SECTION XX-XX-XX

POLYETHYLENE CHEMICAL STORAGE TANKS

PART 1 - GENERAL

* 1. SUMMARY
     1. This section covers all work necessary to manufacture, furnish, install, and test polyethylene chemical storage tank systems complete with all required accessories in accordance with the Contract Documents.
  2. REFERENCE STANDARDS
     1. The following is a list of standards that may be referenced in this section:
        1. NSF International (NSF):
           1. 61, Drinking Water System Components – Health Effects
        2. American National Standards Institute (ANSI)
           1. B-16.5, Pipe Flanges and Flanged Fittings
        3. American Society of Mechanical Engineers (ASME):
           1. B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
        4. ASTM International (ASTM):
           1. C117, Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hotplate Apparatus.
           2. D638, Test Method for Tensile Properties of Plastics.
           3. D648, Test Method for Deflection Temperature of Plastics Under Flexural Load.
           4. D746, Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
           5. D790, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
           6. D883, Standard Definitions of Terms Relating to Plastics.
           7. D1505, Test Method for Density of Plastics by the Density- Gradient Technique.
           8. D1525, Test Method for Vicat Softening Temperature of Plastics.
           9. D1621, Test Method for Compressive Properties of Rigid Cellular Plastics.
           10. D1622, Test Method for Apparent Density of Rigid Cellular Plastics.
           11. D1623, Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
           12. D1693, Test Method for Environmental Stress Cracking of Ethylene Plastics.
           13. D1940, Method of Test for Porosity of Rigid Cellular Plastics.
           14. D1998, Specification for Polyethylene Upright Storage Tanks.
           15. E84, Test Method for Surface Burning Characteristics of Building Materials.
           16. F412, Standard Terminology Relating to Plastic Piping Systems
     2. Building Code: International Building Code - IBC 2009
     3. ARM: Low Temperature Impact Resistance (Falling Dart Test Procedure).
  3. DEFINITIONS
     1. HDXLPE: High-Density Cross-Linked Polyethylene.
     2. LLDPE: Linear Low-Density Polyethylene.
  4. SUBMITTALS
     1. Action Submittals:
        1. Shop Drawings:
           1. Location and orientation of molded in fitting, openings, fittings, accessories, restraints and supports.
           2. Details of inlet and molded outlet fitting, manways, flexible connections, and vents.
     2. Informational Submittals:
        1. Manufacturer’s warranty
        2. Manufacturer's unloading procedure
        3. Manufacturer's installation instructions
        4. Material Submittals:
           1. Resin Manufacturer Data Sheet
           2. Fitting Material
           3. Gasket style and material
           4. Bolt material
        5. Factory Test Report:
           1. Wall thickness verification
           2. Visual inspection
           3. Impact test
           4. Gel test
           5. Hydrostatic test
     3. Operation and Maintenance Manual
        1. Includes all of the information outlined above in one encompassing package.
  5. QUALITY ASSURANCE
     1. The tank manufacturer must be an ISO-9901:2008 certified manufacturer.
     2. The tank manufacturer must have five (5) years of experience in the fabrication of polyethylene storage tanks of similar size and usage.
     3. The tank manufacturer shall be capable of providing tanks certified to NSF/ANSI 61 for potable water and/or chemicals in the water treatment process.
     4. Like items of materials and equipment shall be the end products of one manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts, and manufacturer’s service.
  6. DELIVERY, STORAGE, AND HANDLING
     1. All materials fabricated to this Specification must be packaged, crated, or protected in such manner so as to prevent damage in handling and while in transit.
     2. Tanks shall be stored in compliance with manufacturer’s recommendations prior to installation.
  7. SPECIAL GUARANTEE
     1. Tank manufacturers must guarantee that all tanks manufactured shall be free of defects in material and workmanship for a period of five (5) years limited.
     2. Tanks shall have a minimum 5-year guarantee from the tank manufacturer, covering the complete cost of repair and replacement of the tanks (not including any costs associated with altering, removing, or demolishing the existing facility structure for such removal which shall be borne by the Contractor) so long as the tank was handled and installed in a proper manner.
     3. Full warranty terms can be supplied upon request.

PART 2 - PRODUCTS

* 1. MANUFACTURERS
     1. Assmann Corporation.
     2. Approved Equal
  2. GENERAL
     1. The polyethylene tank must be manufactured in one-piece seamless construction by rotational molding in accordance with the definitions given in ASTM D 1998.
     2. The polyethylene tank shall be manufactured for above ground installation and be capable of storing contents at atmospheric pressure and temperature. Tanks shall be designed to withstand the hydrostatic pressure resulting from a full tank. This specification does not cover the design of vessels intended for applications involving pressure above atmospheric, vacuum, burial, or temperatures above the maximum limit of the tank design.
     3. The resin suppliers recommended maximum material use temperature for cross linked polyethylene resin is 150 degrees F, and for linear polyethylene resins is 120 degrees F. Generally, the less exposure to elevated temperatures, the greater the tank life.
     4. Tanks shall be adequately vented to provide sufficient ACFM (air cubic feet per minute) per manufacturer’s standards.
     5. All equipment specified herein shall be suitable for contact with the stored chemical / service being specified.
     6. All equipment specified herein shall be suitable for contact with potable water in

accordance with NSF 61.

* + 1. All equipment specified herein shall be factory-fabricated and assembled to the maximum extent possible, requiring a minimum of field assembly. Field installation shall be limited to anchoring the tanks and making external piping connections.
  1. TANK DESIGN CRITERIA & CONSTRUCTION
     1. ASTM D1998 standards for Polyethylene Storage Tanks.
     2. The resin used in manufacturing the tanks shall be virgin linear polyethylene or cross-linked polyethylene. No fillers shall be added to either resin.
     3. All tanks used for outdoor installation shall contain a suitable ultraviolet stabilizer, minimum 0.3% 2-hydroxy-4-n-Octoxy-benzophenone or equivalent. The stabilizer shall be compounded into the polyethylene resin.
     4. Tanks shall be designed with uniform wall thickness equal to or greater than the minimum thickness requirements per the Barlow Formula shown in this specification.
     5. The vessel shall be air-cooled to ensure a consistent cure throughout the thickness of the part and reduce the stress caused by shrinkage. This procedure in the manufacturing process allows the part to cure evenly throughout the entire surface area, thus allowing a more controlled and higher cross-linking percentage with less stress on the part when reaching the cooling process. The end result will give each unit greater structural integrity and a longer life span.
     6. The minimum required wall thickness of the cylindrical straight shell at any fluid level shall be determined by the following equation but shall not be less than 3/16-in. thick. The tolerance indicated in this specification applies to these dimensions.
     7. Wall thickness for a given hoop stress is to be calculated in accordance with ASTM D 1998.
        1. The wall thickness of any cylindrical portion at any fluid level shall be determined by the following equation:

T = P x OD/2SD or 0.433 x SG x H x OD/2SD

Where: T = wall thickness, in

P = pressure, psi

SG = specific gravity, gm/cc

H = fluid head, ft

OD = outside diameter, ft

SD = hydrostatic design stress

* + - * 1. The minimum wall thickness shall be sufficient to support its own weight in an upright position without external support but shall not be less than 0.187” thick.
    1. The design of the vessel shall be vertical, flat bottom, closed top, and seamless in construction.
    2. On closed top tanks the top head shall be integrally molded with the cylindrical wall. Its minimum thickness shall be equal to the thickness of the top of the straight sidewall. In most cases, flat areas shall be provided for attachment of large fittings on the dome of the tank.
    3. The bottom head shall be integrally molded with the cylindrical wall.
    4. All tanks shall have a minimum 2” knuckle radius.
    5. The finished tank wall, so far as is commercially practical, shall be free of visual defects such as foreign inclusions, air-bubbles, and pinholes that may impair the serviceability of the vessel.
    6. All edges where openings are cut into the tanks shall be trimmed smoothly.
    7. The inner surface shall be smooth and free of cracks, crazing or pits. Waviness is a characteristic of the molding process for large tanks and is acceptable, provided the surface is smooth and free of cracks.

***Double Wall Tank Design Information***

* + 1. Double wall vessels shall be designed so the top head of the primary vessel covers the interstitial space between the two structures providing protection against the elements. The secondary structure shall be the same diameter as the top head of the primary vessel.
    2. The design of the vessel shall be vertical, flat bottom, closed top, and seamless in construction. The dome of the primary tank shall be larger in diameter than the diameter of the straight shell sidewall of the secondary containment tank.
    3. The secondary vessel shall hold a minimum 120% of the primary vessel.
    4. The outer tank shall be vertical, flat bottom, open top, and seamless in construction and shall have a minimum of four flats on the bottom sidewall that extend towards the center of the vessel providing a means to center the primary tank. The flats shall also provide an area for the placement of bottom discharge fittings. The flats shall also provide stability for the primary tank for installations that require seismic restraint systems.
    5. The two vessels shall be fastened together with stainless steel hardware for shipping and handling. Lifting lugs should be used for lifting the tank in lieu of the fastening bolts.
    6. Wall thickness for both primary and secondary vessels will be uniform throughout and verifiable via wall thickness testing procedures. The thickness of the top sidewall will be consistent with the bottom sidewall.
  1. SERVICE CONDITIONS
     1. Location: Indoors or Outdoors?
     2. Ambient Air Temperature Range: 32 degrees to 100 degrees F.
     3. Relative Humidity: Up to 100 percent.
     4. Operating Pressure: Atmospheric.
     5. Chemical & Material Compatibility:
        1. Sodium Hypochlorite
           1. PVC
           2. VITON
           3. Titanium
        2. Sodium Hydroxide
           1. PVC
           2. EPDM
           3. 316 SS
     6. Chemical & Tank Capacity:
        1. Sodium Hypochlorite
           1. Bulk Tank: 1,500gal
           2. Day Tank: 250gal
        2. Sodium Hydroxide
           1. Bulk Tank: 1,500gal
           2. Day Tank: 250gal
  2. ACCESS OPENING & FITTING DESIGN REQUIREMENTS
     1. Access Openings
        1. Unless otherwise indicated, tanks less than 300 gallons require the smaller 6” or 7” access openings, tanks ranging in size from 400-4,000gal require the mid-sized 16” access opening, and tanks larger than 4,000gal require the 24” access opening. Gaskets shall be closed cell, cross-linked polyethylene foam, Viton, or EPDM materials.
           1. The standard access opening shall be either a 6”, 7”, 16” or 24 diameter openings integrally molded with the primary tank top depending on the size of the vessel.

* + - * 1. The standard 6” or 7” cap design shall be such that the polyethylene cover for the standard opening threads onto the molded lip and is sealed tight with a gasket integral to the cover.
        2. The standard 16” lever locking design shall be such that the polyethylene cover for the standard opening snaps over the molded lip and is secured with a nylon lever-lock. A gasket shall be integral to the cover that seals on the molded lip.
        3. The standard 24” hinged design shall be such that the polyethylene cover for the standard opening compresses over the molded lip and is secured with rubber straps.
        4. An acceptable optional manway cover shall be a ½” thick polyethylene plate, ½” thick XLPE gasket and PVC threaded bolts or a hinged and weighted manway to allow for emergency venting. The optional manway covers shall be mounted on a raised flat molded integrally with the primary dome for structural support.
    1. Tank Fittings
       1. Fitting placement – the tolerance for fitting placement shall be +/- 3% in elevation and degree.
       2. All materials used in tank fitting assemblies shall be resistant to the stored chemicals.
       3. Gaskets:
          1. Material compatible with chemical service, low torque, full face, ASME B16.1 dimensions, two concentric, convex, molded rings between center hole and bolt hole circle.
          2. Type-1/4-inch thick, low torque, full face, ASME B16.1 dimensions.
       4. Tank fittings and openings shall be provided for all tanks as shown on the Drawings and per the schedule at the end of this section.
          1. Contractor shall coordinate fitting size and location for chemical fill, pump suction, and vent piping.
          2. Atmospheric vent shall be provided as noted on the contract drawings.
       5. Tank fittings shall be bulkhead style for connections installed on the top flats of the tank.
       6. Tank fittings shall be bulkhead self-aligning dome style for connections installed on the top dome of the tank.
       7. Tank fittings shall be bulkhead or flange style for connections installed on the upper sidewalls of the tank. Depending on the size and diameter of the tank, flange style connections may be preferred. Depending on the chemical being stored, and size/diameter of the tank, bulkhead style connections may be preferred.
       8. Tank fittings shall be bulkhead, flange, or metallic style for connections installed on the lower sidewalls of the tank. Depending on the size and diameter of the tank, flange or metallic style connections may be preferred. Depending on the chemical being stored, and size/diameter of the tank, metallic style connections may be preferred. Siphon drains should be used on all drain connections to ensure the tanks can be adequately drained.
       9. Flanged Fittings:
          1. Shall be compatible with 150 lb. ANSI bolt pattern flanges.
          2. Bolts and connecting hardware shall be stainless steel.
          3. All bolts, gaskets, and connecting hardware shall be gasketed with materials compatible with the chemical service.
    2. Vents
       1. Vents shall be sized to maintain atmospheric pressure under normal filling and discharge operations. Some applications or service conditions may require larger vents. Vents will be provided as agreed, to prevent pressure or vacuum from damaging the tank when filling or draining.
       2. The vent size shall be directly related to the size of piping specified for discharge and filling. The size of vent shall also take into consideration product flow and air pressure experienced in normal fill and discharge operations. Vents should be designed at 1.5 to 2 times the largest inlet or outlet connection.
  1. ACCESSORIES AND APPURTENANCES
     1. All tank accessories and appurtenances shall be chemically compatible with the stored materials and shall be designed to withstand the hydrostatic pressure resulting from a full tank.
     2. Calibration Tape: Calibration tape shall be self-adhesive, translucent tape and calibrated in multiples of 50 gallons or less. Strips shall use black numerals and tick marks to denote gallonage.
     3. NFPA 704 Signage:
        1. Affix one adhesive label to each tank supplied under this Section.
        2. Affix labels to assure maximum visibility from the normal operating floor.
     4. Nameplate Signage:
        1. Affix one adhesive nameplate to each tank supplied under this Section.
        2. Affix labels to assure maximum visibility from the normal operating floor.
        3. Self-adhesive, phenolic plastic engraved name plates shall include:
           1. Type of vessel, total volume and working capacity, product being stored including percentage of concentration, date vessel manufactured, and name of facility owner.
     5. Flexible connections:
        1. All fittings on the 1/3 lower sidewall shall have 100 percent virgin PTFE expansion joint.
        2. Expansion joint to have 3 convolutions, galvanized limit cables, ductile iron painted flanges and meet the following minimum performance specifications:
           1. Axial Compression: ≥ 1.5 inches.
           2. Axial Extension: ≥ 0.625 inch.
           3. Lateral Deflection: ≥0.75 inch.
           4. Angular Deflection: ≥14 inches.
           5. Torsional Rotation: ≥4 degrees.
     6. Lifting Lugs:
        1. Provide suitably attached for all tanks weighing over 3,000 gallons.
        2. Lifting lugs shall be mild steel epoxy coated stainless steel in construction, bolted to the top sidewall of the tank with donker bolts.
        3. Lifting lugs are to be used to lift the tank when empty.
     7. Pipe Supports:
        1. All piping shall be supported independently of the tank.
        2. Spacing of pipe supports shall be as recommended by the fabricator but shall not be greater than 6 feet on-center.
        3. Pipe supports shall allow removal of supported pipes.
     8. Local Level Indicators:
        1. Tanks shall be manufactured and supplied with local level indicators.
        2. The level indicator shall be assembled within the tank and shall consist of PVC float, indicator, polypropylene rope, perforated interior pipe, PVC roller guides, clear PVC sight tube and necessary pipe supports.
        3. The level indicated shall act inversely to the tank contents and shall not allow entrance of tank contents into the site tube at any time.
        4. Indicator shall be neon orange color for visual ease of operators.
     9. Ultrasonic Level Transmitter (if required):
        1. Tank supplier shall provide one ultrasonic level transmitter for each tank.
        2. Ultrasonic level transmitter shall support the following outputs: 4-20mA
        3. Tank supplier shall locate level sensor to provide accurate tank level measurement throughout the entire tank.

1. Level sensor shall be mounted on top dome at least 8” from side wall and pointing straight down.
2. Level sensor shall be located in accordance with manufacturer recommendations.
   * 1. Ladders (if required)
        1. Ladder assemblies shall be built to the most recent OSHA guidelines from a material that is chemically resistant to the environment. Reference: OSHA 2206; 1910.27; fixed ladders.
        2. Suitable materials shall be Isophthalic Polyester or Vinyl ester Fiber Glass Reinforced Plastic, or Mild Steel with two-part epoxy primer and black epoxy finish.
        3. All ladders shall be supplied with necessary assembly mounting hardware to mount to the storage tank.
        4. The ladder stand-off bracket shall be polyethylene material and conform to the tanks diameter to eliminate any stress point on the vessel.
        5. Ladders shall be designed to help deter personal from walking on tank roof. Top ladder rung or platform shall terminate 48" below tank roof.
        6. The ladder shall have a 24” x 24” platform with a 48” high handrail on both sides and safety chain enclosure. The top of the platform shall be located 48” below the top manway promontory.
        7. The ladder shall be fastened to the vessel with ½” diameter Viton or EPDM gasketed bolts at the platform and shall be anchored to the concrete at the base of the ladder.
        8. Concrete anchors supplied by others.
     2. Interstitial Leak Detection System (if required)
        1. Each tank shall be installed with a leak detection system to detect liquids within the interstitial space between the primary and secondary tank.
        2. Leak detection control system shall be mounted in a NEMA 4X enclosure. The system shall include both audible and visual alarms, as well as an auxiliary relay output rated at 5A @ 120 VAC.
        3. The audible alarm shall have an output of approximately 95 dB at two feet distance. A flashing strobe light shall be mounted at the bottom of the enclosure as well a button to silence the audible alarm.
        4. The leak detection probe shall be conductance type and be provided with 16 feet of interconnection cable. The leak detection system shall be manufactured in the USA.
     3. Tank Restraint System (if required)
        1. Wind and Seismic Restraint Systems shall be designed to meet UBC 1997 and ASCE wind-load and seismic conditions.
        2. Design calculations shall be provided with the technical drawings. Design calculations must include both tank and restraint system loads. Finite analysis of tank must be provided during the submittal process. Anchor bolts and concrete requirements must also be provided.
        3. Restraint system will consist of polyethylene anchor points evenly spaced around the tank base. Restraints shall be cable design with foot pads anchored to the concrete foundation. A turnbuckle shall be supplied on at least one side of each cable assembly to adjust cable tension. The restraint points shall be cabled to the tanks lifting lugs with either stainless steel or galvanized components.
        4. Each tank and its associated attachments shall be structurally adequate for all tank design criteria specified herein.
        5. The actual number of hold down lugs shall be calculated with the tank full.
        6. Restraint system calculations will be stamped by a registered engineering in either Indiana or the state of the systems installation.
        7. Design shall be prepared and sealed by a Professional Engineer licensed in the State the tank will be installed, including:
           1. Tank Design
           2. Tank Restraint System
        8. Restraints shall be designed to 2009 IBC Code.
        9. Anchor Bolts: AISI Type 316, stainless steel bolts, sized by engineered design calculations.
     4. Heat Trace and Insulation (if required)
        1. Tank shall be electrically heat traced to ensure that the contents are maintained at 50º/80º/100º F.
        2. Heat loss calculations shall be based upon a minimum ambient temperature of \_\_\_º F.
        3. The tank location is (indoors or outdoors) \_\_\_\_\_\_\_\_\_\_ and exposed to \_\_\_\_ mph wind.
        4. The tank shall be heated by using one or more Heating Panel. Sets are to be flat, flexible elements, 11" wide and may be up to 19 panels long. Up to five Panel sets, or a total of 95 panels of element, may be operated on one Control Unit.
        5. Each heating panel shall operate on 120 vac single phase. Each heating panel shall be of the low watt density design with a maximum power density of 40 watts/ Per Linear Foot.
        6. Over-temperature operation of the heating panel shall be prevented by the use of an over-temperature cut out switch that is an integral part of the heater construction.
        7. Heating panels shall be supplied with adhesive backing and “peel off” protection film, such that the heater can be directly bonded to the tank surface.
        8. One NEMA 4X digital controller shall control the tank heating system.
        9. The controller shall incorporate two thermostats, switching the heating system via one Solid State Relay. The primary thermostat shall be set to control the desired product temperature. The secondary thermostat shall be configured and wired to provide over-temperature protection for the total heating system.
   1. SOURCE QUALITY CONTROL
      1. Tanks shall be marked to identify the manufacturer, date of manufacture, and serial numbers must be permanently embossed into the tank.
         1. Each tank shall be marked with a quality and routing control number. This number will be used to trace the vessel and shall be common to all required documentation.
      2. Full ASTM testing & documentation shall include:
         1. Gel Test (Crosslink only), Impact testing, Hydrostatic Test, Light Test, Wall Thickness Report.
      3. Material Testing:
         1. Perform gel and impact tests in accordance with ASTM D 1998 on condition samples cut from each polyethylene chemical storage tank.
            1. The cross-linked tank shall have a minimum 70% crosslinking throughout, and Gel Test results shall be provided by the manufacturer using the test method as defined in ASTM D 1998.
      4. Factory Tests:
         1. Hydrostatic testing shall be done on all tanks to ensure a leak proof seal on all installed fittings and a certificate of compliance shall be sent with the tank.
         2. Hydrostatic test: Following fabrication, the bottom tanks, including inlet and outlet fittings, shall be hydraulically tested with water by filling to the top sidewall for a minimum of 1 hour and inspected for leaks. Following successful testing, the tank shall be emptied and cleaned prior to shipment.
         3. Inspect for foreign inclusions, air bubbles, pimples, crazing, cracking.
         4. Take exterior dimensions with the tank empty, in the vertical position. Outside diameter tolerance, including out-of-roundness, shall be per ASTM D 1998. Fitting placement tolerance shall be +/- 1/2-in vertical and +/- 1 degree radial.
      5. The mechanical properties of the polyethylene shall include ESCR, condition A F50 results for 100% Igepal as defined in ASTM D1593 as well as the results using a 10% Igepal solution. Both test results must exceed 1000 hours of exposure without failure.
      6. Material Testings shall meet or exceed the following properties:
         1. Density, D1505: 0.944 to 0.946 g/cc.
3. Cracking Resistance (F 50), D1693: 1,000 hrs.
4. Tensile Strength, Ultimate (2” min), D638: 2,600-3,000 psi.
5. Elongation at Break (2” min), D638: 400%.
6. Vicat Softening Point, D1525: 240 degrees F.
7. Flexural Modulus, D790: 100,000 psi.
8. Brittleness Temperature, D746: -130 degrees F.
9. Heat Distortion Temperature, D648: 67 degrees F.
10. Polyethylene Notch Test (PENT), F1473: > 1,000 hours.
    * 1. Factory Tests:
         1. Impact Tests: A representative sample from each tank shall undergo a factory impact test. Impact test must meet the requirements of ASTM D1998.
         2. Gel tests: A representative sample from each tank provided shall undergo a factory gel test, as prescribed by ASTM D 1998.
         3. Hydrostatic Leak Tests:
            1. Perform on each tank.
            2. Fill to overflow nozzle; allow to stand for 24 hours with no visible leakage.
         4. Tank wall thickness must be measured in increments of one-foot elevations at 0°, 90°, 180° and 270°. Measurements will record entire wall thickness from sidewall bottom to sidewall top and will include vessel dome and base.
         5. Reports: Certify by signature the results of the factory tests.

PART 3 - EXECUTION

* 1. INSTALLERS
     1. Tank(s) specified herein shall be installed by the General Contractor.
  2. INSTALLATION
     1. Install the tanks in strict accordance with the tank manufacturer’s operation and maintenance manual documents.
     2. Contractor shall provide all supervision, labor, tools, construction equipment, incidental materials, and the necessary services required to complete the installation and testing of the equipment.
     3. The manufacturer’s trained technician shall do an onsite inspection of installation. Inspection will verify plumbing connections, venting, and applicable ancillary equipment. A verification of proper installation certificate will be supplied when equipment passes installation checklist.
     4. Tank manuals will consist of installation check lists, tank drawing(s) as built, fitting drawings referencing nozzle schedule on tank drawing, materials of construction, and recommended maintenance program.
     5. Tanks shall be installed in such a manner that no stresses shall be applied to flanged outlets as per manufacturer’s installation instructions.
     6. Grouting:
        1. Uniform and level surface contact shall be made between all tank bottoms and the support foundations by means of grouting.
        2. Tanks shall be set in wet grout tapered from a point one inch higher at the tank center to the foundation edges.
        3. Initially, grouting shall be finished to leave no voids.
        4. Tanks shall be settled down squeezing out excess grout in such a manner as to leave no voids in the tank bottom/foundation interface.
        5. The grout shall not be used to support any load, only to fill irregularities in the tank bottoms and foundations.
        6. The in-place tanks shall not be exposed to any loads until the grout has hardened.
     7. All piping shall be supported independently of the tank. ***Where applicable, flexible expansion joints are required to allow the tank to expand and contract when filling and draining.***
     8. Accurately place anchor bolts using templates furnished by the manufacturer or as otherwise recommended by manufacturer and as specified in Section 05 50 00, Metal Fabrications.
     9. Bolt torques on gaskets shall be as recommended by the equipment manufacturer.
  3. FIELD QUALITY CONTROL
     1. Field Tests:
        1. Hydrostatic Test: Storage tanks shall be filled with clean water to the overflow level after all connections have been made. There shall be no leakage, no signs of weeping, and no signs of capillary action over a period of 24 hours.
        2. Functional Test: Supplementing the requirements of Section 01 75 16, Equipment Testing and Startup of Process Systems, include the following:
           1. Hydrostatic Test: Storage tanks shall be filled with clean water to the overflow level after all connections have been made. There shall be no leakage, no signs of weeping, and no signs of capillary action over a period of 48 hours.
           2. Quality control shall include a final inspection by the Contractor and a written record of this final inspection.
           3. After testing, the tanks shall be thoroughly cleaned and dried.
     2. Post-Startup Testing: A Performance Test for each mixer shall be conducted after Startup using the specified chemicals.
  4. MANUFACTURER’S SERVICES
     1. A manufacturer’s representative for the equipment specified herein shall be present at the Job Site for the minimum person-days listed for services hereunder, travel time excluded:
        1. One (1) person-day for inspection and certification of the installation.
        2. Installation will be inspected by manufacturer to verify system’s flexible connections, venting, and fittings are properly installed. In addition to on- site inspection tank system(s) shall reviewed using tank manual check list as supplied by the Manufacturer, as listed below.
        3. Manufacturer shall provide one (1) hour training session to prepare operators to service and maintain the tank system. Include training manuals in the training session.
        4. A verification of proper installation certificate will be supplied when equipment passes installation inspection.
        5. Tank manuals shall consist of installation check lists, tank drawing (s) as- built, fitting drawings referencing nozzle schedule on the tank drawing, materials of construction, and recommended maintenance program.
     2. Manufacturer Shall Certify in Writing:
        1. Equipment has been provided in accordance with this Specification.
        2. Equipment has been installed in accordance with the Manufacturer’s recommendations and inspected by a manufacturer’s authorized representative.
        3. Proper mechanical connections have been made.
        4. Equipment is ready for start-up, commissioning, and service.
     3. Warranty
        1. Manufacturer warrants that all tanks manufactured and sold shall be free of defects in material and workmanship for a period of five (5) years limited. Fittings are only warranted for 180 days.
        2. Tank must be manufactured by a manufacturer that is ISO 9001:2008 certified or, if a manufacturer does not have ISO certification, this manufacturer may provide a 10-year unlimited warranty.
  5. TANK SCHEDULE

|  |  |
| --- | --- |
| Tank Description & Accessories Requirements | |
| Quantity | 1 |
| Tank Model | ICT4200X19 |
| Storage Volume | 4200 |
| Diameter & Height | 96" D x 152" H |
| Specific Gravity | 1.9 |
| Chemical Being Stored | Sodium Hypochlorite |
| Temperature | Ambient |
| Indoors/Outdoors | Indoors or Outdoors |
| Access Opening | Standard 16" Lever Locking Manway Cover |
| Vent | 4" PVC Bulkhead Fitting/VITON |
| Tank Inlet | 2" PVC Bulkhead Fitting/VITON |
| Tank Anti-foam Elbow | PVC |
| Tank Fill Line | PVC/TT-VITON/VITON |
| Tank Outlet | 2" Double Male Fitting Titanium/VITON |
| Tank Outlet Siphon Drain | PVC |
| Tank Outlet Valve | PVC Compact Ball Valve |
| Tank Outlet Flange Adapter | PVC |
| Tank Outlet Expansion Joint | Teflon Expansion Joint/Galvanized Limit Bolts/Painted Ductile Iron Flanges |
| Tank Level Fitting | 2" PVC Self Aligning Bulkhead Fitting/VITON |
| Tank Ultrasonic Level Sensor | Yes |
| Tank Ultrasonic Level Sensor Display | Yes |
| Secondary Containment Drain | 1" PVC Bulkhead Fitting/VITON |
| Secondary Containment Valve | Yes |
| Heat Trace and Insulation | N/A |
| Leak Detection System | N/A |
| Restraint and Lifting Lug System | Stainless Steel/Titanium-VITON |
| Fiberglass Reinforced Plastic Ladder | N/A |
| Testing and Documentation | ASTM & Hydrostatic Testing Required |
|  |  |

END OF SECTION