolts may have reduced shanks of diameter not less than the diameter at the root of the threads. Flanges shall be provided with 0.125-inch thick high-strength phenolic insulating washers.

## #.1 Electrically Isolating Unions

Unions shall be provided with an electrical insulating material of 1000-ohms minimum resistance conforming to ASTM D 229. The material shall be resistant to the effects of the type of waste products to be handled.

## #.1 Waste Resistant Caulking

Caulking shall be compatible with water and waste products to be handled in the waste storage system.

## #.1 Concrete Sealant

Concrete sealant shall be a cold applied waste resistant in conformance to FS S-S-200, Type M or H.

## #.1 Concrete Anchors

Concrete anchors shall be group II, Type A, class 2 in accordance with ASTM A 307.

## #.1 ABOVEGROUND STORAGE TANK

## #.1 Tank Assembly

Protected Aboveground Storage Tanks shall be furnished as a complete, factory prefabricated unit. The entire tank assembly, including primary and secondary containments, and thermal/physical protective material, shall

be warranted by the tank manufacturer for 30 years. The tanks shall be tested and listed for the following

- (a) UL-142, "ABOVEGROUND TANKS FOR FLAMMABLE AND COMBUSTIBLE LIQUIDS."
- (b) UL-2085, "OUTLINE OF INVESTIGATION FOR INSULATED ABOVEGROUND TANKS FOR FLAMMABLE AND COMBUSTIBLE LIQUIDS."
- (c) UL-2085 TWO HOUR FURNACE FIRE TEST AND TWO HOUR SIMULATED POOL FIRE TEST INSULATED TANK LISTING."
- (d) UL-2085 BALLISTIC AND VEHICLE IMPACT TEST FOR PROTECTED TANK LISTING."

#### #.1 Tank Components

##### #.1 Primary Containment

The primary containment shall be constructed of 3/16 inch steel capable of on-site pressure testing for verification of primary tank integrity.

##### #.1 Interior Protective Coating

Provide each tank with an interior protective coating conforming to MS MIL-C-4556 from the tank bottom up to 18-inches off the bottom. Interior coating shall be a two-coat epoxy coating system consisting of a prime coat and a finish to achieve a total dry film thickness of not less than 6 mils. The epoxy coating shall be resistant to the effects of the type of waste product being stored.

##### #.1 Secondary Containment

The secondary containment shall be constructed of steel. The secondary containment shall totally enclose and provide leak containment across the total surface of the primary containment including joint penetrations in the vessel. Means shall be provided for automatic monitoring of the interstitial or annular space between the primary containment and the secondary containment. Any leakage from the primary or secondary containment shall be detectable. Means shall be provided to recover liquid from the vault's secondary containment should a leak occur. The annular space shall have the capability of being field testable to ensure the integrity of the secondary containment.

##### #.1 Thermal and Physical Protective Material

Non-settling thermal and physical protective material shall be used. Loose fill that may drain from the tank in the event of a rupture of the outer shall is not acceptable.

##### #.1 Spill Containment Pan

Each tank shall have an integral spill containment pan with a lid, minimum 5 gallon capacity. The spill containment pan shall have a normally closed drain valve to allow waste fluid to drain back into the tank in the event of a spill. A 4" waste fill pipe adaptor and cap shall be integral with the spill containment pan.

## #.1 Fill Limiter Assembly (Overfill Prevention Device)

The fill limiter assembly shall be a float actuated shut-off valve. The fill limiter shall shut the flow of waste fill into the tank when the volumetric capacity of the tank has reached between 90 and 95 percent. For tanks [TK- ] and [TK- ], the fill limiter shall be integral with the waste fill tube within the containment pan. For tanks [TK- ], [TK- ] and [TK- ], the fill limiter shall not be integral with the spill containment pan but shall have its own 4" nipple connection. For tanks [TK- ], [TK- ], and [TK- ], the fill limiter shall initiate a signal to close the explosion proof air solenoid valves for the air diaphragm pumps located in the maintenance pit. For tanks [TK- ], [TK- ], and [TK- ], a separate (not integral with the spill containment assembly) waste fill port shall be provided as indicated. (Waste products for [TK- ], [TK- ] and [TK- ], are pumped into the tank by air diaphragm pumps located in the maintenance bay, whereas [TK- ] and [TK- ] waste products are manually pumped or poured into the tank, at tank location).

## #.1 Pump-Out Port

Provide a 4" pump-out port and cap for the removal of waste from the storage tanks.

## #.1 Spare Ports With Caps

Provide each tank with two spare 4" ports with caps, one located at each end of the tank.

## #.1 Stairway

Provide a factory fabricated metal stairway ladder to access spill container and pump out port for each tank. Step landing shall not be greater than 3'-2" from top tank. Stair steps shall be slip resistant in all directions. Stairway assembly shall be anchored to concrete slab. Stairway shall be painted to match tank or hot dipped galvanized.

## #.1 Vents

The primary containment shall be equipped with an atmospheric vent. The primary and secondary containments shall be equipped with emergency vents. Vents shall meet NFPA 30 requirements.

## #.1 Openings

All openings to the primary and secondary containment shall be from the top of the tank.

## #.1 Anchors

Tank shall have zone 4 seismic anchoring brackets integral with the tank assembly. The tank shall also be able to withstand uplifting by ground water flooding.

## #.1 Identification Markings

Tanks shall be placarded and labeled as to contents and warning signs per UFC. Pipe and equipment supplied under this section shall have identification markings applied in accordance with SPECIFICATION SECTION: PAINTING, GENERAL.

## #.1 Painting:

## #.1 Aboveground Storage Tanks

All aboveground storage tanks shall have factory applied finishes only. Contractor shall submit manufacture's standard list of finishes to the contracting officer for color selection.

## #.1 Tanks With Exterior Steel Shell

The finish for outer steel tanks shall have a weather resistant finish that will withstand a salt spray test for a minimum of 1000-hours in accordance with ASTM B 117, including the scribe requirement in the test. Immediately after completion of the test, the coating shall receive a rating of 10, no blistering, as determined by ASTM D 714; and a rating of 10, 1/16 failure at scribe, as determined by ASTM D 1654.

## #.1 Tanks With Exterior Concrete Shell

- a. Primer: Cementitious Acrylic Emulsion, Fill-Coat 2300 or equivalent, two coats.
- b. Intermediate Coat: 9500 Dura-glaze Heavy Duty Epoxy, two mils dry, or equivalent.
- c. Finish Coat: 9310 or 9700 Dura-Glaze Heavy Duty Epoxy Gloss Finish, 2 mils dry, or equivalent.

## #.1 Field Painting

Painting required for surfaces not otherwise specified, and finish painting of items only primed at the factory are specified in SPECIFICATION SECTION: PAINTING, GENERAL.

## #.1 Color Coding

Color coding for piping identification is specified in SPECIFICATION SECTION: PAINTING, GENERAL.

## #.1 Tanks With Vaulted Concrete

For a tank using concrete mixture as the insulation system, the inner double walled tank assembly shall be wrapped in 6x6x10/10 welded wire mesh for concrete reinforcing or with engineered column reinforcement. Concrete to be factory poured. All steel exposed to concrete shall be coated with a high texture moisture barrier (rust inhibitor coating).

## #.1 Direct Reading Tank Gauge

Each storage tank shall be provided with a direct reading type gauge. Direct reading gauges shall be level sensing, mechanically actuated devices which provide the necessary readout in a sealed glass cap with a protective cover.

## #.1 Grounding

Tanks shall be grounded to grounding rod(s) in accordance with SPECIFICATION SECTION 16375 ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND

#### #.1 Tank Certification

The completed tank with accessories shall be factory tested and inspected in accordance with the manufacturers standard procedures. Integrity of both inner and outer walls of the tank shall be certified by manufacturer prior to shipment.

#### #.1 Warranty

The entire tank assembly, including the primary and secondary containments and concrete enclosure (if applicable) shall be warranted by the manufacturer for 30 years against any defects of equipment, materials, workmanship and design.

#### #.1 STORAGE TANK ACCESSORIES

##### #.1 Tank Calibration Charts

Storage tanks shall be furnished with calibrated charts showing the liquid contents in gallons for each 1/8-inch of tank depth. Two reproductions of the gauge chart shall be enclosed in plastic envelopes and bound in hardback binders.

##### #.1 Manual Tank Gauges

Storage tanks shall be provided with two manual gauges (stick gauges) graduated in feet, inches, and eighths of an inch. Stick gauges shall be of wood and treated after graduating to prevent swelling or damage from the fuel being stored.

##### #.1 Monitoring/Leak Detection System

A monitoring/leak detection system including one panel for the aboveground storage tanks (AST) the containment sump and a second panel for the underground oil/water separator tank (UST) shall be provided. The complete system shall comply with NFPA 70 and meet USEPA 40 CFR 280.43(g) and 280(c) and provide continuous monitoring and leak detection of secondary containment storage systems capable of providing positive shutdown or lockout of product pumps when a leak is detected. The sensing circuits shall be intrinsically safe for use in Class 1, Division 1, Group D environments.

##### #.1 AST Leak Detection and Monitoring System

The system shall be the model RONAN X76-4X or Veeder Root ILS-250 or Warrick Controls DMS or equal, capable of monitoring up to 12 inputs and consist of the following:

- A. A wall mounted NEMA 4X enclosure with hinged cover, lockable latches, two 3/4 inch threaded hubs, flush mounted window and control console containing the following:
  - 1) An LED display indicating power on for all active inputs and an alarm LED for each input showing alarm and status conditions
  - 2) A test and acknowledge button for testing the system, silencing alarm and operator interface

- 3) An integral high frequency alarm horn rated at 80db at 10 feet
  - 4) Up to six internal SPDT C-form auxiliary relays rated at 120VAC, 10A
  - 5) All components shall be UL listed
  - 6) Audible and Visual indicators for Alarm annunciation
  - 7) Operating temperature range of 32 degrees F to 165 degrees F
  - 8) Provides intrinsically safe interface to all field sensors
  - 9) Provides signal to remote alarm horn and rotating beacon
  - 10) System wiring shall be 18 AWG THHN or shielded 18 AWG pair Belden cable #8441, or equal
  - 11) All splices or connections of sensor wires shall be sealed using a Scotchlock #UAL connectors or equal
  - 12) Power requirements shall be 115 VAC, 60HZ
- B. Single-cable leak detection and monitor sensors capable of the following
- 1) Detecting a breach of either the primary or secondary tank walls by sensing an intrusion of product and/or water into the tank interface (dry tank interstice)
  - 2) Detecting the intrusion of product and/or water into containment sumps
  - 3) Detecting high level or over-fill in the primary tank of the single or double walled tanks
  - 4) Sensors shall be model: RONAN LS-3 or Veeder Root 7943 or Warrick Controls DWP25 or equal.
- C. Remote Annunciator in a NEMA 4X Enclosure and the following
- 1) Integral ALARM TEST/ACKNOWLEDGE button used to silence audible alarms and test unit's alarm horn and remote horn and lamp
  - 2) High frequency alarm horn rated at 80db at 10 feet
  - 3) Unit ALARM TEST/ACK BUTTON will control a remote horn in conjunction with internal horn
  - 4) UL listed and with intrinsically safe interface connections
  - 5) The remote annunciator shall be provided by the same manufacturer.
- D. Remote Horn and Rotating Beacon description
- 1) The Remote Horn shall be NEMA 4 and shall operate on 120VAC and have a DB rating of 110db at 10 feet
  - 2) The Rotating Beacon shall rotate no less than 90 times a minute and shall be red in color. Provide Federal Signal Part

#8444B019A-11, or equal

- E. The AST Operating Capabilities shall include
- 1) Continuously monitors all inputs
  - 2) The ability to provide automatic shutdown of controlled pumps (maximum of 3)
  - 3) Unlimited sensor combinations
  - 4) Up to 12 input channels
  - 5) Self diagnostics and fail-safe design
- F. The AST system shall include the following
- 1) 1 Console, Type RONAN X76-4X or Veeder Root ILS-250 or Warrick Controls DMS or equal.
  - 2) 6 Sump Sensor, Type RONAN LS-3 or Veeder Root 7943 or Warrick Controls DWP25 or equal.
  - 3) 5 Interstitial Sensor, Type RONAN LS-3 or Veeder Root 7943 or Warrick Controls DWP25 or equal.
  - 4) 1 Remote Annunciator, 120VAC.
  - 5) 1 Remote Horn, 120VAC.
  - 6) 1 Red Rotating Beacon, Federal Signal Part # 8444B019A-11, or equal

#### #.1 UST Leak Detection and Monitoring System

The system shall be the model RONAN X76AST-4X or Veeder Root ILS-250 or Warrick Controls DMS-3 or equal capable of monitoring up to 3 inputs and consist of the following:

- A. A wall mounted NEMA 4X enclosure with hinged cover, lockable latches, two 3/4 inch threaded hubs, front mounted visual and audio alarms and power indicators. The control console shall contain the following
- 1) An LED display indicating power on for all active inputs and an alarm LED for each input showing alarm and status conditions
  - 2) A test and acknowledge button for testing the system, silencing alarm and operator interface
  - 3) An integral high frequency alarm horn rated at 80db at 10 feet
  - 4) Up to three internal SPDT C-form auxiliary relays rated at 20VAC, 10A
  - 5) All components shall be UL listed
  - 6) Audible and Visual indicators for Alarm annunciation
  - 7) Operating temperature range of 32 degrees F to 165 degrees F

- 8) Provides intrinsically safe interface to all field sensors
  - 9) Provides a signal to remote horn and rotating beacon
  - 10) System wiring shall be 18 AWG THHN or shielded 18 AWG pair Belden cable #8441, or equal
  - 11) All splices or connections of sensor wires shall be sealed using a Scotchlock #UAL connectors or equal
- 12) Power requirements shall be 115 VAC, 60HZ
- B) Single-cable leak detection and level monitor capable of the following:
- 1) Detecting a breach of either the primary or secondary tank walls by sensing an intrusion of product and/or water into the tank interface (dry tank interstice)
  - 2) 3  
Detecting the intrusion of product and/or water into dispenser containment pans
  - 3) Detecting high level or over-fill in the primary tank of the single or double walled tanks
  - 4) Monitoring high level and interface level in oil/water separators
  - 5) Sensors shall be model: RONAN LS-3 or Veeder Root 7943 or Warrick Controls DWP25 or equal.
- C. Remote Horn and Rotating Beacon description
- 1) The Remote Horn shall be NEMA 4 and shall operate on 120VAC and have a DB rating of 110db at 10 feet
  - 2) The Rotating Beacon shall rotate no less than 90 times a minute and shall be red in color. Provide Federal Signal Part #8444B019A-11, or equal
- D. The AST Operating Capabilities shall include
- 1) Continuously monitors all inputs
  - 2) The ability to provide automatic shutdown of controlled pumps (maximum of 3)
  - 3) Unlimited sensor combinations
  - 4) Up to 12 input channels
  - 5) Self diagnostics and fail-safe design
- E. The UST system shall include the following
- 1) 1 Console, Type RONAN X76AST-4X or Veeder Root ILS-250 or Warrick Controls DMS-3
  - 2) 1 Interstitial Sensor, Type RONAN LS-3 or Veeder Root 7943 or

Warrick Controls DWP25 or equal.

- 3) 2 High Level Sensor, Type RONAN LS-3 or Veeder Root 7943 or Warrick Controls DWP25 or equal.
- 4) 1 Remote Horn, 120 VAC.
- 5) 1 Red Rotating Beacon, Federal Signal Part # 8444B019A-11, or equal

#### #.1 External Audible/Visual Alarms

The following external audible/visual alarms shall be provided:

- a. External leak detection alarm: The external leak detection alarm shall be located per mechanical drawings. The external alarm shall be connected to the monitoring/leak detection system. The external alarm shall have an audible and flashing light and rotating beacon. The external alarm shall provide an audible and visual alarm in the event of a detectable leak in the interstitial space of the aboveground storage tank and oil/water separator and from the containment sump. An acknowledgement switch shall be provided and located per mechanical drawings. When the acknowledgement switch is manually acknowledged, the external audible alarm shall deactivate and the external acknowledgement light shall change from solid status to a blinking status and the rotating beacon shall deactivate. The external indicator light shall deactivate only when the problem has been identified and corrected.
- b. External overfill alarm: The external overfill alarm shall be located per mechanical drawings. The alarm shall be connected to the monitoring/leak detection system. The external alarm shall have an audible and flashing light and rotating beacon. The external alarm shall provide an audible and visual alarm in the event of an overfill (when tank level reaches 95-percent tank capacity). An acknowledgement switch shall be provided and located per mechanical drawings. When the acknowledgement switch is manually acknowledged, the external audible alarm shall deactivate and the acknowledgement light shall change from a solid status to a blinking status and the rotating beacon shall deactivate.

#### #.1 Audible Alarm Level

Audible alarm shall be a horn sounding from 80 to 100 dB (at 10-feet)

#### #.1 Underground Wiring

Underground electrical wiring shall be enclosed in PVC conduit. Conduit shall be di-electrically isolated from any steel associated with the storage tank.

#### #.1 Guard Posts

Tank shall be protected by guard posts as indicated.

## #.1 Containment Sump

Containment sump shall house a leak detection sensor and have the following characteristics:

- a. Be constructed of fiberglass or a high density plastic.
- b. Be chemically compatible with the type of fuel to be stored in the corresponding storage tank.
- c. Be designed to prevent ground water from penetrating.
- d. Provide a liquid-tight termination point for all secondary containment piping.
- e. Be designed to prevent any spilled petroleum product from leaking to the soil or back into the tank.
- f. Provide a removable liquid-tight hinged lid.

## #.1 Piping Penetrations

The sides of the containment sump shall allow the penetration of carrier pipes, conduits, and any other piping as well as termination connections for exterior containment pipes. Pipe penetrations in the containment sump sides shall be booted and sealed to insure that liquid will not escape from the sump in the event that the liquid level within the sump rises above the pipe penetration. Connections for outer containment piping shall allow product flow into the containment sump with no product leakage to the soil.

Bare piping penetrations into a containment sump shall pass into the sump with no product leakage to the soil.

## #.1 PIPING COMPONENTS

## #.1 Piping Below and Above Grade

## #.1 Piping and Fittings Below Grade

All underground piping and fittings used for carrying fuel shall have a primary pipe constructed of steel and a secondary containment system constructed of fiberglass. Both the primary and secondary containment pipes shall be provided with test fittings to allow for tightness testing and for verification of a detected leak. The fittings shall be accessible without dismantling any piping.

## #.1 Piping and Fittings Above Grade

All above grade piping and fittings used for carrying waste shall be single-wall steel.

## #.1 Steel Pipe and Fittings

## #.1 Pipe

Carbon steel pipe shall be in accordance with ASTM A 53, Type E or S, Grade A or B, or API Spec 5L, seamless or electric-weld, Grade A or B. Pipe smaller than 2.5-inch shall be in Schedule 80. ASTM A 53 pipe 2.5-inch and larger shall be Schedule 40. API Spec 5L pipe 2.5-inch and larger shall be Schedule 40S.

### #.1 Welded Fittings

Fittings for pipe smaller than 2.5-inch shall be forged, socket weld type, 2000 W.O.G. conforming to ASTM A 182 and ASME B16.11. Fittings for pipe 2.5-inch and larger shall be butt weld type conforming to ASTM A 234, Grade WPB and ASME B16.9 of the same wall thickness as the adjoining pipe.

### #.1 Welding Electrodes

Welding electrodes shall be E70XX low hydrogen type conforming to AWS A5.1 or AWS A5.4

### #.1 Flange Fittings

Flange fittings shall be Class 150 in accordance with ASME B16.5, ASTM A 181, or ASTM A 105.

### #.1 Threaded Fittings

Threaded fittings shall be in accordance with ASME B16.3, 150-pound class.

### #.1 Fiberglass Pipe and Fittings

#### #.1 Pipe

Fiberglass pipe shall be designed for the service intended and shall be compatible with the fluid being transported. Use of fiberglass piping is limited to buried secondary containment pipe only and at pressures not exceeding that marked on the pipe. Pipe shall conform to MS MIL-P-29206 or shall be U.L. approved.

#### #.1 Fittings

Fittings shall be of the same material as pipe supplied and compatible with adhesives used for joining the pipe. Fittings for secondary exterior pipe of double-wall piping system shall be designed to accommodate the primary inner pipe or pipes and any additional equipment required, such as leak detection cables. Fittings of the secondary pipe shall be compatible with the secondary material, compatible with adhesives used for joining the pipe and compatible with the transported fluid.

#### #.1 Valves

Valves and ancillary material such as adhesives, and gaskets shall be compatible with water and all waste products to be handled in the waste system. Valves shall be suitable for 125-psig service. Portions of any valve coming in contact with waste fluids shall be of noncorrosive material. The connection type of all valves shall match the same type of connection required for the piping on which installed.

#### #.1 Gate

Gate valves 2.5-inches and smaller shall conform to MSS SP-80 bronze rising stem, threaded, solder, or flange ends. Gate valves 3-inches and larger shall conform to MSS SP-70 cast iron bronze trim, outside screw and yoke, flange ends.

## #.1 Check

Check valves 2.5-inches and smaller shall conform to MSS SP-80, bronze, threaded, solder, or flange ends. Check valves 3-inches and larger shall conform to MSS SP-71, cast iron, bronze trim, flange ends.

## #.1 Ball

Ball valves 1/2-inches and larger shall conform to FS WW-V-35, ductile iron or bronze, threaded, or flange.

## #.1 Anti-Siphon

Underwriter's Approved Anti-siphon Valve, bronze construction or ductile iron, threaded or flange.

## #.1 Fusible

Fusible valves shall automatically close when acted upon by heat of 160 to 165 F. Fusible element shall be in the handwheel. Valve will be provided with self-adjusting stuffing box and back seat feature which prevents leaks at the valve stem. Fusible valve will have the capability to manually shut off system flow. Material construction shall be brass or ductile iron, threaded or flange.

## #.1 Piping Accessories

## #.1 Couplings

Couplings shall be in accordance with API Spec 5L seamless, extra heavy, wrought steel with recessed ends.

## #.1 Nipples

Nipples shall be in accordance with ASTM A 733 or ASTM B 687 and of the same material as the pipe supplied.

## #.1 Unions

Unions shall be in accordance with FS WW-U-531, Class 150.

## #.1 Joint compound

Joint compounds for any type of piping system shall be resistant to water and be suitable for use with the waste product used.

## #.1 Flange Gaskets

Flange gaskets shall be 1/16-inch thick, full face or self-centering flat ring type NBR and be in accordance with ASME B16.21.

## #.1 Flexible Connectors

Flexible connectors shall be close-pitch annular corrugated type with braided wire sheath covering, rated for a working pressure of at least 125-psig, 12-inch minimum live length with threaded end connections, and shall conform to requirements of UL 567. Metal for hose and braided wire sheath shall be stainless steel, in accordance with ASTM A 167.

## #.1 Vent Caps

Each vent cap shall be a pressure/vacuum relief valve of the upward opening type and provide 2.5-inches water column of positive pressure and 6.5-inches water column of vacuum before allowing air or vapor to pass.

## #.1 Strainers

Strainers shall have steel or bronze bodies and removable baskets. Baskets shall have 60 mesh wire screen with larger wire mesh reinforcement.

## #.1 SUPPLEMENTAL COMPONENTS/SERVICES

## #.1 Earthwork

Excavation and backfilling for piping shall be as specified in SPECIFICATION SECTION: EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS as modified herein.

## PART 3 EXECUTION

## 3.1 INSTALLATION

## #.1 Aboveground Storage Tank

- a. Storing and Handling: Storing, handling, and placing of tanks shall be done carefully and with a minimum of handling.
- b. Tanks shall be grounded to ground rod(s) in accordance with SPECIFICATION SECTION: ELECTRICAL DISTRIBUTION SYSTEM.
- c. Installation Procedures: Tanks shall be installed in accordance with the manufacturer's published installation instructions and NFPA 30 and any federal, state or local codes.

## #.1 Piping

Piping shall be free of traps and shall drain toward the storage tank. No pipe of any type shall be embedded in concrete pavement. Any pipe, fittings, or appurtenances found defective after installation shall be replaced. Piping connections to equipment shall be as indicated or as required by the equipment manufacturer. Pipe and accessories shall be handled carefully to assure a sound, undamaged condition. The interior of the pipe shall be thoroughly cleaned of all foreign matter and be kept clean during installation. The pipe shall not be laid in water or stored outside unprotected when weather conditions are unsuitable. When work is not in progress, open ends of pipe and fittings shall be securely closed so that water, earth, or other substances cannot enter the pipe or fittings. Cutting pipe, when necessary, shall be done without damage to the pipe. Pipe shall be reamed to true internal diameter after cutting to remove burrs.

## #.1 Joints

## #.1 Steel Joints

Joints between sections of steel pipe and between steel pipe and fittings

shall be threaded, grooved, or flange as indicated or specified. Connections to equipment shall be made with black malleable-iron unions for pipe 2.5-inches or smaller in diameter.

#### #.1 Threaded Joints

Threaded joints shall be made with tapered threads properly cut and shall be made perfectly tight with a stiff mixture of graphite and oil or with polytetrafluoroethylene tape applied to the male threads only and in no case to the fittings.

#### #.1 Below Grade Piping

Underground pipelines shall be laid with a minimum pitch of 1-inch per 40-feet. Horizontal sections of pipe shall be installed with a minimum of 18-inches of backfill between the top of the pipe and the ground surface unless otherwise noted on drawings. The full length of each section of underground pipe shall rest solidly on the pipe bed. Joints in secondary piping shall not be made until inner pipe is successfully pressure tested.

#### #.1 Pipe Sleeves

Piping passing through concrete or masonry construction shall be fitted with sleeves. Sleeves shall be of sufficient length to pass through the entire thickness of the associated structural member and be large enough to provide a minimum clear distance of 1/2-inch between the pipe and sleeve. Sleeves through concrete may be 20-gauge steel or other material as approved by the CO. Sleeves shall be accurately located on center with the piping and be securely fastened in place. The space between the sleeves and the pipe shall be sealed as shown.

#### #.1 Field Painting

Painting required for surfaces not otherwise specified, and finish painting of items only primed at the factory, shall be painted and have identification markings applied as specified in SPECIFICATION SECTION: PAINTING, GENERAL.

#### #.1 Framed Instructions

Framed instructions containing wiring and control diagrams under glass or in laminated plastic shall be posted where directed. Framed instructions shall include equipment layout, wiring and control diagrams, piping, valves and control sequences, and typed condensed operation instructions. The condensed operation instructions shall include preventative maintenance procedures, methods of checking the system for normal and safe operation, and procedures for safely starting and stopping the system. The framed instructions shall be posted before acceptance testing of the system.

#### #.1 TESTS

##### #.1 Aboveground Storage Tank Tests

##### #.1 Tightness Tests

A tightness test shall be performed on each storage tank. The tests shall be performed following the securement of the storage tank. Tests shall be capable of detecting a 0.1 gallon per hour leak rate from any portion of the tank while accounting for effects of thermal expansion or contraction.

The test shall be a pneumatic test. Gauges used in pneumatic tests shall have a scale with a maximum limit of 10-psig. The storage tank's primary chamber shall be pneumatically pressurized to 5-psig and be monitored for a 2-hour period during which there shall be no drop in pressure in the tank greater than that allowed for thermal expansion and contraction. Following the 2-hour period, the secondary shall be pneumatically pressurized to 3-5-psig. This pressure shall be maintained and soapsuds or equivalent material applied to the exterior of the tank. While applying the soapsuds, the entire tank shall be visually inspected, including the bottom surfaces, for leaks (bubble formations). Leaks discovered in either the primary chamber or the interstitial space shall be repaired in accordance with manufacturer's instructions. The entire pneumatic test shall be performed again in the event a leak is discovered.

#### #.1 Manufacturer's Tests

Following the tank tightness test, the storage tank shall be leak tested in accordance with the manufacturer's written test procedure if the manufacturer's test procedure is different from the tightness tests already performed. Any test failure shall require corrective action and retest.

#### #.1 Piping Tests

Care shall be taken not to exceed pressure rating of various fittings. To facilitate these tests, various sections of the piping system may be isolated to test each separately. Tapped flanges that can be attached to the end of the section of pipe being tested and that will permit direct connection to the piping from the air compressor shall be furnished. No taps in the pipe will be permitted. Gauges shall be subject to testing and approval. In the event leaks are detected, the pipe shall be repaired and the test repeated. On satisfactory completion of tests, the pressure shall be relieved and the pipe immediately sealed. Provision shall be made to prevent displacement of the piping during testing. Personnel shall be kept clear of the piping during pneumatic testing. Equipment such as the tank shall be isolated from the piping system during this test. Gauges used in the pneumatic tests for primary piping shall have a scale with a maximum limit of 50-psig. Gauges used in the pneumatic tests of exterior containment piping shall have a scale with a maximum limit of 10-psig.

#### #.1 Primary Piping

Primary piping shall be tested under a pneumatic pressure of at least 1-1/4 times the designed working pressure of the particular piping system, but not less than 50-psig. Pressure in primary piping shall be maintained for at least 2-hours during which there shall be no drop in pressure in the pipe greater than that allowed for thermal expansion and contraction. This pressure shall be maintained and soapsuds or equivalent material applied to the exterior of the piping. While applying the soapsuds, the entire run of piping, including the bottom surfaces, shall be visually inspected for leaks (bubble formations). Leaks discovered shall be repaired in accordance with manufacturer's instructions. The entire pneumatic test shall be performed again in the event a leak is discovered.

#### #.1 Exterior Containment Piping

Exterior containment piping shall undergo a 5-psig minimum air-pressure/soap test upon completion of installation to confirm the secondary containment integrity. Pressure in secondary piping shall be maintained for at least 1-hour. This testing shall be in compliance with

the manufacturer's published installation instructions.

#### #.1 Manufacturer's Tests

Following the required pneumatic piping tests, piping shall be leak tested in accordance with the manufacturer's written test procedure if the manufacturer's test procedure is different from the tightness tests already performed. Any test failure shall require corrective action and retest.

#### #.1 System Performance Tests

After all components of the system have been properly adjusted, the system shall be tested to demonstrate that the system meets the performance requirements for which it was designed. If any portion of the system or any piece of equipment fails to pass the tests, the Contractor shall make the necessary repairs or adjustments and the test shall be repeated until satisfactory performance is achieved. The tests shall demonstrate the following

- a. The overflow prevention device performs as designed.
- b. The alarms are operational and perform as designed.
- c. Monitoring/Leak Detection System is operational and performs as required.

#### #.1 High Liquid Level Alarm Test

The storage tanks shall be initially filled with the appropriate product in order to verify that the high liquid level external alarms function as designed. The initial overflow shall also verify that the storage tanks fill limiter (overflow protection device) functions as designed. Under no circumstances shall the Contractor overflow any storage tank more than the 98-percent level even if the external alarms and the fill limiter devices do not function as designed. Any problems with the external alarms or the fill limiter device shall be corrected and retested.

#### #.1 INSPECTIONS

##### #.1 Tank Visual Inspections

The exterior surface of the tank shall be inspected for obvious visual damage after the placement of the storage tank. Surface damage to the storage tank shall be corrected according to manufacturer's requirements before proceeding with the system installation.

#### #.1 CLEANING AND ADJUSTING

##### #.1 Storage Tank

The interior of the waste storage tank shall be visually inspected and cleaned free of debris before use.

#### #.1 DEMONSTRATIONS

Contractor shall conduct a training course for the operating staff as designated by the CO. The training period shall start after the system is functionally completed but prior to final system acceptance. The field instructions shall cover all of the items contained in the operation and

maintenance manuals as well as demonstrations of routine maintenance operations.

-- End of Section --