

**SECTION 46 43 00  
SUPERNATANT WITHDRAWAL SYSTEM**

**PART 1- GENERAL**

**1.1 SECTION INCLUDES**

- A. Construction of supernatant withdrawal system
- B. Drawings and General Provisions of Contract, including General and Special Conditions, apply to this section.

**1.2 DEFINITIONS:**

- A. Collection Manifolds: Piping in the first basin, with and without holes, through which water flows to the second basin
- B. Valve Assemblies: An system of valves that represents the operational components of the supernatant withdrawal system

**1.3 RELATED SECTIONS**

- A. Section 01 33 00 – Submittals
- B. Section 26 05 01 – Electrical General Provisions
- C. Section 33 09 30 – Instrumentation and Controls

**1.4 SUBMITTALS**

- A. Submittal shall conform to Section 01 33 00.
- B. Supernatant Withdrawal Tube Drawings: Submit fabricator's shop drawings and obtain approval before shipping.
- C. Dry Pit Drawings: Submit shop drawings, Product Data, or Certification. Obtain approval before shipping.
- D. Valves: Submit shop drawings, Product Data, or Certification. Obtain approval before shipping.
- E. Piping Submit manufacturer's certification of quality prior to delivery of pipe.

**1.5 JOB CONDITIONS**

- A. Testing Sequence:
  - 1. Notify Owner's Representative of readiness to begin test at least 72 hours before test will start.
  - 2. Test to be commenced in the presence of the Owner's Representative.
- B. System Activation:
  - 1. The Process Provider, and/or their representative, will perform commissioning and testing of the Supernatant Withdrawal System.
  - 2. Upon successful completion of the tests, and approval of the Owner's Representative, the Owner will acknowledge successful commissioning.

**SECTION 46 43 00  
SUPERNATANT WITHDRAWAL SYSTEM**

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Collection Manifolds:

1. At least Two (2) collection manifold(s) shall be provided per basin.
2. The collection manifold shall be installed at a fixed elevation to the discharge valve.
3. The manifold shall contain a series of inlet orifices to ensure uniform inflow across the length of the manifold.
4. Manifolds shall be comprised of PVC and ductile iron mechanical joint fittings.
5. A liquid level sensor shall be mounted to one of the collection manifolds

B. Valve Assemblies

1. Each Collection Manifold shall be operated by an individual electrically-actuated plug valve assembly located in the valve pit.
2. The operation of the valve assemblies shall be controlled by the control system.
3. Each assembly will feature a means to purge the manifold before fluid withdrawal.
4. Each assembly will feature a means to allow trapped air to be evacuated during fluid withdrawal.
5. Each assembly will contain a plug valve that will allow effluent flow through the collection manifold on a set schedule.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Lagoon modifications, piping and structures shall be completed per Section 33 47 23

**3.2 INSTALLATION**

A. Collection Manifold(s):

1. Each collection manifold shall be set into place on the support legs and bolted to the connecting flange or pipe end for mechanical joints.
2. The installed elevation shall be the elevation noted on the manufacturer's drawings with a tolerance of +/- 0.25".
3. The collection manifold shall be installed level to the horizontal plane with a tolerance of +/- 0.11° or ± 0.25".

B. Valve Assemblies:

1. Valve assembly to be installed as per process provider drawings and OEM specifications.
2. All electrical connections, assemblies, and actuators shall be installed dry and protected from the elements and flooding.

**SECTION 46 43 00  
SUPERNATANT WITHDRAWAL SYSTEM**

**3.3 COLLECTION MANIFOLD TESTING**

- A. Collection Manifold shall be inspected for elevation, and fasteners by the engineer and/or process provider before water is introduced to the basin.

**3.4 VALVE ASSEMBLY TESTING**

- A. The Valve Assembly shall be tested by the process provider upon inspection of the Control System and/or during “start-up” of the facility.

**END OF SECTION 46 43 00**

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**SECTION 46 51 00  
BLOWERS AND AERATION EQUIPMENT**

**PART 1- GENERAL**

**1.1 SECTION INCLUDES**

- A. Installation of Blowers
- B. Installation of Blower Motor Controls
- C. Installation of Aeration Hardware
- D. Drawings and General Provisions of Contract, including General and Special Conditions, apply to this section.

**1.2 DEFINITIONS:**

- A. Blowers: Electrical low-pressure air compressors that are used to aerate wastewater.
- B. Motor Controls: Electric motor actuators.
- C. Floating Laterals: High-density polyethylene pipes that are attached to the air header pipe at the berm and from which the diffuser assemblies suspend.
- D. Diffuser Assemblies: An single set of air diffusers that suspend from the floating lateral with the purpose of maximizing transfer efficiency of oxygen while mixing the basin(s).

**1.3 RELATED SECTIONS**

- A. Section 01 33 00 – Submittals
- B. Section 26 05 01 – Electrical General Provisions
- C. Section 33 09 30 – Instrumentation and Controls

**SUBMITTALS**

- D. Submittal shall conform to Section 01 33 00.
- E. Aeration Installation Drawings: Submit fabricator's shop drawings and obtain approval before shipping.
- F. Blower Installation Drawings: Submit fabricator's shop drawings and obtain approval before shipping.
- G. Electrical Schematics: Submit fabricator's shop drawings and obtain approval before shipping.
- H. Process Provider Certification: Blower(s) must be authorized and certified as acceptable in writing by the process provider.
- I. Operations and Maintenance Manual.

**1.4 JOB CONDITIONS**

- A. Testing Sequence:
  - 1. Notify Owner's Representative of readiness to begin test at least 72 hours before test will start.
  - 2. Test to be commenced in the presence of the Owner's Representative.

**SECTION 46 51 00  
BLOWERS AND AERATION EQUIPMENT**

B. System Activation:

1. The product provider, and/or their representative, will perform commissioning and testing of the Blowers and Aeration Equipment.
2. Upon successful completion of the tests, and approval of the Owner's Representative, the Owner will acknowledge successful commissioning.

**1.5 METHOD OF MEASUREMENT AND BASIS OF PAYMENT:**

- A. Payment for Blowers and Aeration Equipment shall be per the Bid Form.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Blowers:

1. General
  - a. The blowers shall be oil-free, positive displacement, rotary lobe type with three lobes per rotor, designed for air or other inert gas service, and belt-driven via electric motor.
  - b. Nameplates stating the name of the manufacturer, blower/blower package model number, blower/blower package serial number, the rated capacity, speed, and other pertinent data, shall be attached to each blower/blower package. Blowers shall cycle duty as to maintain the same maintenance schedule.
  - c. Nameplates stating the name of the manufacturer, the motor model number, the motor serial number, the rated horsepower, speed, voltage, amps, rated service factor, and other pertinent data, shall be attached to the motor.
2. Casing
  - a. The casing shall be made of high strength, close grained, cast iron, and shall be adequately ribbed to prevent casing deflection and facilitate cooling. The casing shall be precision machined to allow for minimum clearances. Casing shall be of EN GJL 200 material with integrated pulsation-damping interference channels.
3. Rotor Assemblies
  - a. The rotors shall be one piece casting EN GJS 500 material. The rotor design shall incorporate replaceable seal ring wear sleeves and be designed to carry loads that exceed those required at maximum design conditions. The rotor assemblies shall be statically and dynamically balanced to ISO standard 1940/1-Q2.5 (turbine rotor). The rotors shall be a tri-lobe design in order to minimize pulsation and noise.
4. End Plates
  - a. The gear-end plate shall be cast iron. The drive-end plate shall be integral to the blower casing. Bearing fits shall be precision machined to ensure accurate positioning of the rotors in the casing. Replaceable seal wear inserts shall be provided on the drive-end and gear-end plates.
  - b. The oil chamber covers shall be heavy-duty cast iron with a precision-machined sealing face. Aluminum oil covers are not allowed.

**SECTION 46 51 00**  
**BLOWERS AND AERATION EQUIPMENT**

5. Timing Gears

- a. The rotor timing gears shall be precision machined from case hardened, ground alloy steel to quality standard 5f 21. Each timing gear shall be straight cut and beveled to eliminate axial bearing loads and ensure long life as well as quiet operation.
- b. Each timing gear shall be manufactured in accordance with:
  - (1) DIN 3960, Specifications for Spur Gear Sets
  - (2) DIN 3961 & DIN 3962, Tolerances for Spur Gear Mesh
  - (3) DIN 3964, Specifications for Shaft Centering
- c. Gears shall be finish ground on a precision grinder to ensure concentricity. The timing gear set shall be taper-mounted on the rotors. Keyed, hub mounted, taper-pinned, or splined shaft timing gear mounting designs are not acceptable.

6. Bearings

- a. All four shaft support locations shall incorporate large, heavy-duty, full complement, cylindrical roller bearings with metal cages, designed with at least 5-times the dynamic capacity of ball bearings. The bearing maximum speeds must be at least two times the maximum recommended blower speed. The minimum acceptable L10 design life at the blower's maximum rated speed and maximum rated differential pressure shall be 74,000 hours.

7. Seals

- a. There shall be four (4) piston ring type labyrinth seals at each end of each rotor to minimize leakage and maintenance costs.
- b. A vent cavity shall be provided between the air side and oil side rotor shaft seals on all four (4) sets of piston ring type labyrinth seals. The two (2) vent holes located on the bottom side of the blower shall be left open. The vent holes at other locations shall be closed off with threaded metal plugs.
- c. The input drive shaft seal shall be a high temperature radial lip type seal with Viton elastomers. The seal design shall incorporate a replaceable wear sleeve on the input drive shaft.
- d. The input shaft seal design must allow for the lip seal and the shaft sleeve to be replaced without removing the oil chamber shaft.

8. Drive Motors

- a. Drive motors shall be designed, manufactured, and tested in accordance with the latest revised editions of NEMA MG-1, IEC, IEEE, ANSI, and AFBMMA standards as applicable and shall be capable of continuous operation.
- b. Motor must meet or exceed Energy Independence and Security Act (EISA 2007) standards for motor efficiency.
- c. The motor nameplate horsepower rating shall not be exceeded at the design speed.

**SECTION 46 51 00  
BLOWERS AND AERATION EQUIPMENT**

- d. The temperature rise of the motor windings shall not exceed IEC and NEMA standards when the motor is operated continuously at the rated horsepower, rated voltage, and rated frequency in ambient conditions of 40°C / 104°F.
- e. The motors shall conform to the following:

<b>Mounting:</b>	Horizontal
<b>Type:</b>	Squirrel Cage Induction
<b>Enclosure:</b>	TEFC
<b>Service Factor:</b>	1.15
<b>Duty Cycle:</b>	Intermittent
<b>Ambient Temperature Rating:</b>	40°C / 104°F
<b>Starting Current:</b>	6-10X Full Load Current Maximum
<b>Winding Insulation:</b>	Class F
<b>Temperature Rise:</b>	Class B
<b>Voltage/Phase/Frequency</b>	208, 230, or 460V/3ph/60Hz
<b>Bearing Lubrication:</b>	Grease
<b>Maximum Speed:</b>	3,600 rpm
<b>Speeds:</b>	Single Speed
<b>Motor Protection:</b>	PTC Thermistors

9. Drive

- a. The packages shall be driven through V-belts and sheaves with SPZ or SPB profile. The drive assembly shall be of the high capacity type, oil and heat resistant, with a 1.5 safety factor.
- b. Automatic tensioning of the V-belts by use of a pivoting, swing frame motor base, with adjustable spring assistance and visual indication of V-belt tension, shall be provided to ensure the V-belts remain properly tensioned with minimal maintenance and to extend V-belt, sheave, and bearing life. Adjustment of the tensioning device shall be accomplished without removal of the guard or loosening of the motor mounting bolts. The drive guard shall be the manufacturer's standard sheet metal with provision for ventilation. The installed guard shall be fully-enclosed and designed to meet current OSHA standards.
- c. Belt shall be 100% oil-resistant.

10. Standard Blower Gauges

- a. A pressure gauge shall be provided, pre-piped and panel mounted, on the sound enclosure.
- b. A temperature gauge, with adjustable switching point and contact, shall be provided pre-piped and panel mounted on the sound enclosure.
- c. A filter differential pressure gauge shall be provided pre-piped and panel mounted on the sound enclosure.



**SECTION 46 51 00**  
**BLOWERS AND AERATION EQUIPMENT**

11. Enclosure

- a. A sound attenuating enclosure shall be provided. The sound enclosure shall be sheet steel construction with a "powder coat" type paint finish, which shall be durable and scratch resistant and suitable for outdoor applications.
- b. To prevent transmission of vibration and noise, the legs of the base shall include vibration isolators made of rubber in a steel footing equipped with mounting holes for securing the package to the enclosure bottom.
- c. All access panels/doors shall have slotted key locks or handles. A door key shall be provided.
- d. At least one installed, integral ventilation fan, sized to provide adequate cooling of the package, shall be provided. If not specified, fan voltage will be 115V/1Ph/60Hz. The fan should run congruent to blower.
- e. The blower package shall be capable of being installed directly adjacent to another blower packages of similar design and shall be capable of mounting next to the wall without maintenance interference.

12. Blower Package

- a. The inlet filter shall be integral to the inlet silencer and shall include a washable and reusable polyester element for minimal pressure drop. Air filtration shall be to EN 779, Class G4.
- b. The inlet silencer shall be of the wear-free absorptive type, directly connected to the inlet port of the blower, and shall be mounted horizontally.
- c. The discharge silencer shall be designed specifically for all frequency ranges of the blower to maximize attenuation and shall use a combination of absorption, reflection, and diffusion. The silencer shall be directly connected to the outlet port of the blower. The discharge silencer shall be mounted horizontally and shall be integral to the base frame.
- d. Oil drains from the blower drive-end and gear-end lubricating oil sumps shall be piped to the front of the base for ease of maintenance. The drain valves shall be a ball valve with a fully retained and gasketed threaded cap.
- e. The relief valve shall be spring loaded and factory installed in a location to protect the blower from excessive discharge pressure or vacuum. The relief valve shall be mounted integrally to the blower package.

13. Piping

- a. An elastomeric compensator/flex connector shall be provided for connection of the packaged blower to the system piping to reduce transmission of structure borne noise as well as prevent unacceptable loading of the silencer connection and blower casing. On packages with tube outlets (4" and below) the compensator shall be hose-type. On packages with outlets larger than 4", the compensator shall be arch-type, flanged with both ANSI 125/150 lbs. and DIN PN10 bolting patterns.

14. Quality Assurance

- a. All blowers and equipment covered by this specification are intended to be standard blower equipment, of proven ability, as manufactured by a reputable

**SECTION 46 51 00  
BLOWERS AND AERATION EQUIPMENT**

CE certified manufacturer having at least two (2) years experience in the production of such blowers. The blowers furnished shall be designed, constructed, and installed in accordance with the best practice and methods and shall operate satisfactorily when installed.

- b. All equipment furnished under this specification shall be unused, and shall be the standard product of a manufacturer having a successful record of manufacturing and servicing the equipment and systems specified herein for a minimum of two (2) years.

15. Standard Limited Warranty

- a. The manufacturer and contractor shall warrant the blower being supplied to the owner against all defects in workmanship and materials for a period of sixty (60) months from date of shipment from the manufacturer of the blowers. All other package components shall be warranted for a period of twelve (12) months from date of startup, not to exceed eighteen (18) months from the date of shipment.
- b. The manufacturer's warranty period shall run concurrently with the contractor's warranty period. No exception to this provision shall be allowed. The contractor shall be responsible for proper storage of the equipment so as to remain in "as shipped" condition. If the equipment remains in storage at the job site for longer than six (6) months before installation, the contractor shall provide factory service personnel for a complete inspection of the equipment. Any work necessary to restore the equipment to "as shipped" condition shall be the responsibility of the contractor.

16. Service Conditions and Performance Requirements

- a. Complete Mix Lagoon Blowers (1 duty, 1 standby)

<b>Standard Conditions</b>			
<b>Elevation:</b>	0 Ft. A.S.L.	<b>Gas:</b>	Air
<b>Ambient Pressure:</b>	14.7 psia	<b>K-Value:</b>	1.395
<b>Ambient Temperature:</b>	68 °F	<b>Specific Gravity:</b>	1.000
<b>Relative Humidity:</b>	0%	<b>Molecular Weight:</b>	28.966

<b>Design Conditions</b>			
<b>Inlet Volume:</b>	682 scfm	<b>Estimated Blower Package Noise Level:</b>	71 dB(A) at 3 feet*
<b>Inlet Pressure: (Elevation)</b>	14.3 psia	<b>Blower Speed:</b>	3530 rpm
<b>Maximum Design Inlet Temperature:</b>	100 °F	<b>Percent of Max. Speed:</b>	80 %
<b>Maximum Relative Humidity at Design Inlet Temperature:</b>	90 %	<b>Discharge Temp:</b>	158 °F
<b>Discharge Pressure:</b>	19.0 psia	<b>Motor Brake Horsepower:</b>	25.4 bhp
<b>Differential Pressure:</b>	4.7 psig	<b>Motor Horsepower:</b>	30 hp
<b>Power Supply Voltage:</b>	208 VAC		

**SECTION 46 51 00**  
**BLOWERS AND AERATION EQUIPMENT**

**B. Aeration Equipment**

**1. General**

- a. The aeration system shall be supplied by a single manufacturer as an integrated system. The supply of independent components shall not be acceptable.

**2. Flexible Membrane, Fine Pore Tube Diffusers**

- a. The diffuser unit and diffuser assemblies shall be fully capable of operating under continuous or intermittent conditions and shall be designed with check valve capabilities to prevent entry of mixed liquor into the diffuser unit or air piping on air shutdown or interruption of air supply. A minimum of three (3) check valve features shall be provided, not limited to the following:

- (1) Membrane shall be elastic and allow openings to close when the air supply is interrupted.
- (2) Membrane shall contract and close around full diameter support frame.
- (3) Membrane shall employ a non-perforated section that is aligned and seals against the support frame, air distribution orifices.

- b. Diffuser assemblies shall contain at least 2 or 4 tube units and be suspended from floating PE air laterals configured such that the assembly does not contact the basin floor and shall allow individual assemblies to be retrieved and raised to the lagoon surface for inspection or maintenance.

- (1) Assembly retrieval shall be possible without lowering the liquid level of the basin, without taking the basin out of service, and without disturbing or impairing operation of the process or other diffuser units.
- (2) Assembly shall be retrievable

- c. The diffuser assemblies shall be independently ballasted. The units shall have a submerged weight sufficient to offset buoyant forces under conditions of operation.

- (1) Ballast shall be of proper geometry and weight to assure stability of the assembly when in operation.
- (2) The ballast shall be fully encapsulated into the diffuser assembly, except when assemblies are situated over the side slope of the reactor.
- (3) Ballast and diffuser assembly shall be designed for ease of retrieval and installation. Each diffuser assembly complete with encapsulated ballast shall have total weight dry of less than 70kg.

- d. All exposed, non-coated metal components used in the aeration-mixing assemblies or accessories shall be 304 or 316 stainless steel.

**3. Flexible Tube Diffuser Membrane:**

- a. Membrane shall have a non-perforated section that aligns with the air distribution inlet on the diffuser for full back-flow prevention capabilities.

**4. Aeration System Piping - Floating Laterals:**

- a. Out-of-basin air piping including blower manifold, air header, and header stubs:

**SECTION 46 51 00**  
**BLOWERS AND AERATION EQUIPMENT**

- (1) Header lateral stubs shall terminate at or above the high water level with a full diameter, vertical face flange for each PE air lateral.
  - (2) The Contractor shall provide an isolating/balancing valve on the header/lateral stubs for control and distribution of air throughout the system and to allow isolation of a lateral for inspection and maintenance.
  - (3) Isolation/balancing valve shall be positioned near the air header for accessibility away from the waterline.
- b. In-basin lateral air piping shall transition from the header lateral stub and extend across the aerated portion of the reactor.
- (1) Lateral piping shall be 6" Ø heavy-walled, high density, polyethylene (PE) DR 26.
    - (a) Lateral piping shall be sized to allow a normal airflow variation of 0 to 200% of the design airflow.
    - (b) Inlet connection shall be a full diameter 6" fitting.
    - (c) The initial 20' of the lateral run shall be of High Pressure Flexible EPDM Hose material, then transition to SDR 26 HDPE for the remainder of the lateral.
    - (d) Lateral piping shall be butt fusion welded in the field by the Contractor to assure maximum strength and structural integrity.
    - (e) Fusion welds between pipe sections with different wall thickness shall be completed at the factory. Field fusion welding of these sections shall not be allowed: First segment pipe with DR 11 and DR 26 factory supplied for superior mechanical integrating and quick field installation.
    - (f) Lateral piping shall be shipped to the job site in up to 40' lengths.
    - (g) Laterals sections will be shipped in straight lengths. Outlet for diffuser assemblies shall be factory side fusion welded to the lateral pipe.
  - (2) Each diffuser assembly shall receive air from the floating polyethylene lateral from 2 – 2" flexible EPDM airlines.
    - (a) Airline shall be reinforced with a minimum of four (4) ply spirals of polyester cord.
    - (b) Minimum working pressure for the airline shall be 150 psig.
  - (3) Outlet tees shall be factory installed on the PE lateral section to transition to the diffuser assembly airline.
    - (a) Outlet tee shall be HDPE construction and shall be 2" Ø equivalent diameter as the EPDM airline.
    - (b) Outlet tees shall be factory side fusion welded to the lateral pipe sections. A weld contact area equal to 4 square inches minimum is required for each outlet.
    - (c) All side fusion welding shall be completed in the factory. Field side fusion welding will not be allowed.

**SECTION 46 51 00  
BLOWERS AND AERATION EQUIPMENT**

- (d) The use of mechanical fittings in lieu of fusion-welded outlets will not be allowed.
- (4) Each 2" outlet to be supplied with a heavy duty quick-disconnect assembly to allow easy operation/maintenance and diffuser assembly recover/reinstall.
- c. Floating laterals shall be restrained in place by means of a tether at each end.
  - (1) Tether rope shall attach to the lateral via stainless steel compression clamp and wire rope nuts.
  - (2) Tether rope shall be UV resistant, double-braid polyester.
  - (3) Tether rope shall be anchored to a deadman or helix anchor located on the bank.
  - (4) Floating laterals that flank attached growth media to have a winch on at least one end that allows for easy tension management.
- 5. Spare Parts:
  - a. The Contractor shall furnish the following spare parts and store as directed:
    - (1) One (1) – Complete air diffuser
    - (2) Four (4) – Membranes

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Blowers:
  - 1. Blowers to be installed as per manufacturer's instructions.

**3.2 BLOWER TESTING**

- A. Parts must be inspected as part of a strict ISO 9001:2008 quality control program.
- B. All critical dimensions of the blower components provided by the manufacturer shall be verified and documented prior to assembly.
- C. The rotating parts of each blower actually provided by the manufacturer shall be statically and dynamically balanced before final assembly. The blower alone shall operate without excessive vibration. Removal of material from the face of the rotors for balancing purposes is not acceptable.
- D. Each blower provided by the manufacturer shall be slip tested (per ISO 1217).
- E. Each blower provided by the manufacturer shall be operated at its maximum rated speed and differential pressure for thirty (30) minutes.
- F. On completion of final assembly of the packaged blower and prior to shipment, each packaged blower shall be mechanically run for a minimum of fifteen (15) minutes.

**3.3 AERATION EQUIPMENT TESTING**

**SECTION 46 51 00  
BLOWERS AND AERATION EQUIPMENT**

- A. The aeration equipment shall be tested as per manufacturer's instructions on inspection, start-up, and testing.

**END OF SECTION 46 51 00**

**SECTION 46 53 00**  
**BIOLOGICALLY ACTIVATED CURTAINS AND PARTITION Baffles**

**PART 1- GENERAL**

**1.1 SECTION INCLUDES**

- A. Installation of Attached Growth Facilities
- B. Drawings and General Provisions of Contract, including General and Special Conditions, apply to this section.

**1.2 DEFINITIONS:**

- A. Biologically Activated Curtains/Attached Growth Facilities: Curtains, or segments of curtains, comprised of vertical strands of material that provide both a means to limits short-circuiting and allow for the cultivation of attached-growth biomass.

**1.3 SUBMITTALS**

- A. Submittal shall conform to Section 01 33 00.
- B. Biologically Activated Curtain Installation Drawings: Submit fabricator's shop drawings and obtain approval before shipping.

**1.4 JOB CONDITIONS**

- A. Testing Sequence:
  - 1. Notify Owner's Representative of readiness to begin test at least 72 hours before test will start.
  - 2. Test to be commenced in the presence of the Owner's Representative.
- B. System Activation:
  - 1. The product provider, and/or their representative, will perform commissioning and testing of the Biologically Activated Curtain(s).
  - 2. Upon successful completion of the tests, and approval of the Owner's Representative, the Owner will acknowledge successful commissioning.

**1.5 METHOD OF MEASUREMENT AND BASIS OF PAYMENT:**

- A. Primary Cell Attached Growth Curtains, Anchors - Complete per the Bid Form

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Biologically Activated Curtain(s):
  - 1. General
    - a. The curtain media shall extend across the full width of the reactor at the calculated high water level perpendicular to the basin sides.
    - b. The media shall be UV stabilized polyethylene and shall be of sufficient structural strength to withstand the mass of attached biological growth that will accumulate on the surface of the curtain media.

**SECTION 46 53 00**  
**BIOLOGICALLY ACTIVATED CURTAINS AND PARTITION BAFFLES**

- c. The mounting cable shall be anchored to deadman anchors located on the opposing banks. The applied loads to deadman anchors shall be determined by the supplier.
  - d. All materials used in curtain construction, which are subject to stress from flow or wind, must have the same rate of linear expansion to prevent unequal movement of tension members and base material.
  - e. The curtain shall be fabricated in up to 25-foot sections for attachment to a flotation boom. The individual sections shall be joined with a carrier cable and secured to the flotation boom.
2. Carrier Cable
- a. Media material shall be bound to a carrier cable that extends the full width of the reactor.
  - b. Cable shall be non-toxic to microorganisms, immune to rot and fungus, and chemically resistant to the wastewater and normal concentrations of sewage acids, alkalis, organic solvents and organic compounds.
3. Media Flotation Boom
- a. The media assembly shall float on the water surface with the media suspended in the water column.
  - b. Flotation shall be provided along the entire length of the assembly at the calculated low water level.
  - c. Float shall be non-toxic to microorganisms, immune to rot and fungus, and chemically resistant to the wastewater and normal concentrations of sewage acids, alkalis, organic solvents and organic compounds.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Lagoon, piping and structures shall be completed as per Section 33 47 23

**3.2 INSTALLATION**

- A. Biologically Activated Curtain(s):
  - 1. The first set of Curtains shall be installed immediately downstream of raw sewage inlet pipe in the first cell, and a second set shall be installed immediately upstream of supernatant withdrawal device as shown on the plan sheets.
    - a. Media strands shall be 1-1/8" wide with reinforcement in the center of the strand.
    - b. There shall be 22 strands per horizontal linear foot of media.
      - a. A single Curtain shall possess no less than 4 sq. ft. of surface area per sq. ft. of curtain.
  - 2. Curtain at inlet end shall reach across width of the Bioreactor and be applied to enhance contact between raw influent and primary reactor biomass.
  - 3. Curtain at the discharge end shall encourage supernatant withdrawal from the reactor surface and provides biofiltration of removed fluid while retaining settled MLSS or biomass.



**SECTION 46 53 00**  
**BIOLOGICALLY ACTIVATED CURTAINS AND PARTITION BAFFLES**

4. The Curtain system shall be moored to deadman anchors located on the perimeter of the reactor.
5. The system shall allow a maximum water level variation with no adjustment to the curtain components or mounting system required.
6. The curtain media shall be non-confined and designed to be clog free.
7. The curtain media shall be easily deployed from the perimeter of the reactor.

**B. Partition Baffle:**

1. The Contractor shall furnish all labor, materials, tools, equipment and services necessary to install the baffle curtain system.
2. Baffle curtains shall be installed at its operating water depth.
3. The baffle curtain shall be anchored to shore using PVC coated stainless steel cable or approved alternate.

**3.3 BIOLOGICALLY ACTIVATED CURTAIN(S) TESTING**

- A. Testing will consist of visual inspection of the media to ensure proper installation and start-up procedure.

**END OF SECTION 46 53 00**

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