

**SECTION 22 13 33  
PACKAGED, SUBMERSIBLE SEWERAGE PUMP UNITS**

SPEC WRITER NOTES:

1. Delete between //----// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.
2. This specification section is for completely enclosed packaged, submersible sewerage pump units including sump. The pump and motor shall be configured to be submerged in the effluent basin. For packaged, vertical sewerage pump units use Section 22 13 29.13, WET-PIT MOUNTED, VERTICAL SEWERAGE PUMPS.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. //Packaged submersible centrifugal sewerage pump units // Packaged submersible grinder type sewage 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 all 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 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- //D. Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS.//
- E. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
- F. Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.
- //G. Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.//
- H. Section 26 29 11, MOTOR CONTROLLERS.

**1.3 APPLICABLE PUBLICATIONS**

SPEC WRITER NOTE: Make material requirements agree with applicable requirements specified in the referenced Applicable Publications. Verify and update the publication list to that which applies to the project, unless the reference applies to all plumbing systems. Publications that apply to all plumbing systems may not be specifically referenced in the body of the

specification, but, shall form a part of this specification.

- 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.
- B. International Code Council (ICC):  
IPC-2012.....International Plumbing Code
- C. National Electrical Manufacturers Association (NEMA):  
ICS 6-93 (R2006).....Enclosures  
250-2008.....Enclosures for Electrical Equipment (1000 Volts  
Maximum)
- D. National Fire Protection Association (NFPA):  
70-2011.....National Electrical Code (NEC)
- E. Underwriters' Laboratories, Inc. (UL):  
508-99 (R2013).....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.

SPEC WRITER NOTE: Coordinate O&M Manual and commissioning requirements with specification Section 01 91 00, GENERAL COMMISSIONING REQUIREMENTS and Section 01 00 00, GENERAL REQUIREMENTS.

- E. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replaceable parts:
  - 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.
- //F. Completed System Readiness Checklist provided by the Commissioning Agent and completed by the Contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.//
- //G. Submit training plans and instructor qualifications in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.//

### 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 <http://www.biopREFERRED.gov>.

### 1.6 AS-BUILT DOCUMENTATION

- A. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them on Auto-Cad version //\_\_\_\_// provided on compact disk or DVD. Should the installing contractor

engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.

- B. Certification documentation shall be provided prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and a certification that all results of tests were within limits specified.

## **PART 2 - PRODUCTS**

SPEC WRITER NOTE: Coordinate and assure that the electrical characteristics specified below are clearly shown on appropriate drawings. Coordinate with Electrical Engineer.

### **2.1 SUBMERSIBLE SEWERAGE PUMP UNITS**

- A. Duplex or multiplex // centrifugal // grinder type //, 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 or more pumps as required by Contract Documents. Where hazardous environment condition exists, explosion proof pumps shall be installed.
1. Pump housings shall be // epoxy coated cast iron, // bronze, // or stainless steel//.
- B. Impeller: // Brass // Bronze // Cast iron //, non-clog, to accommodate 50 mm (2 inch) solids. // Grinder pumps, 316 SS impeller and 440 SS cutter and cutter plate. //
- 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 // NEMA 4X enclosure for outdoors // NEMA 7

enclosure for hazardous environment areas //. 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.

1. The circuitry of the control panel shall include:
    - a. Power switch to turn on/off the automatic control mechanism.
    - b. HOA switches to manually override automatic control mechanism.
    - c. Run lights to indicate when pumps are powered up.
    - d. Level status lights to indicate when water in sump has reached the predetermined on/off and alarm levels.
    - e. Magnetic motor contactors.
    - f. Disconnect/breaker for each pump.
    - g. Automatic motor overload protection.
    - h. Provide auxiliary contacts for remote alarming to the Engineering Control Center and BACnet compatible open-protocol type interface to DDC Controls System.
  2. For a duplex system, provide an alternating relay to automatically alternate leadoff and standby duties of each pump of a duplex unit 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.
  3. 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 one minute. Sensors shall be located to activate the alarm adequately before the water level rises to the inlet pipe.
- H. 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.

- I. Sump: Provide // cast iron // fiberglass // polyethylene // basin with gas tight 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.
- J. Provide a union, check and shut-off valve in the discharge from each pump. Locate outside the sump basin.
- K. Removal/Disconnect System: Where indicated on drawings, a removal/disconnect system shall be provided // where sump depth, pump size or other conditions make removal of the pump unusually difficult or unsafe //. The 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 to/disconnects from the discharge fitting as the pump is raised from or lowered into the sump. 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.

SPEC WRITER NOTE: Delete this paragraph if the sump basin depth is less than 1.5 m (5 feet) deep.

- L. Where the sump depth is greater than 1.5 m (5 feet) or other conditions exist to make the removal of the pump difficult or hazardous, the system shall include a rail guided quick disconnect apparatus to allow the pump to be pulled up out of the sump without workers entering the sump and without disconnecting the piping. System to be compatible with and furnished by pump manufacturer.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no cost to the Government.

#### **3.2 STARTUP AND TESTING**

- A. As recommended by product manufacturer and listed standards and under actual or simulated operating conditions, tests shall be conducted to prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with each integrated system.

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 costs to the Government.

//D. The Commissioning Agent will observe startup and Contractor testing of selected equipment. Coordinate the startup and Contractor testing schedules with the Contracting Officer's Representative and Commissioning Agent. Provide a minimum of 7 days prior to notice.//

**//3.3 COMMISSIONING**

A. Provide commissioning documentation in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

B. Components provided under this section of the specification will be tested as part of a larger system.//

**3.4 DEMONSTRATION AND TRAINING**

A. Provide services of manufacturer's technical representative for //four// // // hours to instruct VA Personnel in operation and maintenance of the system.

//B. Submit training plans and instructor qualifications in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.//

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