

## SECTION 333200 – WASTEWATER UTILITY PUMPING STATIONS

**SPECIFIER:** This section is intended to be used when pumps with a low pumping rates are required and solids handling submersibles will not meet the pumping requirements; and in pressure sewer systems. The grinder pumps, controls, lift system and wet well in a pressure sewer system application will typically be specified as a system and provided by a single Supplier. Explosion-proof and intrinsically safe will not usually be required for grinder pump stations serving individual homes. The use of grinder pumps in a duplex pump station serving more than one unit will typically utilize a precast concrete wet well and may require more sophisticated controls. Explosion-proof and intrinsically safe will usually be required. This Section must be edited to adapt it to your specific project conditions.

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

#### 1.2 SUMMARY

- A. This section includes the major items listed below:
  - 1. Submersible grinder pump station complete with pump(s), valves, piping, control panel, electrical wiring, and related accessories.
  - 2. Necessary utility connections.
- B. Related sections include the following:
  - 1. Division 31 Section "Earthwork."
  - 2. [ Division 33 Section "Directional Drilling." ]
  - 3. [ Division 33 Section "Sanitary Sewer System." ]

#### 1.3 REFERENCES

- A. Except as herein specified or as indicated on the Drawings, the work of this section shall comply with the following:
  - 1. ASTM: C478 - Precast Reinforced Concrete Manhole Sections.

#### 1.4 DESIGN AND PERFORMANCE REQUIREMENTS

- A. Design:
  - 1. Design station as a [ duplex ] [ simplex ] [ complete packaged ] [ ] pumping station, including pumps, control panel, level controls, piping, valves, pump removal system, electrical wiring and related appurtenances.
  - 2. Pumps:

- a. Submersible sewage grinder pumps with an integral grinder assembly on a common shaft with the pump motor capable of macerating material in normal domestic sewage to a fine slurry.
  - b. [Explosion-proof with controls that utilize intrinsically safe circuits. ]
3. [ Equipment shall be UL listed and approved for use in hazardous locations. ]

**SPECIFIER: The pumping rates, head, speed and electrical characteristics must be inserted in the bracketed locations under "Pump performance characteristics" and "Pump Motor" below.**

B. Performance:

1. Pump Performance Characteristics:

- a. [Simplex pump stations: [ ] gpm minimum at a total dynamic head of [ ] feet operating at [ ] rpm. ]
- b. [ Duplex pump stations: [ ] gpm minimum at a total dynamic head of [ ] feet operating at [ ] rpm for each pump. ]

2. Pump Motor:

- a. [ Simplex Pump Stations: [ ] hp, (maximum) [ ] v, [ ] phase. ]
- b. [ Duplex Pump Stations: Each pump [ ] hp, (maximum) [ ] v, [ ] phase. ]

1.5 SUBMITTALS

A. Shop Drawings: For submersible grinder pump station.

1. Dimensions.
2. Details of each pump station component.
3. Project specific wiring diagrams for pumps and control panels that identify field wiring requirements.

B. Design Data:

1. Pump performance curves.
2. Pump horsepower requirements.

C. Manufacturer's Instructions: Submersible grinder pump station installation.

D. Operations and Maintenance Manuals: For each submersible grinder pump station.

1. Assembly, installation, alignment, adjustment, and checking instructions.
2. Equipment function, normal operating characteristics, and limiting conditions.
3. Maintenance instructions.

4. Guide to troubleshooting.
5. Parts list.
6. Assembly, cross section, and dimensional drawings.
7. Engineering data and performance curves.
8. Recommended maintenance and lubrication schedule with lubrication recommendation and predicted life of parts subject to wear.
9. Wiring diagrams identifying field connection requirements.
10. Test data.

#### 1.6 QUALITY ASSURANCE

##### A. Fabrication and Installation Personnel Qualifications:

1. Trained and experienced in the fabrication and installation of the materials and equipment.
2. Knowledgeable of the design and the reviewed Shop Drawings.

##### B. Manufacturer's Services:

1. Submit manufacturer's certified statement that the installation complies with manufacturer's requirements.
2. Provide manufacturer's field service, start-up assistance, and training of Owner's personnel.

#### 1.7 WARRANTY

- ##### A. Manufacturer's Warranty: [ 1 ] [ 2 ] years from date of start-up on pump, control panel and level controls.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

**SPECIFIER: The following Manufacturers make grinder pump systems for use at residential units. Project specific conditions must be evaluated and the appropriate grinder pump selected. The list included in the project specification should include 3 or 4 Manufacturers.**

##### A. Manufacturers:

1. [ ABS. ]

2. [ Myers. ]
3. [ Barnes. ]
4. [ Environment One. ]
5. [ Hydromatic. ]
6. [ Flygt. ]
7. [ Or equal. ]

- B. The submersible sewage grinder pumps, control panels, [ wet wells ] and accessories shall be by a single Supplier.

## 2.2 COMPONENTS

### A. Pump:

1. Each Pair of Seal Faces: Held in contact by separate spring systems.
2. Include a self sealing assembly which connects it to the discharge piping.
3. Metal parts of seal including spring, external fasteners, and the pump shaft: Stainless steel.
4. Cutter Blades: Stainless steel or hardened alloy steel.
5. Impeller: Recessed/non-overloading design.
6. Capable of operating without damage in [ high head ] [ low head ] conditions.

### B. Motor:

1. Continuous duty.
2. Capable of at least 10 starts per hour.
3. Capable of operating in a non-submerged condition.
4. Complete with power and control cables; length as necessary to accommodate pump installation and removal.
5. Cables shall include conductors in sizes and quantities to meet each application.
6. [ Explosion proof. ]
7. Motor overheat protection.
8. [ Seal failure protection. ]

### C. Lift System:

1. Sealing flange/discharge elbow to automatically seal pump to discharge connection when lowered into place.

2. [ Nylon lifting rope ] [ Stainless steel lifting chain or cable ] [ for each pump ] to permit removing the pump from the wet well.
3. [ [ Stainless steel ] [ PVC Schedule 80 ] rail system to guide pump to access hatch during insertion and removal. ]
4. [ Lift system shall allow removal of the pump without disconnecting piping in the wet well. ]
5. [ Adjustable guide rail supports to align with pump sealing flange. ]
6. [ Coat non-removable lift system components with tar base epoxy paint. ]

D. [ Wet Well:

1. [ Fiberglass ] [ HDPE ]; [ 24 ] [ 30 ] [ 36 ] [ 48 ] inches in diameter; [ Duplex ] [ Simplex ].
2. Corrosion Resistant Cover:
  - a. Capable of supporting loads typically encountered at the pump station location(s).
  - b. Attached and sealed to wet well with stainless steel bolts.
  - c. Constructed of material compatible with wet well.
3. Factory installed piping connections for [ building sewer and ] discharge force main.
4. Factory installed [ insert size ] electrical conduit connections for power and control wiring.
5. Integral anti-flotation flange or other device.
6. Support brackets for pump removal system and wiring.
7. [ Factory supplied connector for 4-inch building sewer connection. ] ]

**SPECIFIER: Concrete wet wells will usually be used in applications where grinder pumps are used because a low pumping rate is required but a larger wet well volume is needed. Concrete wet wells would not normally be used with simplex grinder pumps serving a small load.**

D. Wet Well:

1. Precast concrete sections: ASTM C478.
2. Base Sections: Cast bottom slab and walls integrally.
3. Grout bottom to slope to pump inlet.
4. Pipe Openings: Neoprene boot with stainless steel bands.
5. Brackets, Anchors, and Other Hardware: Non-magnetic stainless steel.
6. Removable flat concrete top section.

7. Access Frame and Cover:
  - a. Single-leaf aluminum.
  - b. Hinged cover with lifting handle, locking hasps, and safety latch to hold cover in open position.
  - c. Cast into concrete top slab.
  - d. Traffic rated for H20 loading.
  - e. Manufacturers: [ Bilco ] [        ] ].

**SPECIFIER: The control functions described below are more suited to a custom built submersible pumping station and may not be necessary for simplex stations serving individual buildings. Edit to specific project needs.**

E. Control Panels:

1. NEMA 4X weatherproof enclosure, separately mounted [ on pedestal adjacent to new well ] [ on side of building adjacent to wet well ] [        ] as indicated on the Drawings.
2. Factory Wired Complete With:
  - a. NEMA [ or IEC ] rated motor starter for each pump.
  - b. Overload relay for each pump.
  - c. [ Control power transformer with primary and secondary overcurrent protection. ]
  - d. Circuit breaker disconnect for each pump.
  - e. Hand-off automatic selector switch for each pump.
  - f. [ Red “run” indicating light for each pump. ]
  - g. [ Intrinsically safe relays for level controls. ]
  - h. [ Non-resettable elapsed time meter for each pump. ]
  - i. [ Non-resettable event counter. ]
  - j. [ Pump alternator for duplex stations ].
  - k. [ 125V, 20A, GFI type duplex receptacle. ]
  - l. Alarm light [ and horn ] activated by [    ] conditions.
  - m. [ Alarm test and silence push buttons. ]
  - n. [ Auxiliary relays and terminal blocks as required. ]

**SPECIFIER: Grinder pump station Manufacturers offer different methods of control for grinder pump stations. Review the various methods offered and determine the acceptability. Consider this evaluation when determining acceptable pump station Manufacturers.**

3. Functional Intent:
  - a. [ Control pumps by [ 3 ] [ 4 ] [    ] [ intrinsically safe ] [ mercury float switches] for the following functions: ]
  - a. [ Control pumps by [ air bell sensor and pressure switches] [non-fouling wastewater level detection system utilizing magnetic reed switches hermetically

sealed within a watertight protective PVC casing ]. Provide separate switches for the following functions: ]

- 1) [ Low water [ alarm ] and redundant off. ]
- 2) Pump[s] off.
- 3) [ Lead ] pump on.
- 4) [ Lag pump on [and high water alarm]. ]
- 5) High water alarm.

b. [ Pumps shall alternate after each cycle. ]

c. [ [ Low water level ] [ motor over temperature ] [ motor seal failure ] shall lock out pump and require manual reset to start. ]

F. Spare Parts:

1. Provide the Following: [ For each pump size ]:

- a. [ Complete Grinder Pump Units (Wet Well, Pumps, Controls, Floats, Panels, Etc.): ] [ ].
- b. [ Grinder Pump Mechanical Seals: ] [ ].
- c. [ Grinder Pumps: ] [ ].
- d. [ Check Valves: ] [ ].
- e. [ Ball Valves: ] [ ].
- f. [ Control Panels: ] [ ].
- g. [ Float Switches: ] [ ].
- h. Special tools needed to maintain the grinder pump pumping system.
- i. [ ] impeller[ s ].
- j. [ ] grinder assembly[ s ].
- k. [ ] mechanical seal[ s ].
- l. Special tools needed to maintain the system.
- m. [ ] discharge seal gasket[ s ].
- n. [ [ ] spare pump[ s ] for each pump size. ]
- o. [ [ ] additional complete package[s]. ]
- p. [ [ ] spare control panels for each pump size and configuration.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment in accordance with:

1. The Drawings.
2. Manufacturer's recommendations.
3. Shop Drawings as reviewed by Engineer.

B. [ Final location to be determined in the field. ]

C. Install piping and wet well in accordance with Division 31 Section "Earthwork."

D. Electrical Work:

1. In accordance with the National Electrical Code and all applicable local codes.
2. [ The inside of the grinder pump station shall be considered a hazardous location. ]
3. [ Install seal-off fittings in conduits entering/leaving the pump station within 18 inches of the pump station. ]
4. [ Underground cables/wiring shall be installed in [ ] conduit. ]
5. [ Install exposed aboveground cables/wiring in [ ] minimum PVC conduit or as required by NEC. ]
6. [ Electrical wiring from wet well to control panel shall be without splices. ]

3.2 FIELD QUALITY CONTROL:

- A. Manufacturer's Field Service: Arrange and pay for manufacturer's field representative to inspect Contractor's installation of the manufacturer's product, provide certified written statement that the installation complies with the manufacturer's requirements for a minimum onsite time of [ 8 ] [ ] [ hours ] [ days ] during installation. Schedule as soon as practicable after installation and at times approved by Engineer and Owner.

1. Manufacturer's Engineer:

- a. Assist in Start-up: [ 8 ] [ ] hours observation after pumps are operational.
- b. Demonstrate operation and maintenance to Owner's personnel.
- c. Review operation and maintenance manual with Owner's personnel.

- B. Promptly make changes and additions required by manufacturer's engineer.

3.3 CLEANING

- A. Prior to acceptance of the work of this section, thoroughly clean installed materials, equipment, and related areas in accordance with Division 01 requirements.

**Drawings:**

**Indicate:**

1. Schematic detail of typical simplex grinder pump station showing dimensions, pipe sizes, elevations, control panel location, etc.
2. Schematic plan view of typical location of grinder pump station in relation to house.
3. Include table of values for various pump stations, if applicable.

END OF SECTION 333200