

**SECTION 22 14 36
PACKAGED, SUBMERSIBLE, DRAINAGE PUMP UNITS**

SPEC WRITER NOTE: Delete between //----// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Packaged submersible drainage pump units. See schedule on Drawings for pump 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 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic Restraint.//
- F. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
- G. Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT.
- //H. SECTION 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS: Requirements for commissioning, systems readiness checklist, and training.//
- I. 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.
- B. American National Standard Institute (ANSI)/Hydraulic Institute (HI):
 - 1.1-1.2-2014.....Rotodynamic Centrifugal Pumps for Nomenclature and Definitions
 - 1.3-2013.....Rotodynamic Centrifugal Pumps for Design and Application
 - 1.4-2014.....Rotodynamic Centrifugal Pumps for Manuals Describing Installation, Operation and Maintenance
- C. ASTM International (ASTM):
 - A48/A48M-2003 (R2012)...Standard Specification for Gray Iron Castings

A532/A532M-2010 (R2014).Standard Specification for Abrasion-Resistant
Cast Irons

B584-2014.....Standard Specification for Copper Alloy Sand
Castings for General Applications

D. National Electrical Manufacturers Association (NEMA):

ICS 6-1993 (R2001, R2006) Industrial Control and Systems:
Enclosures

250-2014.....Enclosures for Electrical Equipment (1000 Volts
Maximum)

E. Underwriters' Laboratories, Inc. (UL):

508-1999 (R2013).....Standards 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 14 36, PACKAGED, SUBMERSIBLE, DRAINAGE 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 (rpm).
 - c. Capacity.
 - d. Characteristic performance curves.
 2. Electric Motor:
 - a. Manufacturer, frame and type.
 - b. Speed.
 - c. Current Characteristics and W (HP).
 - d. Efficiency.
- 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 replacement parts, and troubleshooting guide:
1. Include complete list indicating all components of the systems.

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, and troubleshooting.
- //F. Completed System Readiness Checklist provided by the CxA 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

SPEC WRITER NOTE: Coordinate O&M Manual requirements with Section 01 00 00, GENERAL REQUIREMENTS. O&M manuals shall be submitted for content review as part of the close-out documents.

- A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be // in electronic version on compact disc or DVD //inserted into a three ring binder. All aspects of system operation and maintenance procedures, including piping isometrics, wiring diagrams of all circuits, a written description of system design, control logic, and sequence of operation shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations. Notes on all special systems or devices such as damper and door closure interlocks shall be included. A List of recommended spare parts (manufacturer, model number, and quantity) shall be furnished.

Information explaining any special knowledge or tools the owner will be required to employ shall be inserted into the As-Built documentation.

- C. 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 in 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.
- D. Certification documentation shall be provided to COR 10 working days 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 certification that all results of tests were within limits specified.

PART 2 - PRODUCTS

SPEC WRITER NOTE: Make material requirements agree with applicable requirements specified in the referenced Applicable Publications. Update and specify only that which applies to the project. Coordinate and assure that the electrical characteristics specified below are clearly shown on the proper drawings.

2.1 SUBMERSIBLE DRAINAGE PUMP

- A. Centrifugal, submersible, designed for // 60 // 82 // degrees C (// 140 // 180 // degrees F) maximum water temperature. Driver shall be electric motor with rigid type support. Provide perforated, nonferrous suction strainer: Systems may include one, two, or more pumps with alternator as required by Contract Documents:
 - 1. Pump housings may be cast iron, bronze, or stainless steel. Cast iron housings for submersible pumps shall be epoxy coated.
- B. Impeller: Brass or bronze.
- C. Shaft: Bronze, stainless steel or other VA approved corrosion-resisting metal.
- D. Bearings: As required to hold shaft alignment, anti-friction type for thrust permanently lubricated. Bio-based materials shall be utilized when possible.

SPEC WRITER NOTE: Use NEMA Type 4 for dripproof (vertical) or NEMA Type 6P for completely enclosed (submersible).

- E. Motor: Maximum 40 degrees C (104 degrees F) ambient temperature rise, completely enclosed, voltage and phase as shown in schedule on Electrical drawings conforming to NEMA Type 6P. Size the motor capacity to operate the 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: Furnish a control panel in a // NEMA Type 1 enclosure for indoors // // NEMA Type 4X enclosure for outdoors //. 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 shall 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. Provide auxiliary contacts for remote alarming to the Energy Control Center and BACnet compatible open-protocol type interface to // existing // DDC Controls System.
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. Wiring terminal block
 - i. Dead front
 - j. Auxiliary contacts
 - k. Control circuit protection

1. Fused control step down transformer
 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 so arranged as to allow the accumulation of enough volume of liquid below the normal on-level that the pump shall run for a minimum cycle as recommended by pump manufacturer to protect short cycling. Sensors shall be located to activate the alarm adequately before the water level rises to the inlet pipe.
 4. 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 shall still function. Each power supply is to be wired in its own conduit.
 5. 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.
- H. Sump: Furnish cast iron, fiberglass or high density polyethylene basin with gas tight covers. Cover shall be sized so as to inspect and maintain pump installation manhole with bolted cover, vent connection, openings for pumps and controls. Sump shall be sized to allow an adequate volume of water to accumulate for a minimum one minute cycle of pump operation.
- I. Provide a union, check and ball valve in the discharge of each pump where indicated on drawings.
- J. Removal/Disconnect System: Where indicated on drawings, a removal/disconnect system shall be provided. The system shall consist of a discharge fitting mounted on a 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 shall connect to the discharge fitting so that it is not necessary to disconnect any piping in order to remove the pump. Where the sump depth

is greater than five 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.

PART 3 - EXECUTION

3.1 STARTUP AND TESTING

- A. Pump installation to comply with ANSI/HI 1.4 for sump pumps.
- B. Leak Test: Charge piping system and test for leaks. Test until there are no leaks. Make 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.
- C. System Test: After installation is completed provide an operational test of the completed system including flow rates, pressure compliance, alarms and all control functions.
- D. When any defects are detected, correct defects and repeat test at no additional time or cost to Government.
- E. The CxA will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the COR and CxA. Contractor shall provide a minimum of 10 working days prior to startup and testing.

//3.2 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.//

3.3 DEMONSTRATION AND TRAINING

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