

## ***Aire-O<sub>2</sub> Turbo<sup>®</sup> Aerator*** ***Superior Surface Aeration Technology.***

surface aerators were developed for the special needs of the pulp and paper industry, food processors, the petrochemical industry and municipalities. Compared to conventional designs, the Turbo Aerator can reduce operating costs by up to 30%.

Aeration Industries International's high efficiency Turbo surface aerator is a low trajectory surface aerator designed to meet the special needs of municipalities, food processors, the pulp and paper industry, and petrochemical industry

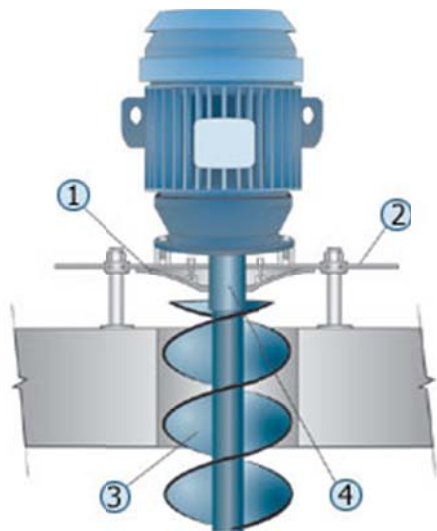
The AIRE surface aerator is technically advanced. The trajectory of the water is horizontal and out rather than vertical and out. An electric motor drives the patented Archimedean type "scooped" impeller, which is far superior to old fashion propeller type surface aerators. Almost effortlessly this impeller pulls wastewater up to a deflector head that transforms water into a fine film, then shoots the water droplets out in a uniform circular pattern.

Because the trajectory of the water is long and low, there is considerably less aerosoling and far more water is exposed to the air, increasing oxygen transfer.

Our high efficiency Turbo surface aerator will help you meet increasingly stringent regulations while reducing your operating costs.



Stationary deflector head and stepped diffuser plate create a low-trajectory pattern that prevents the aerosols that can occur with conventional, high-arching patterns.



1. Stationary Deflector Head
2. Stepped Diffuser Plate
3. High Efficiency "Scooped" Impeller
4. Encapsulated Motor Shaft

# **AIRE-O<sub>2</sub> TURBO<sup>®</sup> AERATOR**

## **MECHANICAL SURFACE AERATORS WITH STAINLESS STEEL FLOTATION STANDARD NEMA SPECIFICATIONS**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

##### **A. SCOPE OF WORK**

- 1) The following specifications direct attention to certain required features of the design package but do not purport to cover all details entering into the design, construction, and/or installation of the equipment. The Contractor shall furnish and install the aerator mechanisms complete in all details and operable under all normal conditions.
- 2) The Contractor shall furnish and install floating aerators. Each aerator shall consist of a motor, a direct drive double-flight impeller, intake cone, and a floatation assembly.
- 3) The equipment Manufacturer shall provide written calculations showing all assumptions made in the design of the system.

#### **1.2 DELIVERY, STORAGE AND HANDLING**

- A. The Contractor shall be responsible for the unloading of the aeration equipment.
- B. The Contractor shall store and handle the aerators in such a fashion that does not inhibit the performance of the unit.

#### **1.3 WARRANTY**

- A. The aerator Manufacturer shall supply a 3-year non-prorated factory warranty.
- B. All parts supplied by the aerator Manufacturer must be warranted by the same.
- C. All warranty repairs must be done in accordance with the factory O & M Manual.
- D. Field replacement of aerator components shall in no way effect the factory warranty.

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**PART 2 PRODUCTS**

**2.1 MANUFACTURER**

- A. To establish a standard of quality, the base bid for the surface aerators shall be the AIRE-O<sub>2</sub> TURBO® Aerator, manufactured by Aeration Industries International, Inc., or pre-approved equal.

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- B. Any alternate equipment Manufacturer shall be approved at least two (2) weeks prior to the bid date.
- C. Alternate equipment Manufacturers shall have a minimum of five installations of the same equipment model and design in a similar application for a period of five years. A reference list shall be provided with names, telephone numbers, and addresses of the qualified installations.
- D. Pre-approved equipment Manufacturers not meeting the requirement in 2.1C are invited to bid, provided they furnish a Performance Bond underwritten by a bonding agent acceptable to the Owner for a period of five years. Equipment and/or components failing within this period due to deficiency in design, workmanship, or material shall be replaced at no cost to the Owner.

**2.2 AIRE-O<sub>2</sub> TURBO® AERATOR COMPONENTS:**

**A. AERATOR DRIVE MOTOR**

- 1) The motor shall deliver [ ] horsepower and shall be rated for [ ] volts, [ ] Hz, [ ] phase service.
- 2) The motor shall be totally enclosed, fan cooled.
- 3) The motor shall in all cases equal or exceed current NEMA specifications.
- 4) The motor windings shall be non-hygroscopic.
- 5) Insulation shall equal or exceed NEMA Class F with Class B temperature rise providing a service factor of 1.15.

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- 6) Motor mounting and shaft extension dimensions shall conform to NEMA standards to facilitate procurement of replacement motors.
- 7) A condensate drain shall be located at the lowest point in the lower end bell housing.
- 8) A stainless steel nameplate shall be provided with each motor and shall be securely fastened thereto. Information shall include voltage, speed, phase, insulation class, amperage, service factor, wiring diagram, and motor serial number.
- 9) Each motor shaft shall have a one-piece solid shaft, continuous from the top bearing to the aerator's double-flight impeller. Wastewater shall not be exposed to the drive shaft. Extended motor shaft or designs utilizing couplings shall not be accepted.
- 10) The motor shaft shall be balanced to within 1 mil to be measured on any part of the motor frame including the C-face.
- 11) Motor/impeller shaft assembly shall be sufficiently rigid that no support bearings are required below the motor. Units with support bearings below the motor will not be allowed unless supplied with a 3-year warranty.
- 12) Motor Bearings shall be regreasable in order to optimize bearing life. The combined radial axial bearing shall be located in the fan end of the motor to provide maximum cooling and minimize bearing contamination. Motor bearings shall be designed for a minimum L2 bearing life of 27,000 hours and a minimum L10 bearing life of 81,000 hours.
- 13) The motor terminal box shall be firmly bolted to the motor frame at four points. The terminal box shall be sized to meet the NEMA standards.
- 14) The terminal box shall be drilled and tapped to receive one compression watertight fitting to accommodate the appropriate electrical service cables.
- 15) Complete internal rotating assembly and stator winding shall be epoxy coated to maximize corrosion protection of electrical components.
- 16) The motor must be supplied with premium insulation for extended life in harsh environments.
- 17) The motor shall be supplied with a double lip seal to prevent water migration up the motor shaft.

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**B. FLOTATION**

- 1) Flotation shall be constructed of stainless steel and designed so to ensure maximum stability.
- 2) The one-piece float shall be stainless steel filled with polyurethane foam of the closed cell type. Fiberglass flotation will not be acceptable.
- 3) The float shall be designed with 15-20% reserve buoyancy. Buoyancy shall be sufficient for all normal operation.
- 4) The flotation unit shall have six stainless steel mooring eyes. These eyes shall be firmly affixed to the float. This will allow for either three or four point mooring.

**C. "STEP" MOTOR MOUNT DIFFUSER PLATE**

- 1) The step motor mount diffuser plate shall be constructed of stainless steel with a machined registered fit. Connecting hardware shall be stainless steel. Units supplied with material other than stainless steel will not be allowed.

**D. DOUBLE-FLIGHT IMPELLER**

- 1) The double-flight impeller shall be stainless steel and conically shaped with double helix construction.
- 2) The design of the double-flight impeller shall provide a non-rotating stationary deflector head for horizontal discharge of the water in a circular pattern minimizing the loads in the motor thrust bearings. Units that utilize a fixed diffuser transmitting hydraulic thrust loads through the motor bearings are not acceptable.
- 3) Designs utilizing marine propellers, deflection inserts, and a submerged guide bushing to stabilize the shaft are not acceptable.
- 4) The radial clearance between the impeller and the volute tube wall shall be such as to yield maximum efficiency and minimal clogging with debris.
- 5) Use of all lip seals shall be above water line.
- 6) Impeller thrust/projected blade area ratio shall not exceed 10 psi to prevent cavitation.

**E. VOLUTE**

- 1) The double-flight impeller shall operate in a volute made of stainless steel plate rolled and welded into a cylindrical shape.

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- 2) The volute shall not contain any structural members of any type that would tend to cause the unit to clog. The flow through the volute shall be unrestricted.
- 3) The volute shall be further supported by 8 stainless steel gussets welded around the perimeter of the volute and contained within the float.
- 4) The volute shall be attached to the float skin by welding the float skin material to stainless steel rings that reinforce the uni-body construction of the entire float assembly.
- 5) The volute top shall have a machined register to ensure perpendicularity and concentricity with the flange support.

**F. PRE-ROTATION BAFFLE (CONE/CROSS)**

- 1) The aerator shall have a cone/cross, which shall be fabricated of stainless steel with an expanding opening on the intake end of the cone.
- 2) Design of cone/cross shall be strong enough to support the weight of the entire aerator assembly and provide stability when the equipment is freestanding on dry ground.

Units unable to support the weight of the entire aerator assembly when free standing on dry ground are not acceptable.

- 3) To minimize energy losses, cone intake velocity shall not exceed 5 feet per second. The cone angle shall not exceed 15° per side, and shall have at the intake end a 30° flair. To prevent vortexing, cross fin diameter shall be equal to the float diameter.

**G. ELECTRICAL SERVICE CABLE**

- 1) Cable shall be CSA/UL approved for severe environments, suitable for underwater service, and one continuous length.
- 2) The cable shall be jacketed, four-conductor, flexible stranded cable with individually wrapped conductors rated SEOOW or equal.

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**PART 3 EXECUTION**

**3.1 LOCATION, SUPPORT, AND MOORING**

- A. Each aerator shall be located substantially as shown on the drawings by 3 or 4 point mooring.
- B. Anchor cables and mooring hardware shall be stainless steel.

**3.2 SHOP TESTING**

- A. Each aerator shall be tested in the water under load. The aerator Manufacturer shall supply complete test data with the submittal package. Radial vibration velocity shall not exceed 0.3 inch/second at the upper motor bearing or volute tube below the float.

**3.3 FIELD SERVICES**

- A. The aerator Manufacturer, through its factory trained field service technician, shall provide service to verify the proper installation and start-up of the aerators. Operation and maintenance instructions should be given to the Engineer/Owner through the use of illustrated material within the manual.

**END OF SECTION**