

ENTERPRISE II FLOATING ASPIRATING MIXER SPECIFICATION PAGE 1

1. GENERAL

- 1.1 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.
- 1.2 Furnish _____ aspirating mixers. Each aspirating mixer shall consist of an electric submersible motor, a direct drive propeller driven at a constant speed, a clog resistant aspirating venturi/nozzle, 4 inch PVC flexible air hose and a float assembly. Aspirating aerators with non-submersible motors shall not be considered equal.
- 1.3 All parts shall be designed and proportioned for ample strength, stability, and stiffness for their intended purpose.
- 1.4 The aspirating mixer shall be capable of handling raw, screened sewage.
- 1.5 The aspirating mixer shall be designed so that 95% of the entire weight of the aspirating mixer assembly is below the water surface.
- 1.6 The aspirating mixer shall be unconditionally guaranteed to not capsize due to ice or turbulence when properly installed.
- 1.7 The aspirating mixer shall be designed to be raised above the surface for inspection and removal. The aspirating mixer shall be designed to be lowered beneath the water surface to desired operating depth and angle.

2. PERFORMANCE

- 2.1 Each aspirating mixer shall be capable of delivering a minimum of _____ cubic feet of air per minute, measured at four feet of liquid depth.
- 2.2 The air will be dispersed as fine bubbles as defined by the U.S. EPA Report Number EPA-600/2-82-003
- 2.3 Each mixer shall be capable of a minimum direct pumpage rate of _____ gpm.
- 2.4 Each mixer shall be capable of producing a minimum of _____ lbs. of thrust.

3. SUBMERSIBLE MOTOR

- 3.1 The motor shall deliver _____ horsepower at 1800 rpms and shall be wired for _____ volts, 60 HZ, _____ phase service.
- 3.2 The motor shall be a Baldor/Reliance Electric Duty Master Submersible AC motor designed for Class 1, Group D, Division 1, and explosion proof, for installation in water or sewage and rated for chemical duty. Motors not having a UL listing, Class 1, Group D, Division 1, explosion proof, for installation in water or sewage will not be considered equal. The high efficiency motor shall be designed for continuous duty and shall be capable of sustaining ten (10) evenly spaced starts per hour. All electrical parts shall be housed in an air filled, corrosion resistant, cast iron, Class 30, frame. All mating frame fits shall have rabbet joints with large overlap, as well as O-ring seals of nitrile rubber.
- 3.3 The motor shall have special Class F insulated windings rated for continuous duty in 25 degrees C liquids and shall be non-hygroscopic. The motor shall have a 1.15 service factor and three (3) thermal switches in the end turns of the motor windings.
- 3.4 The internal components of the motor shall be protected by heavy duty tandem mechanical seals Type 21. The inboard and outer seal shall be of carbon ceramic Any motor using shaft lip seals or a combination of lip seals and mechanical seals shall not be considered equal.
- 3.5 The cable leads shall have strain relief internal to the entry consisting of a strain equalization plate and Buna-N grommets. The cable leads shall be butt spliced and epoxy sealed to prevent intrusion of any liquid from a damaged cable into the motor. Terminal boards shall not be considered equal to the leak proof threaded enclosure impregnated conductor epoxy seal system specified.
- 3.6 The motor shaft shall be continuous from bottom bearing to the mixer's propeller and manufactured from 18-8 stainless steel. The motor shaft shall be machined to a tolerance of plus or minus .002 T.I.R. from lower bearing to the upper end of the motor. The motor shaft shall be supported by two (2) single row double shielded anti-friction pre-lubricated bearings, rated for B-10 life of 100,000 hours.
- 3.7 All external hardware, including the motor name plate, shall be made of 316 stainless steel.

4. FAIRWATER

- 4.1 The fairwater shall house the propeller output shaft coupling, propeller drive shaft and two (2) roller taper bearings.
- 4.2 The fairwater shall be manufactured of ASTM (A536) 65-45-12, ductile iron with no less than .250 minimum sectional thickness.
- 4.3 The propeller drive shaft shall be manufactured from 1.750 inch diameter 316 stainless steel bar stock. The propeller drive shaft shall be supported by (2) preloaded roller taper bearings having a B-10 life of 100,000 hours
- 4.4 The internal components of the fairwater shall be protected by a heavy duty mechanical seal Type 21, silicon carbide seal. The mechanical seals shall be ISO 9000 certified. The use of lip seals or combination of lip seals and mechanical seals shall not be considered equal.

5. PROPELLER

- 5.1 The propeller shall be manufactured of stainless steel and shall be specifically designed to maximize performance of mixing and volume of air for the application intended.
- 5.2 The propeller shall be streamlined to prevent cavitation and reduce drag and shall have trailback blades for weedless, foul resistant operation.
- 5.3 The propeller shall be hydraulically balanced to assure equalization of load under full operation.
- 5.4 The propeller shall be statically balanced to within 5 gram centimeters.
- 5.5 The propeller shall be not greater than 5 inches from outboard motor bearing.
- 5.6 The propeller and motor rotor unit shall be dynamically balanced to a vibration level not to exceed .70 mils while hydraulically submerged.
- 5.7 The propeller design shall be tested in clean water and shown to draw a minimum of 85% of the recommended full motor amperage loads at nameplate voltage and power factor.
- 5.8 The propeller shall be designed to allow easy removal in the field.

6. VOLUTE, VENTURI/NOZZLE

- 6.1 The volute shall be manufactured from ductile iron, Class 30, and be not less than .250 inches minimum sectional thickness.
- 6.2 The volute shall be designed to diminish vortexing of the propeller and be flared to minimize entrance losses.
- 6.3 The propeller shall run inside the nozzle volute.
- 6.4 The design of the venturi/nozzle shall be such that the air/liquid emulsion is discharged horizontally with a directional capability determined by support structure design.
- 6.5 The venturi nozzle shall be of a clog resistant design. The smallest opening shall be not less than four (4) inches.
- 6.6 The air intake port shall be not less than four (4) inches in diameter.
- 6.7 The air delivery tube shall be PVC flexible hose.

7. FLOTATION ASSEMBLY

- 7.1 The flotation assembly shall consist of two (2) non-corrosive pontoons, which shall be filled with a closed cell, non-hygroscopic, contour molded, polystyrene foam.
- 7.2 The pontoon shape shall be designed so that damage will not occur due to freezing.
- 7.3 The pontoons shall be connected by a stainless steel support frame. The support frame shall incorporate two (2) stainless steel 1.25" diameter x 6 feet acme threaded rods connected to the aspirating mixer. Allowing the aspirating mixer to be raised and lowered for depth and angle adjustment.
- 7.4 The support frame shall be designed so that the aspirating mixer can be raised above the water level between the two (2) pontoons for inspection, service and removal.
- 7.5 The support frame shall have four (4) mooring points.
- 7.6 The entire floatation assembly shall be designed to provide operational stability and support not less than two (2) times the weight of the aspirating mixer.

8 ELECTRICAL JUNCTION BOX

- 8.1 The electrical junction box shall be made of non-corrosive material in a LB configuration.
- 8.2 The electrical junction box shall meet NEMA standards, UL and CSA recognized.
- 8.3 The electrical junction box shall be securely bolted to the flotation support structure.
- 8.4 The electrical junction box shall be provided with compression water tight cord grip fittings to accommodate connection of the electrical cable.

9. ELECTRICAL SERVICE CABLE

- 9.1 Cable shall be CSA/UL approved for severe environments, suitable for underwater service and one continuous length.
- 9.2 The cable shall be jacketed, flexible stranded cable with individually wrapped conductors rated STEOW, SEOOW or equal.
- 9.3 Each aspirating mixer shall be furnished with _____ feet of AWG#_____

10. PAINT

- 10.1 All surfaces, other than stainless steel, will be coated with Tnemec Series 66 Hi-Build epoxyline. Paint shall be chemical and corrosion resistant for protection against abrasion, moisture, corrosive fumes, chemical contact, and immersion in potable and waste water application.
- 10.2 All surfaces shall receive two (2) coats for 6 mils thickness.

11. QUALITY ASSURANCE

- 11.1 All mixers will be tested and verified for electrical and mechanical integrity. The following tests will be the minimum performed.
- A. An insulation test of the windings and balance of the rotor.
 - B. A test of the mixer motor (run dry for 5 minutes at full load; to check electrical data measurement.
 - C. A submerged test of the mixer.
 - D. A motor end cable insulation test for moisture content and insulation defects.
 - E. A check of the mixer (run dry) to establish correct rotation and mechanical integrity.
 - F. A check of propeller, motor rating, and electrical connections for compliance with purchase order.

12. DELIVERY, STORAGE AND HANDLING

- 12.1 The Aspirating Mixer shall arrive at the installation site fully assembled and ready for attachment to the flotation or support equipment.

13. OPERATION AND MAINTENANCE MANUAL

- 13.1 Operation and maintenance manuals shall be furnished before start up of the equipment.

14. WARRANTY

- 14.1 The Enterprise II aspirating mixer has a one year limited warranty against defects in material and workmanship.