PART 1 - GENERAL

1.1 APPLICABLE REQUIREMENTS

A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 01 - General Requirements, and Section 220500 - Basic Plumbing Materials and Methods, and other Sections in Division 22 specified herein.

1.2 SCOPE

A. All work to be furnished and installed under this Section shall comply with all the requirements of Division 01, and shall include, but not necessarily be limited to, the following:
1. Domestic hot water recirculating pumps
2. Sewage ejectors
3. In-line flexible coupled pumps.
4. In-line close coupled pumps.
5. In-line circulators
6. Air separators.
7. Air elimination valve.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 220500: Basic Plumbing Materials and Methods

B. Section 224000: Plumbing Fixtures

C. Division 26: Electrical

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Provide systems that are the standard product of an equipment manufacturer regularly engaged in the production of such units who issues complete catalog information on such products.

B. Codes and Standards: Provide pumps which conform to the requirements of:
1. Hydraulic Institute (HI): Manufacturer pumps in accordance with "Standards for Centrifugal Rotary and Reciprocating Pumps."
2. National Electrical Manufacturers Association (NEMA): Provide electrical components which comply with NEMA Standards.
3. National Fire Protection Association (NFPA):
   a. CEC: California Electrical Code
4. Underwriters Laboratories (UL):
   a. UL-778: Motor Operated Water Pumps

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for units showing dimensions, weights (shipping, installed, and operating), capacities, ratings, performance with operating point clearly indicated, motor electrical characteristics, finishes of materials, and installation instructions.

1. Parallel pump plots: For all parallel and series pump applications submit a combined pump curve showing parallel pump operation and single pump non-overloaded operation verifying that the pump selections operate non-overloading on curve in a single pump operation.
2. Submittal information to verify all scheduled characteristics are met including efficiency.

B. Shop Drawings: Submit manufacturer's shop drawings indicating dimensions, weight (shipping, operating), required clearances, methods of assembly of components, and location and size of each field connection.

C. Maintenance Data:
1. Submit maintenance instructions, including instructions for lubrication, tube replacement, motor and drive replacement, and spare parts lists.
2. Include this data, product data, shop drawings, and wiring diagrams in operating and maintenance manuals.

D. Wiring Diagrams:
1. Submit manufacturer's ladder-type wiring diagrams for power and control wiring required.
2. Differentiate between factory-installed and field-installed wiring.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver units to the site in containers with manufacturer's stamp or label affixed.

B. Store and protect products and units against dirt, water, chemical, and mechanical damage. Do not install damaged units - remove from project site.

C. Rigging: Comply with the manufacturer's rigging and installation instructions.

1.7 WARRANTY

A. Provide general one year (12 months) warranty. The warranty shall include parts, labor, travel costs, and living expenses incurred by the manufacturer to provide factory authorized service.

PART 2 - PRODUCTS

2.1 DUPLEX COLUMN SEWAGE EJECTOR

A. The mating surfaces between the motor end bell, the motor shell and the seal chamber shall be sealed by means of "X" section QUAD RINGS. Designs using conventional circulate 'O' rings or rectangular cross sectional gaskets shall not be considered equal.

B. Motor end bell shall be cast iron, designed as a terminal box and separated from the motor shell by a combination bearing support and inspection plate.

C. The motor shall be housed within a heavy duty cast iron shell with cooling fins.
1. Motor shall have Class 'F' insulation and permanently lubricated, double sealed ball bearings having a minimum life of 17,500 hours.
2. Motors using sleeve type bearings shall not be considered equal.

D. Motor shaft shall be 300 series stainless steel with keyway for positive positioning of impeller.
   1. Motors using carbon steel shafts or stainless stub shafts shall not be considered equal.

E. Impeller shall be multi-vane design, constructed of bronze, accurately machined and dynamically balanced to the job site conditions.
   1. The impeller shall not require the use of wearing rings to insure proper operation and shall be capable of passing 2-1/4 inch minimum solids.

F. A double mechanical seal system shall be furnished and housed in a machined cast iron seal chamber filled with clean dielectric oil, providing constant lubrication.
   1. Lower seal surfaces shall be of solid silicon carbide to provide longer life.
   2. Carbon ceramic, tungsten carbide or systems that allow the lower seal surfaces to come in contact with the pumped media, shall not be considered equal.

G. Each pump shall be tested and a computer generated report will be kept in file and made available upon request.
   1. The reported test data shall consist of six duty points of various heads and capacities, one of which will be the design point and shall include actual efficiencies and horsepower requirements.

H. Furnish remote packaged factory pre-wired duplex pump controller, Weil 8101E with the following:
   1. NEMA 4 double door dead front steel lockable enclosure.
   2. Magnetic starter with overload reset through inner door, each pump.
   3. Fused disconnect switch with handle through inner door, each pump.
   4. Automatic alternator separately fused.
   5. Overload reset buttons, each pump.
   6. Running lights, each pump.
   7. H-O-A switches, each pump.
   8. Control circuit transformer for 120V operation for each pump.
   9. Output connection for hi-water annunciation at Simplex.
   10. Alarm silencing switch.
   11. Alarm light with flasher.
   12. Numbered and wired terminal strip.
   13. Single point electrical connection.
   14. All wiring between control panel and pump provided under Division 22.

I. Furnish and install mercury float switches complete with galvanized rod and wall support bracket.
   1. Each pump control switch will consist of 2 normally open mercury switches, encapsulated in epoxy resin.
   2. The float casing will be polypropylene.
   3. The switch cable will be type STO PVC jacket 4 #18 conductor.
   4. 41 strand, 600 volt insulation.
   5. The cable will be secured to the support rod with a polypropylene composition clamp with stainless steel bolts.
   6. Switches used for high water alarm service will be of the same construction as the pump switches, except that 2 conductor cables will be furnished.
   7. The switch housing will be color coded to distinguish between the pump and alarm switches.

8. All wiring between control panel and float switches provided under Division 22.

J. Provide reinforced fiberglass basin with steel anti-flotation ring.
1. Provide with matching gasketed steel top by pump manufacturer.
2. Install basin and pour concrete all around to secure in place.

K. Warranty:
1. The pump manufacturer shall warrant the pumps being supplied to the owner against defects in workmanship and materials for a period of five (5) years under normal use, operation and service.
2. All repairs or replacement parts that may be needed after the initial sixteen months will be made and the cost (F.O.B. factory) pro rated for the period of time the pump has been in operation.
3. The warranty shall be in published form and apply to all similar units.

L. Removal System (Optional)
1. The pump removal system shall permit removal and re-installation of a pump without disturbing the discharge piping. Personnel shall not be required to enter the wet well. The pump shall be guided by two guide poles (by others). The guide poles shall be mounted on the floor elbow and a 304 stainless steel upper guide bracket. Pump sliding bracket will iron. The floor elbow shall be constructed of ASTM A48-83 class 30 close-grained cast iron. The pump sliding bracket shall act as a wedge type coupling between the pump and floor elbow. This insures a metal-to-metal, watertight fit. Systems that require gaskets, diaphragms, or o-rings to ensure a watertight fit shall not be considered equal.

M. Manufacturer: Weil, Weimann, Paco, or Enpo-Cornell.

2.2 AIR ELIMINATION VALVE (AUTOMATIC)

A. Air shall be eliminated to the atmosphere as fast as it is separated from system water, through a float activated remote pressure operated, air elimination valve installed at the top of the air separator.

B. The air elimination valve shall have a high removal rate at low pressure differentials and shall be fully open for the removal of air at all pressures in the operating range from 2 to 150 psig. It shall be tightly sealed against loss of system water and prevent entrance of air in negative pressure situations.

C. The air elimination valve shall be constructed of metal and all working parts shall be non-corrosive. Working pressure shall be 125 psi.

D. Provide minimum 3/8” drain line from vent and route to nearest floor drain or floor sink or other approved drainage location.

E. Manufacturer: Amtrol, Hoffman or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All equipment, unless otherwise shown or noted on the Drawings, is to be installed in accordance with industry standards and manufacturer's recommended installation instructions.

B. Provide vibration isolation, inertia bases, seismic snubber, flexible pipe connections, etc, as specified in related specification sections.

C. For variable flow pumping applications, see Section 230902 Variable Frequency Drives for additional requirements.

D. Contractor to assist testing and balancing contractor in verifying correct pump rotation and system operation.

E. Flush and clean equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls.

F. Isolation for Service: Provide pump installations with a discrete isolation valve on both the supply and intake side of the pump to permit service of the pump and any related strainer, check or balancing valves. Triple duty valves are not equivalent for this shut-off service.

G. Balancing Coordination and Impeller Trimming: Coordinate final pump flow with test and balance contractor. For pumps larger than 5 horsepower, if the system tests and balance indicate that flow exceeds the specified flow by greater than 20%, it is not acceptable to reduce flow merely by adjusting balance valves to create additional head or reducing VFD peak flows. Excess system flow must be reduced by trimming the impeller to match the load.

3.2 MANUFACTURER'S START-UP SERVICES

A. The manufacturer shall provide start-up service in the form of a factory trained service technician. The service technician shall verify correct installation, verify pump systems mounting, verify piping installation, verify control wiring, verify power wiring, and check for proper operation. The service technician shall provide final adjustments to meet the specified performance requirements. Fully staffed parts and service personnel shall be within four hours travel from the jobsite.

END OF SECTION