

SECTION 13421

POLYETHYLENE CHEMICAL STORAGE TANK

PART 1-GENERAL

1.1 DESCRIPTION

A. Scope

1. Furnish and install a chemical storage tank with an integrally molded flanged outlet (IMFO[®]) and other tank connections as specified, constructed of high density crosslinked polyethylene
 - a. Hypochlorite solution tanks CLT-1 and CLT-2
 - 1) Provide with oxidation resistant liner
 - 2) Store and feed sodium hypochlorite solution
 - 3) To be furnished and installed by Owner
 - b. Digested sludge day tank DSDT
 - 1) Store and feed aerobically digested sludge
2. Accessories and piping complete and in place

1.2 QUALITY ASSURANCE

A. References, Codes and Standards

1. American Society of Testing Materials (ASTM)
 - a. D638 - Tensile Properties of Plastics
 - b. D883 - Standard Definitions of Terms Relating to Plastics
 - c. D1505 - Density of Plastics by the Density-Gradient Technique
 - d. D1525 - Test Method for Vicat Softening Temperature of Plastics
 - e. D1693 - ESCR Specification Thickness 0.125" F50-10% Igepal
 - f. F412 - Standard Terminology Relating to Plastic Piping Systems
2. ANSI Standards: B-16.5, Pipe Flanges and Flanged Fittings
3. Building Code: International Building Code, IBC 2009
4. ARM: Low Temperature Impact Resistance (Falling Dart Test Procedure)
5. ASTM D-1998: Standard Specification for Polyethylene Upright Storage Tanks

B. Supplier's Qualifications

1. All tank related product and accessories shall be manufactured and supplied by an organization who has been regularly engaged in the design and manufacture of chemical storage tanks for no less than 10 years prior to the date of this Contract

C. Supplier's Responsibility

1. Verify design, coordination and functioning of entire system
 - a. Notify Contractor and Engineer of discrepancies

D. Tanks shall be manufactured from virgin materials

E. Warranty

1. Refer to General and Supplemental General Conditions
2. Provide 5-year full replacement warranty for tanks

F. Factory Testing

1. Dimensions: Measure and report dimensions and relationship to criteria specified by ASTM D1998 including precision of fitting placement
2. Visual: Inspect for foreign inclusions, air bubbles, pimples, crazing, cracking, and delamination
3. Hydrostatic test
 - a. Following fabrication, hydraulically test with water by filling to the top sidewall for a minimum of half an hour and inspect for leaks
 - b. Following successful testing, the tank shall be emptied and cleaned prior to shipment

1.3 SUBMITTALS

A. Refer to Section 01340

B. Provide sufficient data to show products conform to the requirements of the Project Specifications and Drawings

1. Integrally molded flanged outlet (IMFO[®]) tank and fitting material
 - a. Resin Manufacturer Data Sheet
 - b. Fitting Material
 - c. Gasket style and material
 - d. Bolt or other fastener material
 - e. Lining or interior coating material
2. Dimensioned tank drawings
 - a. Location and orientation of integrally molded in fitting (IMFO[®]), openings, fittings, accessories, restraints and supports
 - b. Details of inlets, fittings, connections, integrally molded outlet fitting (IMFO[®]), manways, flexible connections, and vents
3. Calculations shall be stamped and signed by a registered, third party engineer
 - a. Wall thickness. Hoop stress shall be calculated using 600 psi @ 100 degrees F

C. Manufacturer's warranty

D. Manufacturer's unloading procedure

E. Manufacturer's installation instructions

F. Manufacturer's Qualifications

1. Submit to engineer a list of 5 installations in the same service as proof of manufacturer's qualifications

G. Factory Test Report

1. Material, specific gravity rating at 600 psi @ 100 degrees F. design hoop stress
2. Wall thickness verification
3. Fitting placement verification including molded in outlet (IMFO®)
4. Visual inspection
5. Impact test
6. Gel test
7. Hydrostatic test

PART 2 – PRODUCTS

2.1 GENERAL

- A. Rotationally-molded with integrally molded flanged outlet (IMFO®)
- B. High density crosslinked polyethylene with an oxidation resistant liner system (OR-1000™)
1. For only CLT-1 and CLT-2 tanks
- C. One-piece seamless construction, cylindrical in cross-section and vertical with flat exterior bottom
1. Interior tank bottom sloped to inlet/outlet
- D. Tank vent connection sized to limit internal pressure during filling by mechanical methods
1. Minimum diameter per Drawings
- E. Refer to Drawings for specific fittings, locations and purpose of connection
1. All connections to be factory fabricated with nipple and/or flange of specified size
 2. Provide gasketed blind flange for connections and openings not hard-piped to associated equipment
 3. Provide flexible couplings and connectors as recommended by manufacturer
 4. Provide sealed tank connection as required for level indicating device in DSDT
- F. Top Cover
1. Structurally sound for size and contents
 2. Integrally molded top with access-way
 - a. Dome or cone shaped top

- b. CLT-1 and CLT-2 shall have accommodations for mixer
 - 1) Minimum 6" diameter flanged nipple
- 3. Access way
 - a. Round 17-inch minimum diameter with ACME style thread pattern

G. Size and Volume

- 1. Hypochlorite solution tanks CLT-1 and CLT-2
 - a. Nominal volume: 500 gallons
 - b. Outside diameter: 4.00 ft
 - c. Shell height: 5.17 ft minimum
 - d. Total height: 6.5 ft maximum
 - e. Design basis: Poly Processing Company Stock No. 1100475
- 2. Digested sludge day tank DSDT
 - a. Nominal volume: 1,700 gallons
 - b. Outside diameter: 6.08 ft
 - c. Shell height: 8.00 feet
 - d. Total height: 11.0 feet maximum
 - e. Design basis: Poly Processing Company Stock No. 11001700 with T6IMFOM 6" tapered IMFO® nozzle

- H. Tank shall be marked to identify the manufacturer, date of manufacture and serial number permanently embossed into the tank

2.2 POLYETHYLENE MATERIAL AND FABRICATION

A. Service

- 1. CLT-1 and CLT-2: Sodium hypochlorite solution with maximum concentration of 15%
- 2. DSDT: Aerobically digested sludge with maximum solids concentration of 3%

- B. High density crosslinked polyethylene resin used in the tank manufacture shall meet or exceed the following properties

Property	Value	Test
Density, g/cc	0.938-0.946	ASTM D1505
Environmental Stress Cracking Resistance, F50, hours, 10% Igepal	>1,000	ASTM D1693
Tensile Strength at Yield, psi	>2,600	ASTM D638
Elongation at Break, %	>400	ASTM D638
Deflection Temperature at 66 psi	>140°F	ASTM D648
Impact Strength, -40°C, 0.125 in.	>70 ft-lbs	ARM
Flexural Modulus, psi	>87,000	ASTM D790

- C. Wall thickness for shall be determined in accordance with ASTM D 1998

1. Tanks shall be designed using a hoop stress no greater than 600 psi
2. On closed top tanks the top head shall be integrally molded with the cylindrical wall
 - a. Minimum thickness shall be equal to the thickness of the top of the straight sidewall
 - b. Provide flat areas for attachment of large fittings on the dome of the tank
3. The bottom head shall be integrally molded with the cylindrical wall. Knuckle radius shall be 1-inch minimum

D. Color

1. Natural (unpigmented)

2.3 TANK ACCESSORIES

A. Ladder

1. Fiberglass access ladders for access to dome top access-way
 - a. Use proper chemical resistant materials when anchoring to tank dome or sidewall
 - b. Ladders must be designed to OSHA standard 2206; 1910.27

B. Provide contents level detection for DSDT

1. Refer to Section 16700
 - a. Fixed probes with digital SCADA contacts
 - 1) Tank high level alarm
 - 2) Digested sludge pump off
 - 3) Digested sludge pump on
 - 4) Belt press feed pump off
 - 5) Tank low level alarm
2. Locate probes in tank to avoid interference and false readings from inflow, tank walls, fitting appurtenances or other objects
3. Provide sealed tank connection in top dome for mounting and accessing probes

C. Other Tank Accessories and Criteria

1. CLT-1 and CLT-2
 - a. Fluid operating temperature: Ambient
 - b. Fitting material: PVC
 - c. Gasket material: Viton
 - d. Bolt material: Titanium
2. DSDT
 - a. Fluid operating temperature: 5°C to 23°C
 - b. Fitting material: PVC or D.I.P.
 - c. Gasket material: EPDM
 - d. Bolt material: Stainless steel

D. Fittings

1. Refer to Drawings for required fittings and connections
2. Bolted flange bulkhead fittings
 - a. Constructed with one 150-lb flange installed inside the tank and one flange ring installed outside the tank
 - b. The flange will be socket or threaded according to specific connection requirements
 - c. The head of the bolts shall be encapsulated with polyethylene preventing fluid contact with the metal material
 - d. Encapsulated heads shall have a gasket to provide a sealing surface against the flange
3. Integrally molded flanged outlet fittings (IMFO[®])
 - a. Integral part of the tank, molded from the same material as the tank and provide complete drainage of liquid through the sidewall of the tank
4. Down pipes and fill pipes
 - a. Supported at 6 ft max intervals
 - b. PVC material

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

- A. The tank shall be shipped upright or lying down on their sides with blocks and slings to keep them from moving. AVOID sharp objects on trailers
- B. All fittings shall be installed and, if necessary, removed for shipping and shipped separately
- C. Upon arrival at the destination, inspect the tank(s) and accessories for damage in transit

3.2 INSTALLATION

- A. Install the tanks in strict accordance with manufacturer's installation manual and shop drawings

3.3 FIELD TESTING

- A. Hydrostatically test for 48-hours following installation and connection of all pipes and fittings
 1. Fill tank to maximum capacity with potable water
 2. Acceptance criteria: Zero leakage and no loss of tank contents
 3. Drain and flush tank after successful hydrostatic test

END OF SECTION