

LumenAER®

Solar Powered Floating Circulator

1. GENERAL

Provide a total of ____ LumenAER Solar Powered Floating Circulators as manufactured by AEROMIX Systems, Incorporated of Minneapolis, Minnesota, USA.

Each circulator shall consist of an intake assembly, outlet dish, impeller, motor, controls, solar panels, and floats, all configured to provide vertical and horizontal water circulation within the basin. A rotating impeller shall be used within each circulator which pumps water from the intake for discharge out the dish. The impeller shall be powered by an electric motor and the energy to drive the motor shall be solar as captured by solar panels. Each circulator shall include the necessary controls and batteries to allow 24 hour operation in all weather conditions. Operation of the circulator shall move large volumes of low oxygen water from the intake below the surface vertically through the unit to discharge over the dish at the surface for exposure to the atmosphere where nearly instant oxygen diffusion into the water can occur. Flow outward from the dish shall be near laminar to allow maximum distribution and overall circulation within the basin.

2. DISH

The dish shall be a conical shaped vessel with its greatest diameter at the top just below the water surface. It shall incorporate a horizontal lip at the outer perimeter that allows water to exit the dish at low, near laminar flow velocities. The dish shall incorporate slots allowing water to flow through the circulator even in heavy ice. The dish shall be constructed of 304 stainless steel to maximize corrosion protection of the assembly.

3. IMPELLER

Each circulator shall include a specially designed impeller with 2 overlapping blades for high efficiency pumping at low rpm. The impeller shall be housed in a 304 stainless steel volute which is precisely fabricated for maximum pumping efficiency. The impeller material shall be 304 stainless steel to prevent corrosion. The impeller shall be of non clogging design and will allow a 4" obstruction to pass.

4. INTAKE

The intake structure shall be positioned below the surface and adjustable as to its depth allowing water to be drawn in from whatever depth is set. A hand operated winch shall be incorporated into the circulator to allow for easy depth adjustment of the intake. The intake structure shall be constructed from 304 stainless steel for maximum corrosion protection. The intake structure and any draft tube connecting it to the impeller volute shall have an open diameter at least as large as the impeller diameter to minimize head loss through the system.

5. MOTOR

A DC fractional horsepower (kilowatt) motor shall be used to turn the impeller. The motor shall be of brushless design for long maintenance free operation and shall be capable of

operating at any rpm from near zero to over 100. The motor shall be designed for extended exposure to weather in all climate conditions.

6. BATTERIES

Rechargeable batteries shall be provided allowing the system to operate 24 hours per day. The battery system shall have the capacity to allow full speed motor operation for at least 15 hours under no light conditions and after receiving a full charge. The batteries shall be designed to operate in any weather conditions.

7. FLOATS

Each circulator shall incorporate 3 large floats to support the entire weight of the unit including 250 pounds (114 kgs) of excess flotation. Each float shall be triangular shaped with the apex of the triangle towards the dish to minimize resistance to flow from water exiting the dish. Each float shall have a shell of high-density polyethylene with UV protection built in and be filled with closed cell marine grade foam to prevent the float from sinking even if cracked or punctured. A 304 stainless steel support strut shall connect between each float and the circulator. This strut shall be adjustable to allow the circulator to be leveled and to adjust the submergence of the dish below the water surface.

8. SOLAR PANELS

At least 3 solar panels shall be used of adequate size to allow continuous operation of the circulator 24 hours per day, 7 days per week, during periods when solar radiation is at its lowest level for the site. The panels shall be mounted such that they can be positioned for maximum efficiency.

9. CONTROLS

The circulator shall be complete with controls to convert the power from the solar panels to all on board systems. These controls shall provide for automatic charging of the batteries and allow the system to automatically operate on battery power as needed. All control cabinets, wiring, and external electrical connections shall be weather proof and water resistant. Controls shall provide for automatic reversing of the impeller should it become plugged or fouled.

10. ANCHORING

Each circulator shall be provided with an anchoring kit consisting of 50 feet of 1/4" diameter stainless steel mooring cable and 4 cable clamps. Each circulator shall be constructed with an anchoring attachment lug where one end of the mooring cable is attached. The other end of the mooring cable shall be affixed to concrete blocks at the site as an anchor point under the water.

11. COLD WEATHER OPERATION

The circulator shall be designed for operation during any weather conditions including ice. The shaft shall be protected with an ice sleeve allowing the shaft and impeller to rotate even with moderate ice on the surface. The dish shall incorporate water flow slots allowing water to move out of the dish even if the surface is complete frozen over. The solar panels shall be designed to prevent snow and ice build up on their surface.

12. *EXPERIENCE*

The circulator manufacturer shall have at least 2000 operating installations of aerators and circulators in similar applications and have been in business under the same name and selling water circulators and aerators for at least 10 years.

13. *FACTORY TESTING*

Each circulator shall be tested at the factory for correct operation, lubrication, operating temperature, lack of vibration, and dry amp draw. Upon request, a test sheet certifying suitable operation shall be shipped with each aerator.

14. *WARRANTY*

A warranty statement shall be provided which defines the terms of the warranty.

15. *PERFORMANCE TESTING*

The manufacturer shall have available on site a testing tank with a minimum volume of 100,000 gallons where oxygen transfer rate, velocity, and mixing tests can be executed. The manufacturer of the circulator shall upon request provide certified test results showing the clean water oxygen transfer rate per the ASCE standard. Those results shall be independently confirmed.

16. *SAFETY*

The manufacturer shall provide visible safety warning labels on the shipped equipment that comply with OSHA regulations (29 CFR 1910).

17. *INSTALLATION*

All circulators shall be designed so they can be installed and operated immediately upon arrival without assistance from the manufacturer. The manufacturer shall provide the full and normal warranty when the product is installed by others.

18. *ORIGIN*

Each aerator shall be manufactured in the USA using components mostly made in the USA. Over 80% of the content and labor shall be USA supplied.