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FIBERGLASS REINFORCED PLASTIC TANKS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This section covers the furnishing and installation of fiberglass reinforced plastic tanks for the storage of Sodium Hypochlorite.

Connecting piping, valves and accessories not specified herein are covered in other sections.

1.2 SUBMITTALS

- A. Submit to the Engineer, in accordance with the submittal section, complete drawings, details, and specifications covering tanks, fittings and accessories.

- B. Drawing Approval

- 1. Shop drawings shall be approved by the Engineer prior to fabrication. Approval of Drawings by the Engineer shall not release the Contractor of responsibility of compliance with this Section. All proposed changes to this Section shall be stated in writing.

1.3 REFERENCE STANDARDS

- A. All materials and construction methods shall comply with the applicable provisions of the following standards:

- 1. ASTM D-3299-00 - Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.
 - 2. ASTM D-4097-00 - Standard Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.
 - 3. ASTM D-2563 - Standard Practice for Classifying Defects in Glass-Reinforced Plastic Laminate Parts.
 - 4. Where applicable, provision from A.N.S.I./A.W.W.A. D120-84 – Thermoset Fiberglass Reinforced Plastic Tanks and A.S.M.E./A.N.S.I. RTP-1-1995 – Reinforced Thermoset Plastic Corrosion Resistant Equipment will be used.

- B. Occupational Safety and Health Administration (OSHA)

1.4 DESCRIPTION OF TERMS

- A. Definitions for most terms used within this standard are in accordance with ASTM D-883 Definitions of terms relating to plastics.
- B. **FILAMENT WOUND** – The process in which the principle circumferential load bearing reinforcement is applied by continuous filament winding.
- C. **CONTACT MOLDED** – A molding process that includes spray-up, hand lay-up, or a combination of those manufacturing processes.
- D. **HEAD** – The end closure of cylindrical tanks (top or bottom).

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery, storage and handling of the fiberglass tanks shall be in accordance with the tank manufacturers Handling & Installation Instructions.
- B. The Contractor shall require the manufacturer to assume responsibility for packaging to prevent normal transit and handling damage to the tanks.
- C. Flange faces shall be protected from damage. All openings are to be securely covered to prevent entrance of dirt, water and debris.
- D. Tanks shall be mounted on skids or protective framework so constructed as to provide for easy handling for fork truck or similar device or be provided with lifting lugs, to permit handling by crane. Nozzles, manholes, or other fittings shall not be used for lifting.

PART 2 - PRODUCTS

2.1 GENERAL

Designation					
Classification					
Number of tanks					
Useable capacity, measured to invert of overflow connection, gallons each					
Diameter, feet					

Chemical					
Specific Gravity					
Maximum Operating Temperature					
Location (Indoor / Outdoor)					
Top (Open, Open w/Cover, Dome, Flat)					
Bottom (Flat, Sloped, Dished, Cone)					

2.2 ACCEPTABLE MANUFACTURERS

- A. Tanks shall be constructed by a firm that has at least ten years prior experience in construction of similar fiberglass tanks.
- B. The fiberglass tanks shall be as supplied by CRECO, Incorporated, Crete, IL.

2.3 MATERIALS

- A. RESIN – The resins used shall be a corrosion resistant vinylester thermoset resin that has been determined by previous documented service to be acceptable for the particular service conditions. Catalyst system shall be BPO/DMA catalyst. The resin shall contain no pigments, colorants, or fillers unless specified by the customer.
- B. SURFACING VEIL – The inner surface reinforcement shall consist of a double nexus surfacing veil. The surfacing veil shall contain a coupling agent or binder that is compatible with the corrosion barrier resin.
- C. CHOPPED STRAND MAT OR GUN APPLIED CHOPPED STRANDS – shall be constructed from single-end type E-glass strands 1/2” minimum to 2” maximum length. The coupling agent or binder shall be compatible with the resin used.
- D. CONTINUOUS ROVING – Filament winding requires a single-end type E-glass reinforcement with 250 yards/pound yield. The coupling agent or binder shall be compatible with the resin used.
- E. WOVEN ROVING – Shall be minimum 18 ounces/square yard and compatible with the resin used.

2.4 LAMINATE CONSTRUCTION

- A. **STRUCTURAL TANK** – The laminate comprising the structural tank (bottom head, sidewall, and top head) shall consist of three separate laminates. These are the inner surface and the interior layer, which make up the corrosion barrier, and the structural layer.
- B. **INNER SURFACE** – The inner surface exposed to the chemical environment shall be a resin rich layer .010 to .020 inch thick, reinforced with a double nexus synthetic surfacing veil. The glass content shall be 10% by weight maximum in this layer.
- C. **INTERIOR LAYER** – The interior layer shall consist of a resin rich laminate reinforced with chopped strands. The glass content shall be 27% +/- 5% by weight. The combined thickness of the inner surface and the interior layer shall not be less than .100 inch.
- D. **STRUCTURAL LAYER**
 - 1. **FILAMENT WOUND STRUCTURAL LAYER** – Subsequent reinforcement shall be continuous strand roving. Glass content of the filament wound structural layer shall be 60% to 70% by weight. The thickness of the filament wound portion of the tank shell will vary with tank height (tapered wall construction). If additional axial strength is required, the use of chopped strands or unidirectional glass strands interspersed between wind layers is acceptable.
 - 2. **CONTACT MOLDED STRUCTURAL LAYER** – Subsequent reinforcement shall be comprised of alternating layers of chopped strands and such additional number of plies of woven roving to a thickness as required to meet the physical properties that are used for the design. Each successive ply or pass of reinforcement shall be well rolled prior to the application of additional reinforcement. All woven shall be overlapped 1”. Laps in subsequent layers shall be staggered at least 3” from laps in the preceding layer. The final outer layer shall be chopped strands in all cases.
- E. **JOINTS** – Joints between sidewall sections, and for attachment of top heads or bottom heads shall conform to the width and thickness as specified in the applicable standards.
- F. The outer surface shall be coated with a 10 mil. thick layer of resin for spill protection. This layer will also contain ultraviolet absorbers and white gelcoat.
- G. Where air inhibited resin is exposed to air during cure, a full surface cure shall be obtained by coating the surface with a coat of resin containing 0.2% to 0.6% paraffin wax surfacing agent. Tank shall also undergo a minimum four hour post heat cure for sodium hypochlorite service.

2.5 MANHOLES, FITTINGS AND ACCESSORIES

- A. TOP AND SIDE MANWAYS – Shall be constructed using hand lay-up construction, and of the same materials as the tank they are installed in. Pre-fabricated press molded flat plate side manhole covers are not acceptable.
- B. FLANGED NOZZLES – The nozzle shall be of hand lay-up construction. Press molded flanges attached to pipe with adhesive are not acceptable, except for the inner flange on a double flange nozzle.
- C. COUPLINGS, NIPPLES, PIPE STUBS – Shall be of filament wound or contact molded construction. Press molded fittings are not acceptable.

Tanks shall be provided with the following flanged nozzles:

Quantity	Connection	Nozzle Size in Inches					Location on Tank

Tank shall be provided with the following accessories:

Quantity	Description	Location on Tank

D. VENTS – Unless agreed upon in advance by CRECO, Inc. all tanks shall be vented to prevent an internal pressure or vacuum. The vent must be of sufficient size to handle the flow displacement of all combined inlet or outlet nozzles.

NOTE: Tanks are not designed for improper Air Loading.

E. LIFTING LUGS – Shall be installed on tanks weighing over 200 pounds, unless otherwise specified.

F. HOLD DOWN LUGS – The size and number of hold down lugs shall depend on the wind, seismic, and other loads the tank will be subjected to during normal operation.

G. NAMEPLATE:

Tank nameplate shall be constructed of FRP materials and located approximately 5' up from tank bottom where possible. The nameplate shall include the following information:

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|-----------------------------------|---|
| 1. Serial number | 8. Service temperature |
| 2. Customer | 9. Product |
| 3. Customer purchase order number | 10. Corrosion barrier veil |
| 4. Tank model | 11. Corrosion barrier resin |
| 5. Tank capacity | 12. Structural layer resin |
| 6. Design pressure | 13. Date of fabrication |
| 7. Specific Gravity | 14. Tank tag (If Specified by Customer) |

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install the fiberglass tanks in accordance with the drawings, the manufacturer's installation instructions and to the satisfaction of the Engineer.
- B. Tanks shall be installed on a minimum of 2 layers of 30-lb. roofing felt, or other resilient support, on a level, smooth troweled concrete pad.

3.2 TESTING

- A. After installation and inspection, each tank shall be field tested by filling to the overflow with water. The tank and fittings shall hold water without loss or evidence of weeping for a period of 24 hours.
- B. After testing, the tanks shall be drained, thoroughly, cleaned and dried.
- C. Should any defects in workmanship or materials become evident during inspection, testing, or within the warranty period, repair or replace the defective tank or fitting as approved by the Engineer at no cost to the Owner.