

SECTION 11300 - FIBERGLASS FLAT COVERS FOR ODOR CONTROL

PART 1 GENERAL

1.01

EXTENT OF WORK

- A. The extent of work specified in this Section includes furnishing all materials, labor, tools and equipment, and performing all operations necessary to install items of fiberglass reinforced plastic (F.R.P.), as shown on the Contract Drawings and as specified herein.
- B. The work includes the following items in general.
 - 1. Pre-Engineered Flat F.R.P. Cover for Primary Clarifier Tanks. Weirs.

1.02

RELATED WORK SPECIFIED ELSEWHERE

- A. Ventilation F.R.P. piping, dampers and supports are specified in Section 15600 - VENTILATING SYSTEMS FOR ODOR CONTROL.

1.03

STANDARDS

- A. Applicable Standards of the American Society for Testing and Materials (ASTM).

1.04

SHOP DRAWINGS

- A. Shop drawings shall be submitted to the Engineer for review, in accordance with Section - SUBMITTALS.
- B. As a minimum, the submittal for the F.R.P. flat covers shall include the following:
 - 1. Shop drawings complete with materials of construction as specified.
 - 2. Shop drawings shall specify core material, balsa, steel, flatness, handles, fasteners, gasket profiles, sizes, spacing and locations of structural members, connections, attachments, openings, fasteners and loads, in strict accordance with the plans and specifications.
 - 3. Product data sheets.

4. Drawings shall be reviewed and stamped with the seal of a Registered Professional Engineer, for compliance with the plans and specifications.
5. Manufacturer's certificate of compliance with the plans and specifications.
6. Manufacturer's certification that the air flow beneath the cover is uniform, continuous and meets the minimum velocity in F.P.M. to completely evacuate the air at 12 changes per hour and no dead air spaces exist. The system is designed air-tight and that no air gaps are a part of the system.
7. The name, address, phone number and location of 5 installations, engineering firm, contractor, and plant manager, for reference, with equipment typical to that specified, produced and which has performed satisfactorily for a minimum period of 5 years.
8. Manufacturer's test results of cover molded with balsa-core and fiberglass reinforced plastic laminate using Baltek test method.

1.05 HANDLING AND STORAGE

- A. All materials shall be promptly unloaded upon arrival at the site. Materials shall be stored in such a way as to eliminate potential damage resulting from accidental impact. The panels for the F.R.P. flat covers shall be stored off the ground on a level surface in such a manner as to prevent warping or fracturing of the parts in accordance with the flat covers manufacturer's instructions.

1.06 GUARANTEE AND RESPONSIBILITY

- a. Material and Workmanship
 1. All materials and workmanship shall be guaranteed free from any inherent or hidden flaws or defects for a period of three (3) years from the date of beginning of full-time operation, ordinary wear and tear expected. Any defects occurring as stated above shall be repaired or made good without any expense or operating inconvenience to the Owner. Any material or any workmanship that is found to have been defective during the first year of full time operation, after formal acceptance, shall be replaced and corrected promptly by the Contractor at no cost or operating inconvenience to the Owner.
 2. Failure of the manufacturer to submit the required installation materials, engineering and air flow certifications in compliance to the specifications will be considered non-responsive/responsible and will result in rejection.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name and directions for storage.
- B. Store materials to comply with manufacturer's directions to prevent deterioration from moisture, cold, direct sunlight or other causes.

1.08 MANUFACTURER'S QUALIFICATIONS

- A. The items described under 1.01B above shall be produced by a single manufacturer.
- B. The manufacturer shall exhibit satisfactory performance on projects of similar magnitude under similar or equal service conditions for a period not less than five (5) years.
- C. Manufacturer for the F.R.P. covers, based on acceptable fabrication methods are Warminster Fiberglass Co., of Southampton, PA, or a pre-approved equal.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pre-engineered F.R.P. Covers and Scum Baffles for Odor Control.
 - 1. Fiberglass reinforced plastic covers with accessories shall be designed, manufactured and installed to cover existing circular primary clarifier effluent launder and weir, as shown on the Drawings and as herein specified.
 - 2. The General Contractor shall field measure the inside diameter of all Primary Clarifiers. The F.R.P. flat covers shall meet the following requirements:
 - a. Basis of Design
 - 1. Loading conditions. The launder/weir cover shall be designed to withstand a uniform load of 45 pounds per square foot and a 250 pound load over one square foot. Use L/240 for the maximum allowable

deflection.

2. Covers shall be flat or crowned up to 1/4", to prevent water and debris build-up. Panels that bow down are unacceptable.
3. Functional Requirements.
 - a. The flat cover design shall provide for expansion and contraction due to climatic change without damage to covers under the following conditions.
 1. Winter Conditions (-30°F)
 2. Summer Conditions (140°)
 - b. The bolted cover sections shall be air tight to the fullest extent possible.
 - c. The cover and accessories shall be resistant to corrosive atmosphere such as H₂S gas and corrosive condensate containing sulfuric acid.
 - d. PERFORMANCE - When installed the Cover System shall be tightly sealed with no air gaps or air leaks that will cause the system to malfunction.

When the System malfunctions H₂S gas builds up in pockets of dead air spaces which will cause severe erosion/corrosion of the concrete walls and steel equipment below the Covers.

The correct air flow in C.F.M. (cubic feet per minute) at the correct velocity in f.p.m. must be maintained throughout the entire chamber formed by the Covers to exhibit 12 complete air changes per hour with "**NO**" dead air spaces. Proper design of flow distribution is critical around each half of the clarifier in round or rectangular clarifiers to effectively move the H₂S gas from the inlet duct to the exhaust duct in the most efficient and effective manner. When flow distribution is properly designed, the incoming air pushes out all the air and gases ahead of it to the exhaust duct and into the scrubber system.

- e. STRUCTURAL - Build to withstand 40 p.s.f. load on top of Cover. A 12" x 12" sample piece of the proposed cover construction shall be sent to the engineer for evaluation prior to bidding the project.
- f. LIVE LOAD TEST - A live load test shall be performed at the manufacturer's facility applying 45 pounds per square foot maintained over a period of 24 hours, with a deflection not to exceed L/240. A height gauge shall be set at "0" at the start of the test and shall be read and recorded every 500 pounds until completion of the test. A reading shall also be recorded after the 24 hour period has expired.
- g. DOCUMENTATION - Photographs of the set-up and loading shall be taken when cover is empty and periodically during the test until fully loaded. The owner, engineer and contractor have the right to observe the test at the manufacturer's facility. A test report along with photographs shall be sent to the owner for documentation and verification.

Owner may require test results of previous installations, the names and phone numbers of the engineering firm, contractor and facility where installed shall be submitted to the owner/engineer.

- h. TESTING OF THE COMPLETED INSTALLATION - The air velocity shall be tested at a number of (10 to 12) locations around the clarifier beneath the Cover and recorded using a Veloci Calc plus air velocity meter which measures and automatically records the air velocity. The air velocity shall meet the F.P.M. (feet per minute) required to develop a minimum of 12 air changes per hour beneath the Cover. Testing for P.P.M. H₂S gas shall be performed at a number of locations in close proximity to the water line in the launder. Testing will be performed with the exhauster in operation for a minimum of 1 hour before testing in order to evacuate built up gases beneath the Cover. A properly designed and balanced system shall not contain any dead air pockets exhibiting high concentrations of H₂S gas.

The gas meter readings will be from "0" at the inlet area, 4 to 6 P.P.M. around clarifier and up to 18 to 20 P.P.M. (max) closest to the exhaust duct. The reason for the higher reading at the exhaust area is that gas is being collected as gas is moved from the inlet to the exhaust. Document and record readings at the location tested.

- i. PERFORMANCE BOND - A performance bond in the amount of 2 times the amount of the contract for the Covers plus the contractor's cost for installation, shall be provided by the manufacturer of the Odor Control Hoods/Laundry Covers prior to receiving a contract to supply the Covers. Proof that a bond will be issued shall be presented along with the bid in writing by the bonding company. Any bid not accompanied by this proof will not be considered and will be rejected as being non-responsive.

The Covers shall meet the physical and structural properties of the specification. Testing for air and gas removal shall meet the air velocity in feet per minute and H₂S gas in parts per million as specified.

B. Fabrication.

1. Materials. The materials used in the manufacturing of the F.R.P. flat covers shall meet the following requirements:
 - a. The Laundry/Weir Cover with Scum Baffle molded together as a one piece unit shall be of composite construction, consisting of gelcoat, polyester resin, balsa-core, steel tubing and fiberglass reinforcement.
 - b. The combination Laundry Cover and Scum Baffle molded in one piece, forms a confined region free from irregularities or air-gaps. A totally sealed air/gas-tight system is required for complete removal of air and gas at a rate of air changes per hour at the specified velocity measured at 30° intervals around the covers. There shall be no air gaps allowable

as gaps cause short-circuiting and major reductions, severe inefficiency, reduced number of air changes and low air velocity flowing through the system. The scum baffle and flat cover shall be molded in one-piece, on a curved mold, to form and maintain the true circular shape of the clarifier and the scum skimmer diameter. No further adjustment is necessary at installation, as the true molded-in circular shape is maintained throughout the entire circumference. Separate scum baffles, if used, shall be bolted to or sealed and gasketed between the top of the baffle where it intersects with the flat cover. The laminate shall be a minimum of 3/16" thick on both the exterior and the interior of the cover.

The interior core-material shall be a minimum of 1-inch thick balsa core and molded-in 1" x 1" x 1/8" steel tubing for structural rigidity, flatness, stiffness and long maintenance free service.

- c. Weir Hatch Covers shall be match-metal-die molded and shall have a vertical flange 9/16" high all around. The cover shall be 41-3/8" long by 7-5/8" wide by 3/16" thick. Two stainless steel piano hinges .050 thick by 4" long by 2" open, shall be used for attachment. One hand pull shall be molded-in as an integral part of the cover, and shall be 5" long by 3-1/4" wide by 1-1/2" deep, and contain a 3/8" diameter stainless steel bar for lifting. A "p" gasket as detailed on the drawings shall be bonded around the entire perimeter, on both sides of the vertical leg and shall be used to seal the hatch cover.
- e. Continuous fiberglass circular wall angles and scum baffle brackets for supporting the flat covers are used for flexibility and adjustability in setting the elevation of the cover and the scum baffle diameter.
- f. Anti-skid silica grit coating shall be applied to the walking surface. Molded-in textured surface is not an anti-skid surface and is unacceptable.

g. F.R.P. duct shall be sized to remove air and gas beneath the covers at the rate of 12 changes per hour, in a totally sealed system, at the specified velocity as calculated to achieve 12 complete air changes per hour.

2. Fiberglass reinforced polyester resin composite laminate shall exhibit the following minimum properties:

TEST METHOD	ASTM	MINIMUM TEST RESULT
Impact, Notched, Izod	D256	10 Ft. lbs. per/in.
Heat Distortion Point	D384	175 Degrees
Water Absorption	D570	0.2% 24 hours
Tensile Strength	D638	11,000 PSI
Thermal Expansion	D696	10.5×10^{-6} in/in/°F
Flexural Strength	D790	18,000 PSI
Flexural Modulus	D790	0.9×10^6
Hardness Test, Barcol	D2583	40 Minimum

Procedure used in determining the above properties shall be in accordance with the ASTM Standards, using the method designated above. Hardness tests shall be made on the resin-rich surfaces of the test samples. Test coupons shall be prepared in accordance with the appropriate ASTM test method.

3. A pigmented exterior gelcoat (12-15 mils thick) containing UV inhibitors and sufficient paraffin wax to give an air-inhibited cure is required. Gelcoat shall exhibit minimum physical properties of 40-42 barcol hardness.

4. The underside of the covers shall receive a resin coating 10 mils thick to form a resin rich barrier.

PART 3 EXECUTION

3.01 INSTALLATION

- A. F.R.P. Covers shall be installed as shown, and in accordance with the manufacturer's instructions, and approved erection drawings and as shown on shop drawings.
- B. The anchoring of the F.R.P. cover/scum baffle segments to the existing concrete tank walls shall be in accordance with the approved design and details of the cover

manufacturers. Anchors shall be 316 stainless steel.

3.02 FIELD TESTS, PERFORMANCE AND CERTIFICATIONS

- A. Upon completion of installation, the following testing and inspection functions shall be performed.
- B. The entire system shall be balanced to function at the designed air flow rate, in CFM and FPM.
- C. System shall be checked for leakage and all gaps, cracks and leaks sealed with a RTV silicone sealant. Gaps are unacceptable.
- D. Test and record H₂S gas in PPM at each gas test port location 1- inch above water level in trough. The test result shall show maximum gas removal, with no dead air spaces.
- E. The scum baffle diameter shall form a true circular shape and shall be set accurate to plus or minus 1/8 - inch, and shall match precisely with the circularity of the scum skimmer mechanism.
- F. Check and seal gaps between the top cover and the scum baffle. When the two are separate pieces, air gaps are unacceptable.
- G. The top cover shall slope toward the scum baffle from 1/8 to 1/4, for complete drainage of water.
- H. The covers shall be molded with a crown from 1/8" to 1/4" to prevent water and debris on Cover.
- I. Submit certification that the system has been inspected, tested, calibrated and meets the air-flow design criteria of the specification.
- J. Submit certified test results recorded at each air velocity and gas test port from each clarifier in the system.
- K. Field Test - A load of 350 pounds on a 12" x 12" area will be placed on the covers as directed by the Engineer and deflection created by the load will be measured.
- L. A load test shall be performed at the factory to validate that the cover will support a load of 45 P.S.F. using the L/240 formula for deflection. Refer to 2,01 F and G for details.
- M. All costs incurred in connection with testing and start-up operation shall be paid by the Contractor.
- N. Covers that do not meet the full requirements of the specification and do not meet the performance requirements specified will be removed at the manufacturer's expense.

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