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SHIP City of Oak Ridge - Materials Management
 TO 100 Woodbury Lane / P.O. Box 1
 Oak Ridge, TN 37830
 (865) 425-1819 FAX (865) 482-8475
 Lyn Majeski lmajeski@oakridgetn.gov

 Ordered - 01/30/14 Freight - Default - Handling Code
 Requested - 02/06/14 Taken By -
 Delivery - Deliveries are accepted 8 a.m. TO 3 p.m.

Description / Supplier Item	UM	Unit Cost	Extension	Req. Dt
IMMERSIBLE MOTORS-WASTEWATER PUMPING EQUIPMENT PER THE ATTACHED SPECIFICATIONS	2.0000 EA		EA	02/06/14

 Total Order

**WASTEWATER PUMPING EQUIPMENT
IMMERSIBLE MOTORS
for the
CITY OF OAK RIDGE
RFQ #137559**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment and incidentals required to furnish and install, complete and ready for operation, the pump drivers as further described below. Work shall include, but not be limited to, motors and other accessories as required to retrofit the existing Fairbanks Morse SN K3E1-060120 pumps with new premium efficiency motors.
- B. The work also includes mounting, supports, and all other items required for a complete, functional installation. Start-up shall be supervised by a representative of the motor/pump manufacturer including coordination with the electrical equipment, controls and instrumentation, and Owner technical representatives. Written certification of proper installation and operation shall also be provided by this representative.
- C. Installation shall include mounting of the motors on the existing pump volutes for two (2) existing frame mounted solids handling pumps, complete and functional.

1.02 SUBMITTALS REQUIRED

- A. Supplier shall submit information for the proposed motors to reflect the new conditions for the pump/motor combinations for the Owner and Engineer to review to verify the level of quality of equipment proposed to be supplied by the supplier.
- B. The submittal shall include materials of construction, pump curves with head/flow relationships at various motor speeds, horsepower requirements, amperage draws, efficiencies at the various points on the performance curve, motor dimensions, and other data to accurately describe the proposed equipment.
- C. Submittal shall also include a detailed list of exceptions to the specifications and their impacts to the design drawings.

1.03 SHOP DRAWING SUBMITTALS

- A. Submit shop-drawings, certified product data, etc.
- B. Six (6) certified copies of the results of final installed testing shall be provided.
- C. Four (4) copies of a certified complete operation and maintenance manual shall be provided prior to completion of the project.

1.04 ACCEPTABLE MANUFACTURERS

- A. The equipment shall be manufactured in the U.S. and all spare parts shall be available for same day shipment and next day delivery. The manufacturer shall maintain a fully equipped shop facility to perform all operations including welding, fabrication, assembly and testing. All materials shall be designed to withstand the stresses encountered in fabrication, erection and operation. All equipment shall be of corrosion resistant materials or shall be suitably protected by the supplier with corrosion resistant industrial coatings approved by the engineer.

PART 2 - PRODUCTS

- A. PUMP DRIVERS
 - 1. All motors defined under this specification shall conform to the latest applicable requirements of NEMA, ISO, ANSI, IEEE and NEC.
 - 2. Motors are to be designed for continuous duty for three phase, 60Hz, 460 volt operation.
 - 3. Ratings to be based on a 40 degree C ambient, 1,000 meter altitude or lower operation with a maximum winding temperature rise of 85 degree C by resistance at 1.0 service factor.
 - 4. Motors to be furnished with Class F insulation. All motors covered under this specification shall be capable of operating at 1.15 service factor with Class F rise, but shall be selected for operation within their full load rating without applying the service factor.
 - 5. Motors shall be Tatung Electric Premium Efficiency design.
 - 6. Motors shall be evaluated on conformance to this specification and the total costs including initial costs and operating life cycle costs.
 - 7. Low voltage motors shall be equipped with space heaters appropriate for the frame size and thermal protection by thermostats connected in series. Medium and high voltage motors shall be equipped with space heaters appropriate for the frame size and winding Resistance Temperature Detectors.

B. MECHANICAL

1. BEARINGS AND LUBRICATION

- a. Bearings shall be either deep groove, angular contact, roller or spherical roller.
- b. Bearings shall be selected to provide L10 life for flexible direct coupled applications of 40,000 hrs minimum.
- c. Bearing temperature rise shall not exceed 60 degrees C for 3600 RPM motors and 50 degrees C for 1800 RPM and slower motors.
- d. Bearing ISO identification shall be on the motor nameplate.
- e. Drive end motor lubrication system is to be re-greasable. Opposite drive end bearing system will allow for re-lubrication with oil.
- f. Motor to be lubricated by manufacturer with a premium polyurea grease on the drive end and an ISO compliant oil for opposite drive end. Bearing systems shall be suitable for operation between -25 degrees C to 120 degrees C.

C. ENCLOSURE

1. Motor enclosure, including frame, end brackets, fan shroud, and cover shall be fabricated steel or cast iron type JIS G 5502 or better.
2. Thirty (30') feet of power cable shall be provided for the power leads of the motor, attached by either a sealable water tight gland or a potted hub. The motor shall be equipped with a moisture detector external to the motor.
3. Motor shall be blower cooled such that when the motor is submerged, the blower shall disable without overloading the main motor. The blower fan shall be corrosion resistant, non-sparking bi-directional. The main motor shaft will not protrude through the opposite drive end bracket and there will be no running fit to allow entrance of water into the motor. Once the motor is submerged, the blower motor and/or fan may require servicing or replacing following a return to a non-flooded state.
4. Motor rotor construction shall be of cast aluminum or fabricated copper and their alloys. Rotors shall be dynamically balanced to NEMA or ISO standards.
5. The motor shall be designed to prevent infiltration of water along the shaft by utilizing Varilip type B seal arrangement requiring no grease or utilizing the mechanical seal of the pump in closed coupled applications. Seals shall be capable of withstanding submergence of thirty (30') feet for a period of two (2) weeks.
6. All mounting hardware shall be hex head, ISO 4.6 grade or above. Screwdriver slot fasteners are prohibited on all frames.

7. Corrosion resistant stainless steel nameplate shall be affixed to the motor frame with stainless steel or brass drive pins. Nameplate information shall include all required NEMA data and ISO bearing numbers.
8. All mating frame fits shall have rabbet joints with O-rings to ensure a watertight design.
9. All motor parts, including frame, bracket, fan cover and terminal box are to receive severe duty, high grade epoxy paint. All motor parts shall be primed with an epoxy primer. These parts include the stator/frame assembly, rotor assembly, end brackets, and fan cover. Completed motor assembly must successfully withstand salt spray tests for corrosion per ASTM B-117 for ninety-six (96) hours.

D. ELECTRICAL

1. All motors shall successfully operate under power supply variations per NEMA Part 20.
2. All motors shall be designed with torque starting requirements in accordance with NEMA-MG1- 1998 20.10.1.
3. Motors shall have copper windings.
4. Motor insulation shall be class F minimum on all motors.
5. Motor leads shall be non-wicking type, Class F temperature rating or better and permanently numbered for identification.
6. Each completed and assembled motor shall receive a routine factory test per NEMA standards.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Motors shall be installed, tested and placed into operation in strict accordance with all manufacturers' requirements.

3.02 SERVICE

- A. Provide the services of a factory representative to check the installation, shaft laser alignment, supervise start-up, and instruct Owner's personnel in the proper use and maintenance of the equipment. Service shall be a minimum of sixteen (16) working hours of on-site time, and shall not include travel or preparation time.

3.03 TESTING

- A. Vibration tests shall be performed on each pump/motor combination after installation and initial start-up has been successfully completed.
- B. Vibration testing shall be conducted in strict accordance with the "Hydraulic Institute Standards" for centrifugal, rotating and reciprocating pumps.
- C. Pumps failing the test shall be corrected by the Owner's representative. The supplier shall assist the Owner with the corrections.