SECTION 21 41 23 – fire water and domestic water surge tanks

1. GENERAL
   * + 1. RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

* + - 1. SUMMARY

Provide combination fire protection and domestic water storage tank system including; water tanks, fill valves, controls, level sensing apparatus, alarm systems, control panels and relays, pipe connections, tank coatings and all accessories for a complete, operable, approved system that is acceptable to the Owner and Code Authorities. These systems shall be the unit responsibility of one supplier.

Tank systems covered by this section shall be located within interior locations having temperatures maintained between 40 and 100 degrees Fahrenheit.

* + - 1. REFERENCE STANDARDS

The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

All materials, installation and Workmanship shall comply with the applicable requirements and standards addressed within the following references:

ASTM A36 - Specifications for Structural Steel

ASME - Boiler and Pressure Vessel Code

AWS - American Welding Society, Inc.

AISC - American Institute of Steel Construction

SSPC-SP10 - Surface Preparation Steel Tanks

ANSI/NSF - Standard 61-Potable Water Tank Coatings

NFPA-20 - Centrifugal Fire Pumps, Latest Edition

NFPA-22 - Water Tanks for Private Fire Protection, Latest Edition

Steel Structures Painting - Manual, Volume 1, Good Painting Practices

City of Houston Plumbing Code

* + - 1. QUALITY ASSURANCE

Systems design shall be in conformance with the City of Houston Plumbing Code, City of Houston Fire Marshal, NFPA-20 and NFPA-22.

Obtain and become familiar with requirements of Owner's insurance underwriter and incorporate all applicable provisions for compliance.

Thoroughly and clearly document all Project related communications with code and regulatory agents and expediently forward communication documentation to the BJC Project Manager.

Tanks shall be constructed in accordance with AWS Specifications for vessel fabrication, with structural design in accordance with AISC latest issue.

All materials shall be new to assure against the possibility of contamination from previous usage.

Manufacturers shall maintain a local service organization and spare parts available from local stock.

Control panels shall be completely wired and tested prior to shipment.

* + - 1. SUBMITTALS

General:

No Work shall be performed until the Shop Drawings, calculations and product data have been approved by BJC PD&C and the project fire protection engineer. This will require early processing of all submittals. The Contractor is solely liable for any Work performed or material purchases made prior to this approval.

Product Data:

Include dimensioned fabrication Drawings of water tanks indicating all components and accessories.

Include drawing of annunciator panel, giving information including front panel elevation, nameplate text, component list, dimensions and wiring diagram.

Include cut sheets for tank fill valves, level alarm switches, accessories, and alarms.

Provide material and coating specifications.

Record Documents:

Record actual locations of tank, valves, pipe connections and control panels.

Provide certification of Drawings by a Structural Engineer, registered in the State of Missouri, bearing seal and signature.

Provide notarized compliance certification of partition air test.

Provide written certification from the lining applicator verifying tank coating was provided and applied as specified and that the tests were performed and successful results obtained.

Provide full written description of manufacturer’s warranty.

Operation and Maintenance Data:

Operation and Maintenance Data: Include components of system, servicing requirements, Record Drawings, inspection data, component installation instructions, exploded valve assembly views, wiring diagrams, tank coating cleaning recommendations, replacement part numbers and availability, preventive maintenance schedule, preventive maintenance recommendations and procedures, location and contact numbers of service depot

* + - 1. DELIVERY, STORAGE and HANDLING

Accept tank and components on Site in factory packing. Inspect for damage. Comply with manufacturers rigging and installation instructions.

Protect tank and components from physical damage including effects of weather, water, and construction debris.

Provide temporary inlet and outlet caps, and maintain in place until installation.

1. PRODUCTS
   * + 1. GENERAL

All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

* + - 1. acceptable manufacturers

Tank - Unitank Systems by Albert Sterling & Associates, Inc.

Tank Coatings – McCrory Engineering, Inc. / Ameron

Level Alarms - Warrick / Unipoint

Fill Valves - Cla-Val

* + - 1. Water tank system

Water Tank:

Provide rectangular partitioned tank system for fire protection and domestic water storage with capacities of usable water as indicated on Contract Drawings. Provide separate compartments for fire protection water and for potable water. Provide double wall partition between potable and fire protection compartments to provide isolation as required by the City of Houston Plumbing Code.

Fire protection water storage shall not be less than twenty five hundred gallons.

Domestic water storage shall not be less than twelve hundred gallons and shall be divided into two compartments when storage exceeds two thousand gallons to minimize disruption of service during maintenance.

Double wall partition:

Partition shall extend to the top of the tank with each wall of the partition sealed with a continuous weld between the wall and four sides of the tank and be adequately stiffened to allow operation when one partition only is drained.

An air space shall be provided between the walls of the partition of not less than four (4) inches for tanks with a height of ten (10) ten feet or less. (For tanks over ten feet in height the space between the walls of the partition shall be not less than six (6) inches).

Provide a non-threaded opening at the bottom of the partition to give visual evidence of loss of integrity of the walls of the partition.

Perform a one psi air test with all welds soaped to assure no leaks in the partition chamber. Submit a notarized certification of compliance with this test.

Tank fittings and accessories shall include the following and such other items as required for a complete, code compliant system and as indicated on the contact Drawings. Pipe connection sizes shall be as indicated on Contract Drawings.

Top - 1/4” steel plate minimum, ASTM A36.

Sides and bottom - ¼” steel plate minimum, ASTM A36.

Steel channel stiffeners welded to top and sides where required.

24” x 24” manway with gasketed cover in top of each compartment.

24” x 24” manway with bolted and gasketed cover in sidewall of each compartment.

Stainless steel ladders inside each compartment and coated ladder on outside of tank.

A return bend vent pipe with an area not less than one half of the area of the overflow riser; vent opening and overflow riser covered with a metallic screen of not less than one hundred (100) mesh.

150 psi ANSI flanges and 3000 psi forged steel half couplings. (Provide stainless steel flanged nozzles and half couplings for domestic water compartment.)

Two inch half couplings for backup high level switch.

Three inch stilling wells with 3” x 2” flange for mounting Ultrasonic sensor, the stilling well to extend to the bottom of the tank, the bottom of the stilling well to be cut at a 45 degree angle.

Water level gauge consisting of two and one half inch angle valves with ball checks, ¼” needle drain valve with 5/8” rigid plastic Site glass on each tank or compartment. Rigid plastic sight glass to be run inside continuous baked urethane coated Unistrut to provide physical protection.

Metal nameplate affixed to tank giving the name of fabricator, date of fabrication and serial number of tank.

Domestic pump suction with 2’ x 2’ anti-vortex plate.

Fire pump suction with 2’ x 2’ anti-vortex plate in accordance with NFPA-20, 2-9.10 Vortex plate.

Fire pump test return inlet at top of fire protection water storage tank compartment with interior stilling baffle.

Overflow on fire protection water storage tank compartment.

Overflow on each domestic water storage tank compartment.

* + - 1. Water tank protective coating

All primers and paint coating shall comply with referenced standards for use on potable water systems.

Tank coating system shall be applied by a certified applicator approved by the manufacturer.

Surface Preparation: After fabrication and prior to applying interior tank coating, inside of tanks shall be thoroughly cleaned and abrasive blasted on all interior surfaces including ceiling, floor, walls, manways, and nipples to NASE #2 near white surface to obtain a minimum surface profile of 2 mils.

Application shall conform to standards of Steel Structures Painting Manual, Volume 1, Good Painting Practice.

Interior Surfaces: Inside coating and top of tank coating will be McCrory-500 Epoxy Lining system and shall be applied with a minimum of two (2) coats to a minimum 15 to 18 mil D.F.T. (dry film thickness) to all interior surfaces including interior of nozzles and to the top of the tank. Tank coating system shall be manufactured and installed by McCrory Engineering, Inc. A Certificate of Compliance stating that the lining was installed in accordance with these specifications shall be provided by the Manufacturer/Applicator. McCrory Engineering, Inc. warranty for McCrory-500 is (6) six years utilizing the McCrory Engineering Preventative Maintenance program of inspections of the application in year 2 and 4 following the application.

Exterior Surfaces: Paint the outside of the tank, except top and bottom, with a shop coat of Ameron Amercoat 185H, 2 to 3 mils DFT, fast drying, lead and chromate free, rust inhibitive alkyd metal universal primer. One coat Ameron Amercoat 78HB quick dry coal tar epoxy, 16 mils DFT, shall be applied to the bottom of the tank. After the tank has been erected at the site another coat of primer and a final coat of finish paint shall be applied under another Division.

Set the bottom of the tank in a coat of mastic that completely covers the area under the tank. The thickness of the mastic shall be as recommended by the manufacturer to form a monolithic, highly impermeable membrane system compatible with the material of the tank. Mastic shall be Ameron Amercoat 78HB quick dry coal tar epoxy.

* + - 1. Level alarm system

Provide Unipoint Ultrasonic level alarm and valve control sensors and level signal panel with all control relays, terminals, level sensing equipment alarms, and all other apparatus and accessories specified or necessary for complete signal and valve control system. System shall be the unit responsibility of one supplier.

Provide the following and such other items as detailed on the Drawings:

Ultrasonic Level Transmitter: Gems Sensor, Model No. UCL 201001 continuous ultrasonic sensor for measurement up to 18.5 feet in depth, with PVDF, NEMA 2 enclosure and 2” NPT connection for mounting on 3” stilling well with 3” x 2” flange and extending to the bottom of the tank, the bottom of the stilling well to be at a 45 degree angle.

Level Alarm and Valve Control Panel (120 volts, AC)

UNIPOINT custom level control and alarm panel, NEMA 4X fiberglass enclosure.

Amber “Power On” light.

Electronic analog panel meter controller with LED display of tank level and setpoint action.

Common alarm buzzer with silencing push button.

High and Low Level Alarm light and water level readouts with nameplates for each.

Auxiliary alarm contacts for remote alarm devices.

Numbered terminal strip for field connections to ultrasonic sensors and remote alarm devices.

Duplex solenoid fill valve control with automatic alternation of lead valve.

Fill valve HOA switches and valve on light for each valve.

High level signal for block valve where required.

Backup high level switch contacts.

Where two tanks or compartments for the same service are being monitored, provide a panel selector switch to avoid duplication or signals and to select control for the operating tank or compartment. Selector switch shall select tank or compartment to be monitored.

* + - 1. Fill valves

Fill valves shall be sized and piped as indicated on Contract Drawings.

Provide Cla-Val No. 136G-03AB (136G-01AC on 3” and smaller) normally closed, self contained solenoid fill valves with stainless steel trim, to be activated by the Ultrasonic level transmitter.

Each water storage compartment shall be served by at least two fill valves. Valve operation shall be lead/lag with the lead fill valve automatically alternated after each fill cycle.

* + - 1. Block valves

Block valves shall be sized and piped as indicated on Contract Drawings.

Provide Cla-Val No. 136G-03AB, normally open, self contained solenoid valve with stainless steel trim. Block valves shall be activated by the Ultrasonic high level signal from the respective tank or tank compartment.

Block valve shall not be required where the tank overflow discharges directly outside the building.

1. EXECUTION
   * + 1. INSTALLATION, testing and start-up

Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

All installation shall be in accordance with manufacturer’s published recommendations.

Provide 4” thick reinforced concrete housekeeping pad under water tank system.

Provide individual manual shutoff valves to isolate each fill valve for servicing. Manual shutoff valves that isolate fire protection water supply shall be provided with tamper switches.

Provide block valves on tank fill lines only when tank overflows cannot discharge by gravity onto grade through an exterior wall.

Provide full line size valved bypass around block and fill valves for each tank compartment to allow manual filling.

Electrical power serving tank level control and monitoring shall be from emergency source.

Electrical power serving block valves shall be from emergency source.

Tank water levels for the Level Alarm and Valve Control System shall be field selectable. Levels shall be as indicated on Contract Drawings and as recommended by the tank manufacturer.

Provide a representative of the Level Alarm and Valve Control System manufacturer to supervise the final adjustment of the level alarm and valve control system after installation is complete.

Provide a representative of the Level Alarm and Valve Control System manufacturer, after success completion of commissioning integrated systems test, to instruct the Owner’s operating personnel in its use.

Wiring between components on the tank and the control panel included within this specification shall be responsibility of the Alarm and Valve System Supplier.

All flow switches, valve supervisory switches and alarms installed within fire protection water supply shall be coordinated with the Fire Alarm Contractor for a complete, operable and approved system.

Interior Coating Inspection:

Inspection to commence only after the coating has sufficiently cured, usually one to five days. (Consult the coating manufacturer for specific curing schedule.)

Film Thickness: check with a non-destructive, magnetic pull-off type gauge such as a Mikrotest Model DFG-100 or electronic thickness gauge. Verify accuracy of thickness gauge with National Bureau of Standards certified thickness calibration plates.

Holiday Test: Furnish a 67-½ volt DC, 80,000 ohm Tinker-Rasor wet sponge holiday detector, or equal, and test all interior surfaces for holidays.

* + - 1. warranty

The complete system shall be warranted in writing against defects in materials or Workmanship under normal use and service for a period of one year after date of Substantial Completion.

END OF SECTION 21 41 23