

SECTION VI**Duplex Lift Station with Above Grade Valve Pit****DESCRIPTION**

The contractor shall furnish and install one submersible sewage lift station with concrete wet well, pumps, piping, and factory built wet well-mounted submersible pump control station and all needed equipment factory installed on a stainless steel base and fiberglass enclosure. The principal items of equipment shall include a U. L. certification for package pumping stations, 4" steel internal piping, valves, 4" ductile iron riser piping, control panel, two submersible vortex pumps, 72" diameter by 15.50' (186") deep concrete reinforced wet well, all as shown on the plans and specified herein.

The "PumpMate" shall be as manufactured by USEMCO, Inc., Tomah, Wisconsin and Represented by Southwest Fluid Systems, LLC. or approved equal.

ALTERNATES

The contractor may, if he so chooses, may provide an alternate quotation to his base bid. The amount to be added or deducted from the base bid, for a system provided by other system manufacturers, must be indicated with the alternate quotation. This amount shall include all costs or savings, which will result from the proposed alternate and will include any special expenses incurred by anyone affected by the offered alternate. This shall include, but is not limited to, greater energy cost due to less efficient equipment, required greater installation space, or any other item with which this system is to be interfaced. In order for an alternate to be considered, it will be necessary for the contractor to provide one set of written information completely describing the alternate fourteen (14) days prior to the bid date. Should the alternate or the information describing it fail to describe its capability in meeting the job requirements or if the contractor fails to furnish complete information, the engineer shall regard the proposal as an inferior alternate and disregard the alternate bid.

SYSTEM COORDINATION AND SINGLE SOURCE RESPONSIBILITY

The equipment provided shall have a completely integrated microprocessor based automatic control and monitoring system consisting of the required controller, power equipment, motor starters, level/flow and alarm monitoring equipment in a factory wired and tested assembly. The automatic control and alarm/monitoring system components shall be standard, catalogued, stocked products of the system supplier to assure one source responsibility, immediately available spare/replacement parts, proper system interconnections and reliable long term operation, also included shall be alarm light and SENSAPHONE 400 dialer.

FIELD SUPERVISION

The services of a factory trained, qualified representative shall be provided to inspect the completed installation, make all adjustments necessary to place the system in trouble free operation and instruct the operating personnel in the proper care and operation of the equipment.

GUARANTEE

The manufacturer of the pump station shall guarantee for a period of one year from the date station is placed into operation or eighteen months from date of shipment, whichever occurs first, that the entire station and all equipment therein shall be free from defects in design, materials and workmanship. In the event a component fails or is proven defective during the guarantee

period; the manufacturer will provide a replacement part without cost, upon return of the defective part.

SYSTEM DESCRIPTION

Furnish and install TWO (2) submersible vortex pumps, KSB Model AMEREX F 100-220/044YLG meeting the following performance requirements. The pump's submersible electric motor shall be capable of operation at 230 Volts, Single (1) phase, 60 Hz service. The motor shall be supplied with 30 feet of properly sized electric submersible power cable sized in accordance with NEC standards. Each pump shall be fitted with 30 feet of lifting chain or cable.

Performance Requirements:

Design Conditions: 142 GPM
34 Ft. TDH
Maximum Motor HP: 5.0
Maximum Motor RPM: 1750

REFERENCED STANDARDS:

American Iron & Steel Institute (AISI)
American Society for Testing and Materials (ASTM)
Factory Mutual (FM)
Hydraulic Institute Standards for Centrifugal, Rotary, and Recip. Pumps (HI)
National Fire Protection Association (NFPA)
National Electric Code (NEC)
National Electrical Manufacturers Association (NEMA)
Anti-Friction Bearing Manufacturers Association (AFBMA)

WARRANTY

The pump manufacturer shall warrant the pump and motor to the Owner against defects in workmanship and materials for a period of 7 years from installation or eighteen (84) months after shipment. Pump manufacturer warranty shall be in published form and shall to all similar units. A copy of each warranty shall be provided to the Owner at startup.

PUMP DESIGN

The pump's design shall allow for removal and reinstallation of the pump without the need for personnel to enter the confined space of the wet well and without the removal of bolts, nuts or other fasteners. The pump shall connect to a permanently mounted discharge connection by simple downward motion, without rotation, guided by at least two non-load bearing Type 316 stainless steel guides. Final connection shall insure zero leakage between the pump and its discharge connection flange by means of an o-ring seal. No part of the pump shall bear directly on the floor of the wet well. The contractor shall also supply stainless steel lifting chain or cable of sufficient length to properly and safely lift the pumps from the wet well.

PUMP CONSTRUCTION

Major components (pump casing, impeller, intermediate housing, motor housing) shall be of at minimum ASTM A48 Class 35 cast iron with smooth surfaces devoid of blowholes and other irregularities. All exposed fasteners shall be ASTM A 276 Type 316Ti stainless steel. The cutter/grinder assembly shall be of at minimum a hardened white iron having a minimum Brinell Hardness Rating (BHR) of 750 - 1000.

Mating surfaces between components where watertight integrity is critical shall be machined and fitted with Nitrile Rubber or Viton O-rings. Because these are critical passages and flame paths, no secondary sealing compounds, greases, or other devices shall be used.

COOLING SYSTEM

The motor shall be adequately sized and designed so that integrally cast motor cooling fins have sufficient surface area to allow the motor to run continuously in submerged or partially submerged conditions without the need for internal oil circulation systems or cooling jackets which circulate the pumped media up inside the motor shell. Further, the motor's design shall allow it to be capable of running for extended periods in a dry mode without damage to the motor or seals.

CABLE AND CABLE ENTRY SEAL

The power cable shall be suitable for the submersible application and sized in accordance with NEC requirements. The cable entry design shall insure that no entry of moisture is possible into the high-voltage motor terminal area even if the cable is damaged or severed below water level to a submerged depth of up to 85 feet.

MOTOR

The submersible motor shall be squirrel cage, induction in design, housed in a completely watertight and air filled chamber. The motor shall have at minimum a 1.10 service factor and be suitable for use in Class I, Division 1, Group C & D atmospheres as Explosion Proof. The motor stator shall use at minimum Class F insulation rated for 311 Degrees F. The motors shall be designed, rated, and warranted for continuous operation and capable of at minimum twenty (20) starts per hour. Temperature monitors shall be embedded in the motor windings for use in conjunction with and supplemental to external motor overload protection. The pump's control shall shut down the pump should any of the monitors detect high temperature and automatically reset once motor temperature returns to normal. Do not provide motors that contain other than ecologically safe paraffin base oil in the seal chamber. Do not provide motors containing dielectric oils used for motor cooling and/or bearing lubrication.

BEARINGS

Furnish upper and lower bearings as needed to provide a B10 bearing life of at minimum 40,000 hours at anticipated axial and radial loadings. The bearings shall be sealed/shielded permanently lubricated for the life of the pump/bearings.

MECHANICAL SEALS

Each pump shall be provided with two totally independent shaft seals, installed in tandem. The upper seal shall operate in an oil-filled chamber with drain and inspection plug (with positive anti-leak seal) for easy access from external to the pump. The lower seal shall be of bellows type with both faces of at minimum Silicon Carbide. The seals shall require neither routine maintenance nor adjustment, but capable of being easily inspected and replaced. The seals shall be non-proprietary in design, with replacements available from a source other than the pump manufacturer. Do not provide seals with the following characteristics: conventional double mechanical seals with single or multiple springs acting in opposed direction; cartridge-type mechanical seals; seals with face materials other than those specified.

SHAFT

Provide a common pump/motor shaft of sufficient size to transmit full driver output with a maximum deflection of 0.002 inches measured at the lower mechanical seal. The shaft shall be completely of at minimum ASTM A 276 Type 420 stainless steel. Do not use carbon steel as shaft material without using a stainless steel shaft sleeve.

IMPELLER

The impeller(s) shall be of gray cast iron, Class 35B, dynamically balanced, semi-open, non-clogging design capable of handling soils, fibrous materials, heavy sludge and other matter found in wastewater. The impeller(s) shall have a back shroud only with back pump-out vanes to equalize axial thrust, and curved blades which protrude into the pump casing for maximum efficiency. The impeller will create a vortex which carries solids through the pump casing without passing through the blades. Impeller(s) shall be capable of passing a minimum 3” diameter solid.

VERIFICATION OF PERFORMANCE

All pumps shall be field tested after installation to demonstrate satisfactory operation without excessive noise, vibration, cavitation or over-heating. Any pump that fails to meet any of the contract specifications will be modified, repaired, or replaced by the contractor at no additional cost to the owner.

The manufacturer or his Authorized Representative shall conduct site tests. Tests shall include checking for correct rotation, maximum motor amperage draws within nameplate specifications, balanced voltages on each power leg with the pump operating to within manufacturers tolerances, and demonstrated compatibility of the pump/motor with the controls supplied. Test results shall be in printed form and signed by the manufacturer or his Representative and supplied to the owner.

ABOVE GRADE EQUIPMENT CHAMBER

The equipment chamber common base shall be of stainless steel plate to be bolted to the Contractor furnished concrete top.

The exterior shall be a tan textured surface. Smooth and/or glossy exteriors will not be acceptable and will not be considered due to their appearance and reflectivity characteristics.

The cover will have access doors on two sides. All access doors shall be equipped with continuous hinges and tamperproof keyed latches. All hardware for the cover shall be tamperproof. The entire cover shall be removable in order to service the equipment in the pump station. Removal shall require no more than two maintenance personnel for removal without the use of lifting equipment. The cover shall be provided with inlet and discharge louvers and a thermostatically controlled fan. A forced air electric heater with a minimum capacity of 1500 watts that is controlled by a thermostat and plugs into the control panel with a twist lock connection will be provided with the enclosure.

Removable lifting eyes shall be placed about the perimeter of the equipment base to facilitate lifting and handling of the station.

Station shall have 4” Emergency Pump Connections on the Suction AND Discharge piping of the Above Grade Valve Chamber.

An aluminum hatch located exterior to the equipment chamber shall be provided for access to the wet well. Steel hatches or access doors will not be acceptable. The aluminum frame shall be ¼” thick extruded aluminum having a continuous concrete anchor as a part of the one-piece extrusion. The access cover shall be of ¼” aluminum diamond plate, reinforced with stiffener bars as required. The cover shall be able to withstand the live load of 300 lbs. per square foot.

The cover will have stainless steel hinges and be equipped with a lifting handle and a padlock locking post (padlock by others). The cover shall open to 90 degrees and lock automatically in that position by a stainless steel positive locking arm. The cover will have a full-length ¼” thick aluminum skirt that will be continuous from the frame to the bottom of the base. This aluminum hatch will be manufactured by the control station manufacturer and will not be a “buy out” item.

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A 1000 lbs jib crane and socket shall be provided to facilitate pump removal.

WIRING

All wiring shall be minimum 600-volt (UL) type MTW or AWM and have a current carrying capacity of not less than 125% of the full load current.

The conductors shall be in complete conformity with the National Electric Code, state, local and NEMA electrical standards.

To ensure the safety of all personnel working with this equipment, as well as providing a simple means of tracing wires when troubleshooting, all wiring shall be color-coded in strict accordance with the wiring diagrams furnished by the equipment supplier.

An isolation plate shall be provided for pump and float cord entry into the wetwell. The plate shall be drilled and tapped to accept cord grips that are rated for this service. The plate will be gasketed and installed with a sealant to insure a gas tight fit.

UL APPROVAL

The control panel shall be constructed in compliance with Underwriter’s Laboratories Industrial Control Panels listing and follow-up service; utilizing UL listed recognized components where applicable. The control panel shall bear the Underwriters Laboratories 508/698A serialized label and relating to hazardous locations with intrinsically safe circuit extensions.

CONTROL PANEL

The described equipment shall be housed in a NEMA 3R painted steel enclosure arranged for mounting within the equipment chamber as shown on the drawings. The enclosure shall be approximately 36” high and 10” deep. The enclosure shall be constructed of not less than 14-gauge #304 stainless steel.

This weather proof, tamper proof, rain-tight enclosure shall be designed specifically for mounting in an unprotected outdoor location. The enclosure shall be gasketed. It shall have a hinged front weather door with 3 point latching mechanism and locking capability. It shall also have an internally mounted hinged aluminum inner panel so that all the components normally actuated by operating personnel are accessible without opening the dead front and yet are not exposed to the elements or to unauthorized personnel.

All major components and sub-assemblies shall be identified as to function with laminated, engraved Bakelite nameplates or similar approved means.

The Control panel shall include the following standard features:

- overload relays
- circuit breakers
- running lights
- H-O-A switches
- Alternator
- terminal strip
- time delay relay
- SENSAPHONE Dialer

All control wiring within the control panel shall conform to the National Electrical Code. All wiring shall be neatly installed and run in plastic raceways to prevent interference with any operating devices. All door mounted devices shall be labeled to functions with permanently attached nameplates and all internal wiring, terminal strips, etc. shall be properly identified for field connections and trouble shooting.

The following options shall also be included:

- running time meters
- alarm light
- Four alarm dry contacts
- lightning arrestor
- 115 Volt Convenience Outlet
- UL 508 listing

The pump motor shall have short circuit and overload protection by means of properly sized motor starters and thermal magnetic molded case. Circuit breakers shall be provided as disconnect switches, protection against short circuits, or a ground for each pump motor. Circuit breakers shall have an interrupting rating of 14,000 amps at 460 volts and shall be U.L. listed. The operating mechanism shall allow manual switching and shall indicate when the breaker has tripped.

ACROSS THE LINE STARTERS

The magnetic across-the-line starters with manual reset shall be provided with the melting alloy type overload relays for each phase to assure positive motor protection.

DUPLEX LOGIC

The sewage pumps shall alternate automatically on the completion of each pumping cycle. One pump shall start as the lead pump and the other pump shall be started if the wet well level continues to rise to the start level of the lag pump. After each operating cycle the lead and lag

positions shall alternate. A manual selector switch shall be provided so that the operator can designate either pump to stay continuously in the lead position. Adjustable time relays shall be provided to prevent simultaneous starting of pumps after power failure.

FLOAT SWITCHES

Shall be Mercury or Mechanical Tilt Normally Open Float Switch. Floats shall be internally weighted with Heavy Duty Exterior. Float cable shall be no less than 30' long.