

# ECS House Industries, Inc.

3720 Highway 1 South, Cherry Valley, Arkansas 72324

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## **5hp Direct-Drive, ECS House #SDB059TA2 Floating Electric Brush Aerator Specifications**

### **PART 1 GENERAL**

#### 1.1 Summary

- A. The design, fabrication, supply, and installation of the aeration system shall be as specified herein.
- B. Floating brush aerators are equipped with all necessary equipment and materials to meet the specified requirements in the proposed wastewater treatment process.

#### 1.2 Qualifications

- A. The aeration system supplier shall be experienced in wastewater treatment processes and shall be prepared to demonstrate the affect on the client's process of the aeration systems supplied through documented analysis relating to flow, hydraulic retention time, and biological contact.
- B. The floating brush aeration system Design Engineer shall have documented water and wastewater treatment and design experience for a minimum of ten (10) years.
- C. The manufacturers of the aeration system components shall provide a twelve (12) month warranty on all items from the date of start-up, not to exceed eighteen (18) months from the date of delivery.

### 1.3 Submittals

- A. The Contractor shall submit to the ENGINEER for approval, submittals showing full details of all aeration equipment and appurtenances. The submittals shall be supported by such notes or written directions as may be necessary.
- B. This submission shall be made as soon as feasible after Contract award. The Contractor shall furnish the ENGINEER with (5) five copies of the submission as approved. He shall also provide approved copies sufficient for the use of his own forces.
- C. The information required on the submittals shall include, but not necessarily be limited to, the following:
  - 1. Full and complete specifications covering the proposed equipment and appurtenances to be furnished, including certified aeration design provided by Floating Brush Aeration Design Engineer. The design shall show the mixing and oxygen capabilities of the ECS House Industries, Inc. Floating Brush Aerator System.
  - 2. Detail drawings showing plan and elevation dimensions of the proposed equipment and appurtenances to be furnished.
  - 3. Assembly, Installation, and adjustment instructions.
  - 4. Nearest location of factory maintenance and service facilities that will be available to service the equipment offered.
  - 5. Full and complete specifications for each motor or motor drive unit, or gear reducer proposed to be furnished as a component part of the equipment
  - 6. Such weights of the equipment as necessary including the heaviest piece to be handled during construction.
  - 7. Warranty as specified herein.
  - 8. Troubleshooting guide.
  - 9. Electrical requirements, including power and control wiring schematics.

Failure to submit the above data as set forth shall be cause for rejection of the submittal and equipment.

### 1.4 Operation and Maintenance Manuals

- A. Upon the Engineer's approval of submittals the manufacture shall provide (5) five copies of the operation and maintenance manuals.
- B. The O&M manuals shall include details of all components, installation instructions, start-up procedures, and operation and maintenance procedures. The O&M manuals shall include specific instructions for receiving and handling, assembly, mooring, wiring, installation, repair, service and storage.

## PART 2 PRODUCTS

- 2.1 The Contractor shall furnish and install a total of four (4) 5hp floating electric brush aerators as part of this project. ECS House Industries, Inc., located in Cherry Valley, Arkansas, shall manufacture the floating electric brush aerators or Engineered Approved Equal.
- 2.2 Aeration units and appurtenances shall be adaptable to the layout shown on the drawings and shall be of new and current manufacture. Units shall operate without objectionable noise or abnormal vibration over the specified operating range. All rotating parts shall be balanced through precise CNC machining and precision rotor and shaft alignment. Units shall have a nameplate that will include the manufacturer's name, serial number, model number, size, gear reducer speed, and horsepower.
- 2.3 Horizontal - Rotor Assembly
- A. The 5 hp floating electric brush aerator assembly shall include an 8" schedule 40 rotor pipe. The rotor shall be 059" long and no shorter. The rotor shall have 45 brushes that are 6" minimum width x 14" minimum length and have 133-degree V-shaped angle. The brushes shall be robotically welded, on both sides, in a spiral configuration to achieve superior balance and rotation. The rotor assembly shall be constructed of 304L Stainless Steel. Lifting eyes shall be welded onto the rotor pipe so complete unit can be removed and installed with balance.
- The rotor shall have welded in CNC machined inner-plates that shall allow both the drive and non drive end shafts the ability to be bolted-into the rotor. The drive shaft and non drive shaft shall be fabricated from 316 stainless steel.
- B. Welded-in or bolted "on" drive or non drive end shafts shall not be acceptable.
- C. Lifting mechanisms shall be welded onto the rotor pipe so the complete unit can be removed and installed with balance.
- 2.4 Non Drive End Rotor Bearing
- A. The non drive end bearing shall be a grease lubricated, stainless steel, eccentric collar 1-1/2" ball-bearing assembly. The bearing shall have a 304L stainless steel inspection cover and an auxiliary non-corrosive seal mounted in a power coated seal plate on the rotor side of the power coated bearing bracket. The collar shall have a stainless steel rear cover mounted above and around the upper half the collar and bolted to the bearing bracket sides. An external grease fitting shall be located on the side of the bearing bracket. The bearing shall have an L10 bearing life over 100,000 hours.

- B. Any aerator that has to use a plastic drive-end bearing will not be acceptable.

## 2.5 Electric Motor

- A. Each aerator shall use a premium efficiency severe-duty C-face motor with feet. The motors shall be 5hp, 3 phase, 50 Hertz, 415 volt, 1750 RPM with a 1.25 operating service factor when motor is operating at 90% of rated full load during normal operation.
- B. Motor shall be totally enclosed, fan cooled (TEFC), rated for severe corrosive-duty, NEMA Class F insulation, cast iron construction with an epoxy coating, and stainless steel hardware and nameplate. ( Premium efficiency; meets or exceeds the requirements of EPACT '92 and Canadian Federal Efficiency Levels defined in CSA C390-93. Full load efficiency of all ratings is certified under the EEV Program of the CSA.)

## 2.6 Electric Motor Certification

- A. The aerator manufacturer shall provide certification that the nameplate data affixed to the aerator's electric motor is valid, specific data applicable to that particular motor.

## 2.7 Gear Reducer

- A. Constant-duty AGMA Class III DODGE Model TA2, Gear Reducer shall be directly mounted on the rotor's drive shaft with tapered-bushings. The shaft mounted helical gear reducer shall have tapered roller bearings. Ball bearings in the gear reducer are not acceptable. The gear reducer shall be rated for a minimum of 12hp, providing a minimum 2.0 hp Service Factor.
- B. The input shaft and output hub seals shall be non-corrosive, non-metallic, stainless steel spring loaded double lip, nitrile seals. The output hub shall have two seals on each side. The input shaft of the gear reducer shall be connected to the motor shaft with a Dodge PX40 coupler thus giving the assembly a "Dampened System" and creating the "Direct Drive" aerator. The coupler shall be high speed and the coupler element shall be constructed of high density reinforced rubber. The gear reducer shall produce a nominal rotor speed of 70 RPM. The gear reducer shall not be connected to the motor using any type of V-belt driven system or a "low speed coupled" direct driven system.
- C. An input shaft mounted steel hub shall have a cooling fan bolted to the hub face to provide gear drive cooling.

## 2.8 Aerator Drive End Shaft & Triple Seal Protection System

The 1-15/16" diameter 316 SS drive shaft enters the gear drive enclosure through the "Triple Seal Protection System".

- A. This consists of CNC machined, piloted, inner and outer seal plates which help prevent fluids from entering the gear housing. The inner and outer plate seals shall be non-corrosive, non-metallic type, stainless steel spring loaded, double-lip, nitrile seals. The outer seal is additionally protected with a v-ring shaft seal and protective stainless steel collar. The cavity between the inner and outer seal plates are grease filled through a port on the side of the outer seal plate. Internally, the drive shaft is supported by a 1-15/16" piloted flange bearing that is bolted internally to the drive case with a spacer ring that permits a close fit and aligns the shaft seals. The aerator gear drive enclosure shall be designed to keep fluids from entering the enclosure. The materials are 304L Stainless Steel, 7 gauge and 1/4" plate steel. The enclosures shall be ECS House Industries part numbers MFG005489.

The gear reducer enclosures consists of a welded drive case, drive case cover with glued neoprene seal with hinge linkage, vented motor mounting bracket, motor height adjusting brackets with adjusting bolts, vent hole splash prevention angle, 16 gauge 304SS motor cover, stiffening angles bolted to the upper case sides and ends, and anti-rotation angles that lock the gear drive into position after motor and gear drive input shaft alignment. The rotor end stiffening angle shall provide an adjustable hinge point for compression of the cover seal around the rotor end top edge of the enclosure, sides and motor bracket.

The vent holes on the motor bracket shall be protected with a 16 gauge 304 stainless steel splash angle to prevent fluids from entering the enclosure in case of wash down. The motor bracket bolts directly to the drive case to provide room for installation and removal of the shaft mounted gear drive assembly and shall be sealed with silicon. The motor bracket shall provide that the C-face motor shall be removed without repositioning the gear drive.

The sealing drive case cover shall be held closed with two stainless steel clamp latches mounted on stainless steel blocks bolted to the drive case enclosure sides. The latching force shall be adjustable to maximize sealing of the cover. The stainless steel clamp catches shall be bolted to the drive case cover flange. When in the raised position for service and inspection, the cover shall be held open with manually inserted stainless steel pins with lanyard in the hinge linkage.

The drive train enclosure shall be bolted to the framework in four places provided by four angle brackets bolted to the enclosure sides.

2.9 Flootation Assembly, Main Frame Construction, Flootation Attachment Bands, Anchoring System, and Powder Coating Specifications

- A. Each 5 hp unit shall have (2) two-16 gauge, 304L stainless steel tanks. The drive-end tank shall be 8' long x 22" diameter, and the non-drive end tank shall be 8' long x 19" diameter.
- B. All stainless steel floats shall be seam welded and pressure checked after fabrication. The stainless steel floats shall be foam filled with "closed celled" two part foamular foam.
- C. The main frame of the aerator shall be fabricated from 304L Stainless Steel. The main frame shall be fabricated out of 3" schedule 40 pipe and 7 gauge steel. The frame shall be welded and bolted together with stainless steel hardware.
- D. Each float shall be attached to the mainframe using 7 gauge, 304L Stainless Steel bands and connected to the frame with stainless steel pins and 304L stainless steel bolted brackets. The frame shall be connected to the anchoring system in such a manner that external forces, resulting from wave action and other external movement, are not transferred to the Flootation attachment.
- E. Each unit shall have adjusting linkage attached to each corner of the main frame. Adjusting linkage shall be capable of changing the operating depth of the horizontal rotor blades; the horsepower requirement and amperage draw, and provide aerator leveling. Adjusting linkage shall be fabricated from 304L stainless steel rods with brass adjusting nuts. A djusting linkage shall not be connected directly to the anchoring system nor shall it mechanically depend upon the anchoring system for it to be effective.
- F. Anchoring system shall hold the aerator firmly in position. The type of anchoring system to be used is determined by the placement of the aerator(s) as indicated on the ENGINEER'S Plans. Anchoring system shall be fabricated from 304L Stainless Steel. The anchoring system shall not restrict the unit's flootation and shall allow for continuous aerator operation with fluctuations in the water surface elevation up to (plus/minus) three feet ( $\pm 3$ ft.). The anchoring system shall consist of two (2) parallel mooring arms, one (1) cross-brace assembly, and two (2) bank stake poles in order to anchor to the levee of the lagoon or cable anchoring can be provided.

### **PART 3 EXECUTION**

- 3.1 The aerator shall be installed as shown on the drawings and in strict accordance with the manufacturer's instructions.
- 3.2 The aerator supplier, through their field service technician or representative, shall provide service to verify the proper installation and supervision of equipment start-up. Operation and maintenance instruction shall be given to the engineer/owner through the use of illustrated material within the manual.
- 3.3 Installation supervision and start-up services shall be provided only to the extent required to comply with the manufacturer's warranty conditions.
- 3.4 After completion of the equipment installation, testing of the rotor shall be done continuously for a period of 24 hours.

## **PART 4     WARRANTY**

4.1     ECS House Industries, Inc. will warranty its equipment as free of defects in material and workmanship for a period of twenty-four (24) months to the original purchaser subject to the restrictions and conditions listed herein. Warranty period will begin upon delivery to the original purchaser or its designee. ECS House Industries, Inc. will replace or repair any part built and manufactured by ECS House Industries, Inc. within the warranty period that have failed under normal use subject to the restrictions and conditions listed herein. ECS House Industries, Inc. will not be responsible for shipping or handling on parts returned for warranty. All parts returned for warranty replacement or repairs must be returned within thirty (30) days of failure, have proper serial number and should have a RMA number attached. All motors, bearings, gear reducers, chains, sprockets, or any other part or component purchased by ECS House Industries, Inc. will be subject to the original warranty and warranted separately by their respective manufacturer. Some, but not all, original manufacturer's warranties are listed on the following pages. ECS House Industries, Inc. is not obligated to bear the cost of labor, lodging, removal of equipment from water, meals or transportation of any warranty provided herein. The warranty/limited liability of equipment, product liability shall follow and be governed by Arkansas State Laws.

**RESTRICTIONS, LIMITATIONS, AND CONDITIONS.** ECS House Industries, Inc. expressly limits the repair or replacement of defective material, parts or workmanship to be performed at ECS House Industries, Inc. facility or another place designated by ECS House Industries, Inc. No warranty will be honored by ECS House Industries, Inc. when in the sole opinion of ECS House Industries, Inc. there is loss or damage resulting from any cause beyond the control of ECS House Industries, Inc. including, but not limited to, abuse, neglect, alterations or modifications, an accident, unauthorized repairs or attempted repairs, improper installation, or damages from acts of God or governments, floods or fires, or other parties, specifically including, but not limited to purchaser. ECS House Industries, Inc. will not be responsible for failures of any kind due to pH levels that vary outside normal limits or abnormal water density in any application. All warranties as stated herein will be null and void upon failure of any kind that is determined by ECS House Industries, Inc. to have been caused by lack of routine maintenance and proper fluid changes as required by the operator's manual and the original equipment manufacturer. All warranties stated herein will be null and void upon any failure due to foreign objects coming in contact with any ECS House Industries, Inc. equipment. All serial numbers shall remain intact and together as recorded and coordinated by ECS House Industries, Inc. All parts replaced during the warranty period shall be purchased from ECS House Industries, Inc. and be of the correct part for the correct model. ECS House Industries, Inc. shall not be liable for any damage caused by corrosion to any material, part, or workmanship during the warranty period or any other time. This warranty is subject to any existing conditions of supply which may directly affect our ability to obtain materials or manufacture replacement parts. Any repair or replacement under this warranty shall not extend the original warranty expiration date.

**LIMITED WARRANTY AND LIABILITY.** ECS House Industries, Inc. shall have no obligation or liability of any kind whatsoever and shall not be liable for lack of oxygenating, loss of product or crop, time or delays, special or consequential damages of any kind of damage whatsoever arising out of the use of or failure of any product manufactured or sold by ECS House Industries, Inc. during the warranty period or anytime thereafter due to corrosion, bacteria, ameba, or any cause whatsoever. ECS House Industries, Inc makes no other warranty, expressed or implied, and, specifically, ECS House Industries, Inc disclaims any implied warranty or merchantability or fitness for a particular purpose.

If any provision of this Warranty or the application thereof to any party or circumstance shall to any extent be invalid or unenforceable, the remainder of this Warranty, or the application of such provision to parties or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby and each provision of this Warranty shall be valid and enforceable as to the fullest extent permitted by law.