MONSOON HORIZONTAL PADDLEWHEEL AERATOR SPECIFICATION

A. General

Aerators as manufactured by AEROMIX Systems, Incorporated of Minneapolis, Minnesota, USA. Each aerator shall be ____ horsepower, and shall consist of an electric motor directly coupled to a gearbox to drive a paddlewheel type rotor mounted on a floating platform. The rotor blades shall mix the water horizontally while producing strong aeration by maximizing the air to water surface interface.

B. Aerator Frame

The frame shall be of welded construction from three (3) inch by $3/16^{th}$ inch 304 Stainless Steel square tubing so it will not twist and will remain rigid during normal aerator operation. The frame may include optional legs to support the equipment when on land and to act as low water level legs during operation. Enlarged pads shall be attached to the bottom of each leg to assure stability during assembly/maintenance/operation. A simple frame provides easy installation and handling using lifting straps and light duty cranes/hoists. Absolutely all frame components shall be constructed from Stainless Steel to prevent corrosion and deterioration due to UV exposure. Aluminum, painted steel, or galvanized frame components are not acceptable.

C. Rotor

The rotor shall be constructed of ____ blades attached to a rotating Torque Tube (hollow shaft). Each blade shall be made from 13GA 304 Stainless Steel and shall be shaped to provide a scooping action to maximize the volume of entrained water and oxygen transfer. The blades shall be field replaceable and shall not require welding when replaced. Each blade is mounted on heavier gauge blade supports which are bolted together to form a complete closed circular blade star. The blades shall be positioned in a staggered spiral configuration to provide even load distribution and uniform aeration during operation. Maximum blade submergence is not to exceed ten (10) inches.

One precision machined flanged 304 Stainless Steel three (3) inch shaft shall be bolted to each end of the precision rotating Torque Tube. Mating components shall align with built in assembly guides. The Torque Tube has machined flanged ends to provide alignment of the end support bearings and prevent fluid intrusion into the tube. The nominal diameter of the Torque Tube shall be eight (8) inches constructed from a Schedule 10 stainless steel. The Torque Tube end shafts shall provide smooth (minimum Ra 120) corrosion free surfaces for the aerator bearings. Constructing or joining parts of the Torque Tube by welding is unacceptable. All connecting parts, brackets and fastener hardware shall be constructed from 304 Stainless Steel for

maximum strength, ultra-violet protection and corrosion resistance. Painted or galvanized steel blades, torque tubes and hardware shall not be acceptable.

D. Aerator Bearings

Mounted Ball bearings, located at each end of the assembly, shall be used to support and align the Rotor assembly to ensure optimal performance under combined radial and thrust loads. Each bearing shall have a design life (L_{10}) of at least 100,000 hours. All bearings shall have a corrosion duty coated housing to prevent chemical attack from the wastewater and to allow easy maintenance.

These bearing housings shall be constructed from cast iron using a rib design for added strength. The split housing design shall provide for quick replacement of bearing inserts. The housing shall employ guide pins in the base and mating holes in the cap to ensure proper alignment and orientation of the aerator bearing. Each bearing shall be a wet-duty, grease lubricated, sealed pillow-block type. Water or wastewater lubricated bearings are not acceptable. Shaft collars are provided and equipped with setscrews to allow for shaft attachment/detachment. Optional Automatic Lubrication devices are available on each bearing, and will continuously deliver proper volumes of grease.

E. Aerator Motor

All motors shall be completely sealed and shall comply with EPACT 92 standards and all applicable provisions of the standards of the National Electric Manufacturers Association (NEMA). These electric motors shall support a minimum service factor of 1.15.

Each motor shall be TEFC and rated for _____Hp, _____ volts, ____ Hertz, ____ phase, 40 degrees C ambient temperature rise, with Class F insulation. The motor shall be general duty and have a C-face type frame to allow it to bolt directly to the gear reducer. The standard full load efficiency of the motor shall be at least 91%. No special fittings, face-plates, or special design motors shall be used.

F. Drive to Rotor Coupling

A Tapered Grid Coupling shall be used to transmit the mechanical power from the aerator drive to the blade rotor. The Tapered Grid Coupling will be used for accommodating misalignment, and compensate for end movement. The grid type coupling allows for easy maintenance, replacement, and is designed for the shock loads, torsional dampening, fatigue life and torque capacity required in wastewater applications.

G. Aerator Gear Reducer

A Gear Reducer, with an AGMA service factor of 1.50 (24 hours operation with moderate shock) or greater, shall be used. The Gear Reducer shall lower the motor RPM and increase the output torque to a value that optimizes rotor aeration and mixing. The

Gear Reducer will display a 28:1 reduction ratio at 60 Hz, (24:1 at 50 Hz) provide an output rotational speed of 63 RPM, and shall employ an output minimum efficiency of 96%. The compact housing is completely sealed, eliminating the need for maintenance while providing positive, continuous and efficient lubrication for internal components. The housing is configured with a NEMA C face for minimum assembly length with any standard brand of standard motor. A patented circulate tooth profile ensures shallow pressure angles and compressive forces only to reduce wear, service factors higher than AGMA standards, high overload capacity (500%), and maximum efficiency (rolling motion). Oversized bearings provide high overhung and thrust load capacity, long service life, smooth and quiet operation. The gears and shafts of the Gear Reducer shall be constructed from Nickel-Chromium-Molybdenum steel for high tensional strength and shock loading capacity. The Gear Reducer shall operate within a wide temperature range of 32° to 104° F (0°C to 40°C).

The Gear Reducer housing shall be made from ribbed cast iron to maximize strength and maximize heat dissipation to the environment. The reducer assembly shall be totally enclosed in compact corrosion duty housing, and be positioned such that it is above the water surface at all times. The reducer and motor shall be directly coupled without exposed belts, gears or couplings to eliminate slipping, reduce maintenance, and provide a safe work environment for operations personnel.

H. Pontoons

Pontoon (s) shall be used on each end of the aerator frame for flotation. Each pontoon shall have an 18-gauge, 304 Stainless Steel skin with all seams and ends fully closed. Polystyrene foam shall be injected into each pontoon to totally fill the interior and prevent sinking even if the pontoon skin is punctured. End caps shall be welded shut to maintain waterproof conditions in the interior of the floatation device. No foam fill ports shall be acceptable. Aluminum or plastic floats are not acceptable due to chemical corrosion and possible degradation from UV exposure. Pontoons shall be firmly secured to the frame with mounting brackets and pivot arms. These are attached to the frame by quick connect pins for simple and fast assembly/disassembly, and to allow pivotal motion around the locking pins for blade submergence adjustment. Two pontoons are provided on each side (drive and driven) of the Torque Tube and are mechanically joined and interlocked to each other with heavy duty braces.

A heavy duty, push/pull, dual purpose, ratchet jack adjustment mechanism shall connect the aerator frame with the pontoon pairs on each side, to allow for easy aerator blade submergence and level adjustment. The same mechanism is used to level the equipment while floating. The ratchet jack shall be connected to the aerator frame and float assembly with a series of clevis lugs and pins. The same lugs can be used for lifting and handling of the aerator in case of assembly, maintenance, or repair.

I. Flotation Capacity

Each float system shall provide a flotation safety factor of at least two times the total assembly weight including the aerator and motor. The flotation system shall withstand normal wave action, wind velocities, and aerator thrust without capsizing.

J. Protective Covers

The power assembly and both Torque Tube bearings shall be protected from splashing water and rain via protective covers and splash shields. The protective covers shall be constructed from 14GA 304 Stainless Steel and easily removable for access to bearings, gear drive, and motor. They shall allow adequate ventilation to prevent overheating of gear drive or motor and to prevent excess bearing temperatures. The splash shields are made of 304 Stainless Steel and UV resistant plastic.

K. Fasteners

All fasteners shall be 304 Stainless Steel. All threaded assemblies shall be coated against anti seize and extra corrosion protection.

L. Factory Testing

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

M. Performance Testing

Upon request the manufacturer will provide independently certified oxygen transfer test results satisfying ASCE equipment performance requirements.

N. Start-up and Training

AEROMIX Systems, Inc. or its assigned Representative shall perform start-up and training of the MONSOON at a time mutually and place mutually agreed to by both parties.

O. Warranty

The manufacturer shall provide a detailed warranty statement outlining the terms of a Twelve (12) month limited warranty.