

SECTION 33 16 13**GROUND WATER STORAGE TANKS****PART 1: GENERAL****1.01 SCOPE**

- A. Section includes requirements for designing, fabricating, and erecting a welded steel ground storage tank.

1.02 SYSTEM DESCRIPTION**A. Design Requirements**

1. Design steel tank for capacity and dimensions as set forth in the Request for Proposals (RFP).
2. Layout of floor plates to be such that seams parallel to edges or intersecting with corners of concrete foundation or pipe encasement have 1-foot minimum spacing distance from these edges or corners.
3. Shell and floor plate thickness is $\frac{1}{4}$ inch minimum or required thickness determined by design plus $\frac{1}{16}$ inch corrosion allowance whichever is greater.

B. Design Requirements:

1. Tank design shall comply with AWWA Standard D100 and dimensions specified above.
 - (i) Foundations shall be designed in accordance with AWWA D100 Section 12.
 - (ii) Wind pressure shall be determined in accordance with AWWA D100 Section 3.1.4.
 - (iii) Seismic Loads shall be determined in accordance with AWWA D100 Section 13.
 - (iv) Snow load shall be determined in accordance with AWWA D100 3.1.3.1.
2. Perform welding in accordance with latest editions of applicable specifications of the American Welding Society.
3. Tank walls to be of butt welded construction. The roof is to be a stiffened, self supporting dome or umbrella type.

4. Tank constructed so as to receive a stroke of lightning without damage as outlined by NFPA 780, Chapter 3 and 4.
5. Sewers, drains, standing water, and similar sources of possible contamination shall be kept at least 50 horizontal feet from the tank.
6. The area surrounding the tank shall be graded in a manner that will prevent surface water from standing within 50 horizontal feet of the structure.
7. All finished water storage structures shall have watertight roofs which exclude birds, animals, insects, and excessive dust.

1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings to the AW Project Manager where indicated.
- B. Tank and Foundation Drawings: Submit detailed drawings for steel tank and accessories and any foundation modifications to the AW Project Manager for approval before fabrication or erection is begun. Indicate on tank drawing whether design is based on AWWA D100 or on AWWA D100, Section 14-Alternate Design Basis for Standpipes and Reservoirs. Included with this submittal shall be details of all weld joints referenced in the above drawings, showing the plate edge preparation, the type of electrode, the number of weld passes and other information pertinent to each weld joint.
- C. Design Computations: Submit design computations for steel tank, accessories and foundation to the AW Project Manager for review before tank fabrication is begun. Design computations as submitted are to be certified by a Licensed Professional Engineer in the State in which the Project is located. AW Project Manager's review comments do not in any way relieve responsibility for accuracy and completeness of design.
- D. Radiograph/Welding Reports: Submit report of radiograph inspections and a welding report if design incorporated AWWA Standard D100 – Section 14.
- E. Provide certification that the steel plates and structural members are manufactured in the United States and are free from inclusions of slag and other foreign matter and also free from heavy deposits of rust and/or pitting.
- F. Upon completion of erection of the tank, provide AW with a "Notarized Certification of Compliance" stating that the tank has been designed, fabricated, erected, inspected and tested in accordance with all of the requirements of AWWA Standard D100 and that the results of all inspection, radiographs and tests indicate that the tank is in full compliance with said AWWA Standard D100.

PART 2 PRODUCTS

2.01 MATERIAL

A. Tank Disinfection and Painting Systems

1. Provide tank disinfection in accordance with AWWA Standard C652 and Specification Section 33 16 13.11 Water Storage Tank Disinfection.
2. Provide tank painting conforming to Specification Section 09 97 00, Water Storage Tank Painting.

2.02 ACCESSORIES

A. Roof Hatches (Two Required):

- 1) Provide two (2) hatches of minimum 24 inches square with a 4-inch neck and located near roof perimeter. Provide cover with hinges and a hasp on the outside.
- 2) Provide two (2) hatches of minimum 24 inches in diameter with a 4-inch flanged neck with gasketed and bolted cover.
- 3) The frame of any access opening shall be provided with a close fitting solid shoebox type cover which extends down around the frame at least 2" and is furnished with a gasket(s) between the lid and frame.
- 4) The lid to any access opening shall have a locking device.
- 5) Locate near center of roof with AW Project Manager's approval, and if the requirements of this hatch and roof vent can be incorporated into one opening, roof hatch and vent can be combined.

B. Shell Manholes (three required): minimum 30-inch diameter, gasketed, bolted, and hinged on the outside.

C. Bolting, Hasp and Hinge Material: Stainless steel bolting, ASTM A320 (Type 304), for all manholes, hatches and overflow piping. Hasps and hinges to be type 304 stainless steel. Provide gaskets of red rubber material.

D. Overflow:

1. Overflows discharging between 12 and 24 inches above the ground surface shall include an appropriate air gap. All overflow pipes shall be screened with No. 24 mesh non-corrodible screen installed at a location least susceptible to damage by vandalism.
2. Overflow pipes shall not be connected to, or discharge into, any sanitary sewer system.

3. 6 inch (min) diameter steel ($\frac{1}{2}$ inch wall in wet areas, $\frac{1}{4}$ inch wall in dry areas) or ductile iron overflow pipe and weir box to have a 12,500 gpm minimum capacity with water level not more than 12 inches above the overflow elevation.
 4. Minimum depth of weir box is 4.0 feet. Coat steel pipe inside and out as the tank. Coat ductile iron pipe exterior the same as the tank. Overflow dimensions may require adjustment for larger size storage tanks.
 5. There shall be at least one opening above the water line which shall be framed at least 4 inches above the surface of the roof at the opening; or if on a buried structure, shall be elevated at least 18 inches above any earthen cover over the structure.
 6. Overflows discharges shall not cause erosion.
- E. Ladders: Ladders having an unbroken length in excess of 20 feet shall be provided with appropriate safety devices. This requirement shall apply both to interior and exterior reservoir ladders.
- F. Vertical Outside Ladder with Safe-T-Climb Rail: Start 15 feet minimum above proposed grade. Provide aluminum vandal deterrent at base of ladder. Provide ladder no less than 16 inches wide with minimum 2 inch x 5/16 inch side rails, 7 inch minimum toe room and $\frac{3}{4}$ inch diameter minimum non-slip rungs. Rail members are to be galvanized material. Provide two Saf-T-Lock sleeves and harnesses. Construction shall comply with AWWA, OSHA, federal, state and local requirements.
- G. Roof Platform: Construct with steps and handrails on both sides to the point where the roof slope is 2 in 12 or less. From this point, provide stainless steel safety cable with support posts to the apex of the roof so personnel can remain tied-off while accessing the manhole and vent. The construction of the platform is to allow the stepped portion to be removed, such that the roof plate and platform underside is accessible for painting. Provide 4 x $\frac{1}{4}$ inch toe plate on all railing. Construction shall comply with AWWA, OSHA, Federal, State and local requirements.
- H. Roof Vent: A minimum of two roof vents shall be provided and protected with insect screens. Inverted vents shall be downturned a minimum of 2 inches below any opening or shielded to prevent the entrance of surface water and rainwater. Vents shall be fitted with No. 24 mesh or finer non-corrodible screen with additional heavy gage screen or substantial covering which will protect the No. 24 mesh screen against vandalism and contamination of the water.
- I. Grounding lugs. Provide four (4) equally spaced grounding lugs welded to base of shell.
- J. Tank Anchors and Anchor Chair: If required, quantity and location to be designed by the tank manufacturer.
- K. Steel Inlet/Outlet Piping: Provide steel (1/2-inch wall) or ductile iron inlet and outlet flanged piping as shown on the Drawings.
- L. Tank Drain: Provide separate tank drain pipe to a drain hydrant as shown on the Drawings.

2.03 SOURCE QUALITY CONTROL

- A. AW reserves the right to perform shop inspection of materials and shop fabrication and painting procedures. Submit an accurate shop fabricating and painting schedule for all materials being furnished under this Section. The fabrication and shop painting schedule is required to be received by AW at least two (2) weeks prior to the start of any fabrication. Failure to notify AW in sufficient advance of these procedures is grounds for rejection of the materials.

PART 3: EXECUTION

3.01 ERECTION

- A. Fabricate and erect tank in accordance with latest edition of AWWA Standard D100.
- B. Piping Connection:
 - 1. Provide temporary pipe connection for the filling and testing of the tank. Make permanent pipe connections, after monitoring of settlement is complete, and the AW Project Manager has given approval to do so.

3.02 FIELD QUALITY CONTROL

- A. Inspection
 - 1. At completion of welding, have at least one spot radiograph taken in the field on four sides of every plate below overflow elevation. Consider spot radiographs required by AWWA Standard D100 as a part of above requirements.
 - 2. All bottom plates to be tested by air pressure or vacuum method in accordance with AWWA Standard D100.
 - 3. Submit a report on radiograph inspections to Engineer. Report to include a layout sketch indicating location of radiographs with respect to plate edges, and Inspector's acceptance record for all radiographs.
 - 4. If design incorporated AWWA Standard D100 - Section 14, submit the required welding report by a certified welding inspector. Include certificate to purchaser of compliance with AWWA inspection requirements under Section 14 with report.
- B. Settlement Check
 - 1. Prior to filling tank, record elevations at quarter points along outside of foundation. Permanently mark points for future reference. Record elevations to within 0.01 ft. using the site benchmark from construction.

2. Submit documentation of all elevations taken along with a foundation plan showing point locations, oriented to north and referenced to major tank appurtenances, sealed by a registered land surveyor licensed in the State in which the project is located.
- C. Leak Test
1. Check for leaks on tank surfaces during the filling process. Fix any leaks to the satisfaction of the AW Project Manager.

END OF SECTION 33 16 13