
USACE / NAVFAC / AFCEA / NASA UFGS-33 56 13 (April 2006)

Preparing Activity: NAVFAC Replacing without change
UFGS-13210 (August 2004)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 9 October 2006

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DIVISION 33 - UTILITIES

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SECTION 33 56 13

ABOVEGROUND FUEL OIL STORAGE TANKS

04/06

NOTE: This guide specification covers the requirements for aboveground fuel oil storage tanks, including piping and connections.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project

**specification when you choose to reconcile
references in the publish print process.**

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

ASME INTERNATIONAL (ASME)

ASME B16.26 (1988) Cast Copper Alloy Fittings for
Flared Copper Tubes

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M (2005) Carbon Structural Steel

ASTM A 569/A 569M (1998) Steel, Carbon (0.15 Maximum
Percent), Hot-Rolled Sheet and Strip,
Commercial

ASTM B 117 (2002) Operating Salt Spray (Fog) Apparatus

ASTM B 88 (2003) Seamless Copper Water Tube

ASTM B 88M (2003) Seamless Copper Water Tube (Metric)

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

MSS SP-58 (2002) Pipe Hangers and Supports -
Materials, Design and Manufacture

MSS SP-69 (2002) Pipe Hangers and Supports -
Selection and Application

MSS SP-80 (2003) Bronze Gate, Globe, Angle and Check
Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 30 (2003) Flammable and Combustible Liquids
Code

NFPA 30A (2003) Code for Motor Fuel Dispensing
Facilities and Repair Garages

NFPA 70 (2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 142 (2002) Steel Aboveground Tanks for
Flammable and Combustible Liquids

UL 2085 (1997; Rev thru Dec 1999) Protected
Aboveground Tanks for Flammable and
Combustible Liquids

UL 674 (2003) Electric Motors and Generators for

Use in Division 1 Hazardous (Classified)
Locations

UL 698

(1995; Rev thru Mar 1999) Industrial
Control Equipment for Hazardous
(Classified) Locations

UL 886

(1994; Rev thru Apr 1999) Outlet Boxes and
Fittings for Use in Hazardous (Classified)
Locations

1.2 SYSTEM DESCRIPTION

Provide aboveground storage tank systems and fuel piping systems complete and ready for operation. Fuel piping systems shall include aboveground piping, and connections to existing piping systems.

1.3 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Aboveground storage tanks (AST) [; G] [; G, [____]]

Submit shop drawings for each size of AST for approval. Indicate types, sizes, locations, installation details, and other construction details.

SD-03 Product Data

Aboveground storage tanks (AST) [; G] [; G, [____]]

Leak Detection System [; G] [; G, [____]]

High level alarm system [; G] [; G, [____]]

Tank Level Gage System [; G] [; G, [____]]

Alarm Control Panel System [; G] [; G, [____]]

Remote alarm system [; G] [; G, [____]]

Fuel dispensing systems [; G] [; G, [____]]

Tank Fill Pumping System [; G] [; G, [____]]

SD-06 Test Reports

Field acceptance test [; G] [; G, [____]]

SD-08 Manufacturer's Instructions

Installation instructions

SD-10 Operation and Maintenance Data

Aboveground storage tanks (AST), Data Package 2 [; G] [; G, [____]]

Alarm control panel system, Data Package 2 [; G] [; G, [____]]

Accessories for AST's, Data Package 2 [; G] [; G, [____]]

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.4 DELIVERY AND STORAGE

Handle and store aboveground storage tanks and containment piping systems, to prevent distortions and other damage that could affect their structural, mechanical, or electrical integrity. Replace damaged items that cannot be restored to original condition. Store items subject to deterioration by exposure to elements, in a well-drained location, protected from weather, and accessible for inspection and handling.

PART 2 PRODUCTS

2.1 ABOVEGROUND STORAGE TANKS (AST)

Tanks provided shall be either of the two specified tank types. Each provided AST shall be UL listed for compliance with **UL 2085**, as an insulated, secondary containment aboveground storage tank, protected type. Each tank shall bear the UL label in compliance with **UL 2085**.

2.1.1 Concrete Vaulted Tank

- a. Tank System: tank, thermal protection, secondary containment, and its enclosure (concrete vault) shall be shipped as a completed unit, that is, completely fabricated in manufacturer's factory.
- b. Primary Tank: Listed under **UL 142**; in compliance with **NFPA 30**; **ASTM A 569/A 569M** or **ASTM A 36/A 36M** carbon steel; warranted for a minimum of 20 years by the manufacturer.
- c. Concrete Vault: Minimum 6 inches thick; minimum design strength of **4000 psi 30 MPa** at 28 days; encases and protects both primary and secondary containment; steel re-inforcing bars; vault shall be either monolithic, or be provided with one horizontal joint or seam for the removeable top of vault. No vertical joints or seams will be allowed.
- d. Corrosion Protection: Coating on steel components exterior to the concrete encasement shall meet requirements of **ASTM B 117**
- e. Spill and Overfill Containment: UL listed **7 gallon 26.5 liters** spill/overfill container manufactured as an integral part of the primary tank, surrounding the fill tube and protected by the 2 hour fire rating of the encasement; container shall have a stick port and normally closed valve to release spilled fluid into primary tank.
- f. Overspill Protection: One or more of the following methods:
 - (1) Direct reading level gauge visible from the fill pipe access.
 - (2) Audible and visible high level alarm.
- g. Exterior Finish: Exposed aggregate with cementitious sealer, or vault surface sealed with cementitious sealer and then coated with gloss urethane finish coat..
- h. Signage: Signage shall be recessed in exterior of concrete to ensure against damage.
- i. Venting: **NFPA 30**; **2 inch 51 mm** atmospheric vent and emergency vent.
- j. Anti-spill Valves: Where product piping extends below the top of the primary tank, piping shall include shutoff valve and a normally closed safety valve; safety valve shall be an approved anti-siphon valve or an electric solenoid valve.

2.1.2 Double-wall Steel Tank, Concrete Insulated

- a. Primary tank, its outer steel tank (outer enclosure), interstitial insulation, and the exterior fiberglass coating, all shall be shipped as a completed unit, that is, completely constructed in manufacturer's factory.
- b. Primary Tank and Outer Steel Tank: Listed under [UL 142](#); in compliance with [NFPA 30](#); [ASTM A 569/A 569M](#) or [ASTM A 36/A 36M](#) carbon steel; warranted for a minimum of 20 years by the manufacturer.
- c. Interstitial Insulation (Concrete): Concrete bounded by primary steel tank and outer steel tank; encases and protects primary tank; concrete placement shall be monolithic, that is, without seams; tank system provides the support legs which provide minimum of [3 inch 76 mm](#) clearance under outer tank.
- d. Corrosion Protection: Provide a fiberglass impregnated cladding on the exterior surface of the outer tank. This cladding shall be factory applied in the tank manufacturer's factory or an in factory acceptable to the tank manufacturer. The cladding shall be provided to a minimum thickness of [3 mm 1/8 inch](#) in compliance with the instructions of the cladding system manufacturer.
- e. Secondary Containment: Outer steel tank.
- f. Spill and Overfill Containment: UL listed [7 gallon 26.5 liters](#) spill/overfill container manufactured as an integral part of the primary tank, surrounding the fill tube and protected by the 2 hour fire rating of the encasement; container shall have a stick port and normally closed valve to release spilled fluid into primary tank.
- g. Overspill Protection: One or more of the following methods: (a) direct reading level gauge visible from the fill pipe access, (b) audible and visible high level alarm.
- h. Venting: [NFPA 30](#); [2 inch 51 mm](#) atmospheric vent and emergency vent.
- i. Anti-spill Valves: Where product piping extends below the top of the primary tank, piping shall include shutoff valve and a normally closed safety valve; safety valve shall be an approved anti-siphon valve or an electric solenoid valve.
- j. Outer Steel Tank Exterior Finish: manufacturer's fiberglass impregnated coating with total dry thickness a minimum of [1/8 inch 3 mm](#) thick.

2.2 ACCESSORIES FOR AST's

Provide the following accessories coordinated with each tank design: Leak detection sensor, high level alarm switch, fill port with overfill spill box, fuel outlet with anti-siphon foot valve, leak detection sensor, and vent with whistle alarm.

2.2.1 Leak Detection System

Provide continuous surveillance probe type leak detection system. System

shall be suitable for operation in NFPA 70, Class 1, Group D environment. Locate the leak detection system in the leak containment space between the primary tank and the secondary containment. Leak detection system shall electronically detect fluid leakage into containment space.

Sensor output and transmission shall be electronic. Probe mounting system shall not restrict the flow of liquid to the sensing area of the probes. Sensor output shall provide control signal to the alarm control panel system specified in this section.

Probe configuration shall be brass or stainless steel components with BUNA-N float. System shall give alarm condition when no more than 1/2 inch 13 mm of liquid leakage is present.

2.2.2 High Level Alarm System

Provide each tank with a vertical float type high level switch with alarm setting at 95 percent tank capacity. Switch output shall provide control signal to the alarm control panel system specified in this section.

2.2.3 Tank Level Gage System

Provide tank manufacturer's standard cataloged level gage system

[2.2.4 Fuel Dispensing Systems

Provide tank manufacturer's standard cataloged product subject to the compliance with the following requirements; for each system, provide

- a. Designed and built and UL listed for service in the fuel indicated.
- b. Commercial dispenser - single; top-mounted package for ASTs of capacity of 2000 gallons 7570 liters or less; end or side-mounted package, as indicated on drawings, for ASTs of capacity of more than 2000 gallons 7570 liters.
- c. Fuel filter element.
- d. Submersible pump with control box, 3/4 HP .56 KW minimum.
- e. Breakaway.
- f. Swivel.
- g. Solenoid valve.
- h. Expansion relief valve.
- i. Painted shear valve mounting bracket.
- j. Standard flow filter and adapter.
- k. Whip hose, length as indicated.
- l. Automatic commercial nozzle.
- m. Combination Body safety shear valve
- n. Ball valve.

- o. Painted mount bracket.
- p. Manufacturer's basic vent package.

] [2.2.5 Tank Fill Pumping System

2.2.5.1 Pre-engineered System

Provide a pre-engineered tank fill pumping system; a group of interrelated components which are design and construction coordinated and combined by one manufacturer into a unitary system as indicated in the manufacturer's catalog. The interrelated components include the steel frame, fill box, piping and fittings, valves, pumpset, and controller for automatic operation.

- a. Freestanding, steel frame mounted, pad mountable, open construction.
- b. Weatherproof and lockable steel fill box with a 7 gallon 26.5 liter spill containment sump.
- c. Quick disconnect hose coupling with dust plug.
- d. Inlet shutoff valve.
- e. Check valve.
- f. Outlet shutoff valve.
- g. Line purging valve.
- h. Spill sump drain valve.
- i. Transfer pump with explosion proof motor.
- j. Ground stud.

2.2.5.2 Controller For Automatic Operation

- a. Level transmitter for installation in 2 inch 51 mm tank fitting.
- b. 90 percent tank level visual alarm.
- c. 95 percent tank level visual alarm.
- d. Tank leak alarm.
- e. Audible alarm horn activated by alarms specified above.
- f. Power available indicator.
- g. Control power on-off switch.
- h. Pump start/stop push-buttons.
- i. top-off/hose drain mode push-button.
- j. Pump starter.

k. Explosion proof controller enclosure.

] 2.3 PIPING SYSTEMS

2.3.1 Copper Tubing System

Provide [ASTM B 88M](#) [ASTM B 88](#), Type K or Type L copper tubing with [ASME B16.26](#) flared fittings or compression type fittings for fuel oil supply, fuel oil return, and secondary (controls) piping.

2.3.2 Gate Valves

[MSS SP-80](#), Class 125.

2.3.3 Check Valves

[MSS SP-80](#), Class 125, swing check.

2.3.4 Pipe Hangers and Supports

Provide [MSS SP-58](#) and [MSS SP-69](#), Type 1 with adjustable type steel support rods, except as specified or indicated otherwise. Indicated hangers which do are not covered by [MSS SP-69](#) configurations, shall meet the applicable design requirements of [MSS SP-58](#), and the hanger spacing requirements of [MSS SP-69](#). Attach to steel joists with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor.

2.3.5 Dielectric Connections

Provide dielectric connections at piping connections of dissimilar metals.

2.4 ELECTRICAL REQUIREMENTS

Provide switches and devices necessary for the tank electrical systems system; wiring, fittings, and components shall be explosion-proof in compliance with applicable requirements of [UL 674](#), [UL 698](#), and [UL 886](#) for Class I, Division 1, Group C and D hazardous locations. Electrical installations shall conform to requirements of [NFPA 70](#).

[2.4.1 Alarm Control Panel System

Control panel shall be in NEMA 4X enclosure, suitable for the environment, and the panel shall include solid state circuitry, and visual alarms. Locate each panel at indicated spot. Panel shall incorporate a manual, self-test system which permits verification of proper operation of high level alarm audible and visual alarm equipment. Provide a reset button to silence the audible alarm, but at the same time maintaining the lit alarm light until the alarm condition is corrected.

] 2.4.2 Remote Alarm System

System shall be in NEMA 4X enclosure, suitable for the environment, and shall include an audible alarm. Locate each enclosure at indicated spot.

]PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Fuel Storage Tanks

Install vault type fuel storage tanks, vents, and other connections in accordance with NFPA 30 and NFPA 30A and published installation instructions of the manufacturer.

3.2 FIELD TESTING.

Prior to application of test pressure, remove or valve off piping components which may be damaged by test and install a calibrated test gage in the system. Maintain test pressure for at least one hour on all new piping work. In the event of leakage, locate and repair leak and repeat test. Submit a field acceptance test report for each new AST system installation and each new piping system installation.

3.2.1 Piping System Test

After tank erection and installation of valves and piping, test piping. Perform hydrostatic test of new fuel piping work at 100 psig 27 kPa per mm (gage) for one hour. Replace defective material disclosed by pressure test and repeat test until results are satisfactory.

3.2.2 Storage Tank Test

Pressure test tanks at not less than 5 psig 1.4 kPa per mm (gage) or more than 7 psig 1.9 kPa per mm (gage) and as recommended by the manufacturer.

3.3 INSTRUCTION TO GOVERNMENT PERSONNEL

Furnish the services of competent instructors to give full instruction to the designated Government personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the AST system, accessories for the AST, and the associated piping system. Instruction shall be given during the a regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. Schedule instruction time with Contracting Officer. The number of man-days (8 hours per day) of instruction furnished shall be one. Use approximately half of the time for classroom instruction. Use other time for instruction in the field at the equipment or system.

-- End of Section --