

SECTION 22 13 33

PACKAGED, SUBMERSIBLE SEWERAGE PUMP UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Packaged submersible centrifugal sewerage pump units including pump, motor, controls and sump in one complete system. See schedule on Drawings for pumps capacity and head.
- B. A complete listing of common acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
- D. Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.
- E. Section 26 29 11, MOTOR CONTROLLERS.

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standards will govern.
- B. International Code Council (ICC):
IPC-2018.....International Plumbing Code
- C. National Electrical Manufacturers Association (NEMA):
ICS 6-1993(R2016).....Industrial Control Systems: Enclosures
250-2018.....Enclosures for Electrical Equipment (1000 Volts Maximum)
- D. National Fire Protection Association (NFPA):
70-2020.....National Electrical Code (NEC)
- E. Underwriters' Laboratories, Inc. (UL):
508-2018.....Standard for Industrial Control Equipment

1.4 SUBMITTALS

- A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 13 33, PACKAGED, SUBMERSIBLE SEWERAGE PUMP UNITS", with applicable paragraph identification.

C. Manufacturer's Literature and Data Including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

1. Pump:

- a. Manufacturer and model.
- b. Operating speed.
- c. Capacity.
- d. Characteristic performance curves.

2. Motor:

- a. Manufacturer, frame and type.
- b. Speed.
- c. Current Characteristics and W (HP).
- d. Efficiency.

3. Controls and Disconnect Apparatus:

- a. Starting switch.
- b. Automatic control and level alarm.
- c. Alternating relay.
- d. Circuiting of control panel.
- e. Sensors.

4. Sump.

5. Removal/Disconnect system.

D. Certified copies of all the factory and construction site test data sheets and reports.

E. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replaceable parts, and troubleshooting guide:

- 1. Include complete list indicating all components of the system.
- 2. Include complete diagrams of the internal wiring for each item of equipment.
- 3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.

1.5 QUALITY ASSURANCE

- A. Bio-Based Materials: For products designated by the USDA's Bio-Preferred Program, provide products that meet or exceed USDA recommendations for bio-based content, so long as products meet all performance requirements in this specifications section. For more information regarding the product categories covered by the Bio-Preferred Program, visit <https://www.biopreferred.gov>.
- B. Refer to Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS for additional sustainable design requirements.

1.6 AS-BUILT DOCUMENTATION

- A. Comply with requirements in Paragraph AS-BUILT DOCUMENTATION of Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

PART 2 - PRODUCTS

2.1 SUBMERSIBLE SEWERAGE PUMP UNITS

- A. Duplex or multiplex centrifugal, submersible pumps, designed for 60 degrees C (140 degrees F) maximum water service. Driver shall be electric motor with rigid type support. Systems to include two pumps as required by Contract Documents. Where hazardous environment condition exists, explosion proof pumps shall be installed.
 - 1. Pump housings shall be heavy cast-iron.
- B. Impeller: thermoplastic elastomer (Basis of Design: Hytrel), non-clog, to accommodate 50 mm (2 inch) solids.
- C. Shaft: Stainless-steel.
- D. Bearings: As per manufacturer's recommendations to hold shaft alignment, anti-friction type for thrust, permanently lubricated.
- E. Motor: Maximum 40 degrees C (72 degrees F) ambient temperature rise, completely enclosed, voltage and phase as shown in schedule on electrical drawings conforming to NEMA 250, Type 6P. Size the motor capacity to operate pump without overloading the motor at any point on the pump curve. Refer to Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.
- F. Starting Switch: Manually-operated, tumbler type, as specified in Section 26 29 11, MOTOR CONTROLLERS.
- G. Automatic Control and Level Alarm: Provide a control panel in a NEMA 1 enclosure for indoors. The controls shall be suitable for operation with the electrical characteristics listed on the electrical drawings. The control panel shall have a level control system with switches to start and stop pumps automatically, and to activate a high water alarm. The level control system will include sensors in the sump that detect the level of the liquid. The sensors may be float type switches, ultrasonic level sensors, transducers, or other appropriate equipment. The high water alarm shall have a red beacon light at the control panel and a buzzer, horn, or bell. The alarm shall have a silencing switch.

- H. The circuitry of the control panel shall include:
1. Power switch to turn on/off the automatic control mechanism.
 2. HOA switches to manually override automatic control mechanism.
 3. Run lights to indicate when pumps are powered up.
 4. Level status lights to indicate when water in sump has reached the predetermined on/off and alarm levels.
 5. Magnetic motor contactors.
 6. Disconnect/breaker for each pump.
 7. Automatic motor overload protection.
 8. Provide auxiliary contacts for remote alarming to the Engineering Control Center and BACnet compatible open-protocol type interface to DDC Controls System.
- I. Provide an alternating relay to automatically alternate leadoff and standby duties of each pump at the end of each pumping cycle. Standby pump shall start when water level in sump rises to a predetermined level that indicates excessive inflow or failure of the lead pump.
- J. Sensors that detect the level of water in the sump shall be arranged as to allow the accumulation of enough volume of liquid so that the pump will run for a minimum cycle time of two minutes. Sensors shall be located to activate the alarm adequately before the water level rises to the inlet pipe.
- K. Provide two separate power supplies to the control panel, one for the control/alarm circuitry and one for power to the pump motors. Each power supply is to be fed from its own breaker so that if a pump overload trips a breaker, the alarm system will still function. Each power supply is to be wired in its own conduit. Wiring from the sump to the control panel shall have separate conduits for the pump power and for the sensor switches. All conduits are to be sealed at the basin and at the control panel to prevent the intrusion of moisture and of flammable and/or corrosive gases.
- L. Sump: Provide fiberglass basin with gas tight steel covers. Covers shall have a manhole with a bolted cover of minimum size to inspect and service the pumps, vent connection, and openings for pumps and controls.
- M. Provide a union, check and shut-off valve in the discharge from each pump. Locate outside the sump basin.
- N. Removal/Disconnect System: System to be compatible with and furnished by the pump manufacturer. The removal/disconnect system will consist of a discharge fitting mounted on vertical guide rails attached to the sump. The pump shall be fitted with an adapter fitting that easily connects/disconnects from the discharge fitting. The discharge piping will connect to the discharge fitting so that it is not necessary to disconnect any piping in order to remove the pump.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. If an installation is unsatisfactory to the COR, the contractor shall correct the installation at no additional cost or time to the Government.

3.2 STARTUP AND TESTING

- A. Perform tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.
- B. The tests shall include system capacity, control function, and alarm functions.
- C. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.

3.3 DEMONSTRATION AND TRAINING

- A. Provide services of manufacturer's technical representative for 4 hours to instruct each VA Personnel responsible in operation and maintenance of the system.

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