

SPECIFICATIONS - DETAILED PROVISIONS
Section 13311 - Welded Steel Tanks for Water Storage

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SECTION 13311
WELDED STEEL TANKS FOR WATER STORAGE

PART 1 - GENERAL

1.01 REQUIREMENT

Under these specifications the Contractor shall be required to design, furnish, deliver, erect, and paint a welded steel tank with a steel roof and concrete foundation ring which includes all appurtenances hereinafter described in these specifications, at the time and within the time as designated in the Notice Inviting Bids of the specification. When reference is made to other than District specifications, the latest revision shall be used. Tank painting shall be accomplished in accordance with District Specification Section 09873/09873.1 unless otherwise specified.

Some work for this tank may or may not be provided by others, depending upon whether the work has been specified in the Special Conditions. Work that may be provided by others includes the following:

- Rough and/or fine grading of tank site.
- Tank foundation ring.
- Installation of valve enclosures and special piping.
- Access roads to the tank site.
- Paving to and around tank site.
- Fencing.

The appropriate standard specification section with respect to the above list has been included elsewhere in the contract documents if that work is to be provided by the tank contractor. Details of the intended work is included on the contract drawings.

- A. Access Roads. Neither the terms hereof nor anything shown on drawings in connection with the right-of-way provided by the District shall be construed to entitle the Contractor to conduct operations on said right-of-way in violation of any ordinance or regulation restricting interference with water courses and drainage channels, road, alleys, or street until he has obtained permits therefore from the proper authorities.

Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street or way during performance of the contract work and he shall so conduct his operations as not to interfere unnecessarily with the authorized work of other agencies in such streets and ways.

- B. Power. The Contractor shall provide at his own expense all necessary power required for his operations under the contract. The Contractor shall provide and maintain in good order such modern plant and power equipment as may be necessary in the opinion of the Engineer to perform in a satisfactory and acceptable manner, and in accordance with the specifications, all the work required of the Contractor.
- C. Construction Area. Sufficient area at the tank site will be provided by the District for storage of materials and operation of equipment.

1.02 QUALITY ASSURANCE

- A. Materials. All materials and articles furnished by the Contractor and used for permanent installation in the work shall be new and shall conform to the respective specifications or brands herein designated and in the event the materials are not specified in detail in these specifications, the materials shall conform to the best standard construction practice as determined by the Engineer. All materials furnished shall be subject to rigid inspection and no material shall be used in the work until it has been inspected and accepted by the Engineer.
- B. Lines, Grades, and Measures. All lines and grades will be established by the Engineer and the Contractor shall provide him with such assistance and materials as may be required. The contractor shall carefully preserve all survey stakes and reference points so far as possible. Should any stakes or points be removed or destroyed unnecessarily by any act of the Contractor or his employees, they may be reset at the Contractor's expense.

The Contractor shall inform the Engineer a reasonable length of time in advance of the times and places at which he intends to work in order that lines and grades may be furnished, that inspection may be provided, and that necessary measurements for records and payments may be made with minimum inconvenience.

1.03 SUBMITTALS

The Contractor shall furnish certified copies of reports of tests or analyses of any of the materials used in the work and in accordance with applicable specifications for the material as provided in these specifications. All certificates shall be furnished and all tests and analyses required in connection therewith shall be made at the expense of the Contractor.

The Contractor shall furnish to the Engineer, as soon as issued, duplicate copies of all orders placed outside the Contractor's plant for articles or materials to be furnished by the Contractor for incorporation in the work. Said orders in all cases shall carry a notation to the effect that the articles and materials are subject to inspection and acceptance by the District, said inspection to be both during manufacture and after delivery at the site of the work. The Contractor shall also furnish the Engineer with such additional information as reasonably may be required regarding the character of the materials and the progress of their procurement.

After award of the contract and prior to any construction, the Contractor shall furnish a complete set of design drawings (including fabrication and shop drawings) that shows the tank configuration on the site which Contractor proposes to erect, including tank diameter, height, and roof type. The Contractor shall furnish the required drawings of the tank foundation for construction, and all fabrication drawings of the tank and appurtenances, and all equipment data, for approval by the Engineer. Design calculations for the tank foundation, the tank, shell, tank roof, interior tank structural system, tank overflow, tank vent, and all related tank appurtenances shall also be submitted for approval. The tank overflow shall be designed for the flow as shown on the contract drawings, as specified in the Special Conditions, or as required by the Engineer to accommodate the tank inlet line capacity.

1.04 JOB CONDITIONS

- A. Contractor's Equipment. The Contractor shall provide such modern equipment as may be necessary in the opinion of the Engineer to perform in a satisfactory and acceptable manner, and in accordance with the specifications, all the work required of the Contractor.
- B. Dust Abatement. The Contractor shall furnish all labor, equipment, and means required and shall carry out protective measures wherever as often as necessary to prevent his operations from producing dust in amounts damaging to property or causing nuisance. The Contractor shall be responsible for any damage resulting from dust originating from his operations. The dust abatement measures shall be continued until all required construction is completed or until the Contractor has completed arrangements with the proper authorities whereby he is relieved of further responsibility. All compensation to be received for dust abatement shall be included in the prices named for appropriate items of the bidding sheet.

1.05 PAYMENT

- A. Measurement for Payment. Quantities for furnishing all materials and erecting welded steel tanks as shown on the contract drawings, as described on the bidding sheet, and specified herein, will be measured in place on the basis of furnishing, delivery, and erection of each completed tank including steel plate, accessories, miscellaneous metalwork, protective coatings, and other miscellaneous items required for the completed structure as described herein.
- B. Payment. Payment for quantities of completed tanks measured as stated above and accepted, will be paid for on a lump sum basis at the bid prices as stated herein, which prices shall constitute full compensation for furnishing and delivery of all labor, equipment, tools, materials, and manufactured items necessary to complete the described work in place.

1.06 GUARANTEE

The Contractor hereby guarantees that the entire work constructed by him under the contract will fully meet all requirements thereof as to quality of workmanship and of materials furnished by him. Since inspection is between 11 and 23 months, a two (2) year warranty is appropriate. The contractor hereby agrees to make at his own expense any repairs or replacements made necessary by defective materials or workmanship supplied by him in the tank coating work which has become evident within two (2) years after the Notice of Acceptance of the work is filed, and to restore to full compliance with the requirements of these specifications any part of the welded steel water storage tank and appurtenant works which during said two (2) year period is found to be deficient with respect to any provisions of this specification. The Contractor shall make all repairs and replacements promptly, upon receipt of the written orders for same from the Engineer. If the Contractor fails to make the repairs and replacements promptly, the District may do the work and the Contractor and his Surety shall be liable to the District of the cost thereof. The warranty period for coating and painting is prescribed in Standard Specification Section 09873/09873.1

PART 2 - PRODUCTS

2.01 TANK FOUNDATION RING

Unless specified otherwise, the Contractor shall design and construct the tank foundation ring to meet the requirements of these specifications, the soils report and the geologist report. The tank foundation ring shall be a minimum of 3 feet in width with a minimum of 1½ feet outside the tank shell and shall extend a minimum of 18-inches below grade.

The ringwall shall be fitted with 1-inch PVC weep holes and crack control joints at 15 feet on centers. A ½ inch cane fiber pad shall be placed between the ringwall and tank floor surface.

A 6-inch layer of 1/2" clean crushed rock shall be placed under tank within the confines of the ringwall. A sample of the rock shall be submitted for approval ten (10) days prior to the delivery date.

2.02 TANK

The materials, design, fabrication, erection, and testing of the welded steel tank shall be in accordance with the latest revision of AWWA D-100, and/or AWWA D-100 Appendix C. The tank shall be designed for seismic loading in accordance with AWWA D-100, unless greater value is specified in the Special Conditions. Steel plate shall be in accordance with Table C-1, Appendix C. The tank roof support shall be of steel beams, and column(s) of steel pipe. Vent(s) shall be permitted only in the roof except as required in these detailed provisions.

The tank shall be of height and minimum net storage capacity as shown on the contract drawings. A one (1)-foot encroachment into the knuckle of the roof is permitted for storage capacity. It is the intention in these specifications to afford the District the opportunity of utilizing Contractor's standard size tanks. In providing the required storage capacity, storage below the inlet-outlet pipe extension must be disregarded.

2.03 ACCESSORIES

The following items shall be furnished with each tank and fabricated in accordance with the applicable sections of the latest revision of the specifications stated herein:

- A. Shell Manhole. Hinged 30" diameter per AWWA Spec. D-100.
- B. Flush-Cleanout. 48"x48" as shown on the construction drawings.
- C. Overflow. As per District drawings. Minimum design capacity for the overflow shall be as shown on the contract drawings or as specified in the Special Conditions.
- D. Stairway to Roof. As per OSHA standards, extending from top of tank to the ground with 1:1 maximum slope and slip resistant treads. Stairway shall be painted in accordance with exterior tank coating specifications and shall be fitted with an anti-climb barrier at the 10 foot level.
- E. Inside Tank Ladder. Per District Standard Drawing A-415, extending 8-inches from bottom of tank to the roof with stainless steel center safety rail for harness attachment. The safety rail shall be secured to ladder with all stainless steel hardware and fasteners, but shall be cathodically isolated from ladder using dielectric isolation film suitable for submergence. One complete safety belt assembly shall be supplied to the District with each tank having the safety climb rail feature. All rungs of the ladder shall have full welds on both sides of the rails.
- F. Roof Hatch and Access Platform. As per AWWA Spec. D-100 and District Standard Drawings B-979 and B-984.
- G. Roof Vent. A circular-shaped roof vent shall be located at the center of the roof of the tank in accordance with AWWA D-100, Section 7.7. The vent opening shall have a capacity to pass air at a rate so that water entering or leaving the tank will not develop excessive pressure. The vent opening shall be screened to protect against insects. The screen shall be made of 16 x 18 mesh fiberglass wire cloth and secured to the vent structure by tensioned stainless steel bands. The screen shall not be mounted until after the final tank coatings have been applied.
- H. Tank Inlet-Outlet. As shown on the contract drawings; it shall be designed to not only support the weight of AWWA C-504 Butterfly Valve and its hydraulic operator, but also to allow for the valve to move with the tank shell and prevent tank shell rupturing during seismic movement of the tank shell. Shell reinforcement surrounding the inlet-outlet nozzle shall also provide for thrust towards the tank due to hydrostatic test pressure of no less than 50 p.s.i. exerted against the inlet-outlet butterfly valve.

2.04 TANK DETAILS AND MATERIALS

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- A. The design metal temperature shall be 20° F.
- B. The shell plate shall not underrun the calculated thickness of the course in question.
- C. Manual arc-welding electrodes shall conform to the latest requirements of AWS-ASTM Spec. No. 233 or 316, whichever is applicable and shall be suitable for the electric characteristics, the position of welding, and other conditions of intended use.
- D. Reinforcing plates or insert reinforcement of penetrations shall be of the same material as the shell plate to which they are attached.
- E. All permanent attachments welded to shell plates, regardless of size, shall be of material having an allowable design stress not lower than the calculated shell stress at the level of attachment.
- F. The material for the stairway, platforms, safety cage, floor plates, roof plates, and roof accessories shall conform to ASTM Designation A-36.
- G. In no case shall the shell thickness of a lower course be thinner than the course above it.

PART 3 - EXECUTION

3.01 COMPLIANCE WITH REGULATIONS

The Contractor shall familiarize himself and comply with all applicable state, county, and municipal rules and regulations pertaining to sanitation, fire protection, barriers, warning lights and signs, and with forced-ventilation requirements for coatings application and curing.

3.02 TANK ERECTION

The tank and foundation ring specified under "PART 2 - PRODUCTS" shall be erected in accordance with the provisions of the AWWA Specification recited in Article 2.02 of this specification, the Special Conditions, the Contract Drawings, and approved submittals.

Cane-fiber joint filler meeting the requirements of ASTM D-1751 shall be placed between the tank floor and the concrete ringwall (see AWWA D-100 Section 12.6.1.1b). The tolerances for the ringwall shall be in accordance with Section 12.6.2 of AWWA specifications.

3.03 VACUUM TESTING

After erection of the tank but before leak testing and disinfection, all joints in the tank bottom shall be vacuum tested per the procedures outlined in AWWA D-100.

3.04 LEAK TESTING

After erection of the tank but before leak testing and disinfection, all joints in the tank bottom shall be vacuum tested per the procedures outlined in AWWA D-100.3.04. Following the manufacturer's recommended period of curing for the interior coating, the tank shall be washed and disinfected. The tank shall then be filled and checked for leakage. For District contracts, water will be supplied by the District.

3.05 SECURITY

The Contractor shall be responsible for the security of the construction site until the project is complete. All temporary fences, security guards, or other security measures are the responsibility of the Contractor.

3.06 TOXIC MATERIALS

Toxic materials including lead, chromates, and mercury are not permitted. Any materials or coatings containing carcinogens or toxins that require special hazardous waste treatment or disposal are not to be used.

3.07 CLEANING UP DURING CONSTRUCTION

The Contractor shall keep the premises occupied by him in a neat and clean condition, and free from unsightly accumulation of rubbish. Upon completion of the work and before the final estimate is submitted, the Contractor shall, at his own cost and expense, satisfactorily dispose of or remove from the vicinity of the work all plants, buildings, rubbish, unused materials, concrete forms, and other equipment and materials belonging to him or used under his direction during the construction, and in the event of his failure to do so, the same may be removed and disposed of by the District at the Contractor's expense.

Fences on the right-of-way shall be removed by the Contractor where necessary for the performance of the work and where required shall be rebuilt in as good condition as found. Where designated, fences shall be maintained until the work is completed or their removal is authorized. Where the Contractor removes existing fences to facilitate the work, temporary fence protection for lands adjacent to the right-of-way shall be provided at all times during the continuation of the contract. Such temporary fence protection shall be adequate to prevent livestock from straying from or onto adjacent lands and shall be constructed complete with gates and/or cattle guards. The cost of all work described in this paragraph shall be included in the prices bid for other items of work.

END OF SECTION 13311

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