SECTION 333216 - PACKAGED WASTEWATER GRINDER PUMP ASSEMBLIES

This Section specifies on-lot sewage grinder pumping units. Submersible centrifugal- and progressing-cavity-type grinder pumps are included in this Section. Pumping units are for use in conjunction with gravity sewers or low-pressure sewerage systems.

Check state and local requirements about design, installation, and permitting of on-lot sewage grinder pumping systems. Add specific state and local requirements as they may apply to this Section.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

On-lot sewage grinder pumping units.

FRP basins.

Pump control systems.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 033000 - Cast-in-Place Concrete: Requirements for anti-flotation collar.

Section 310001 - Earthwork Materials: Basin bedding, ballast, and backfill materials.

Section 310000 - Earthwork: Excavation requirements.

Section 333126 - Sanitary Pressure Sewer Piping: Connection to low-pressure sewerage system.

Section 400593 - Common Motor Requirements for Process Equipment: Requirements for electric motors as specified in this Section.

Section 406700 - Control System Equipment Panels and Racks: Hardware requirements for pump control panel.

* + - 1. DEFINITIONS

Limit list of definitions to terms unique to this Section and not provided elsewhere.

* + - * 1. FRP: Fiberglass-reinforced plastic.

Remove paragraph if not a LEED project.

* + - 1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

LEED requires compliance with specific editions of referenced standards. Consider including publication dates for referenced standards in this Section to ensure the correct standard is used for LEED compliance.

* + - * 1. American Bearing Manufacturers Association:

ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

* + - * 1. ASTM International:

ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

* + - * 1. National Electrical Manufacturers Association:

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

* + - 1. PREINSTALLATION MEETINGS
         1. Convene minimum [**one week**] [**<\_\_\_\_\_\_\_\_> weeks**] prior to commencing Work of this Section.
      2. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data: Submit manufacturer information concerning materials of construction and fabrication.
        5. Shop Drawings: Indicate detailed dimensions for materials and equipment, including pump basins, pumps, piping, controls including wiring schematics, and accessories.
        6. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures, anchoring, and layout.
        2. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        3. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.
        4. Qualifications Statements:

Coordinate following subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

Submit manufacturer's approval of installer.

Remove paragraph if not a LEED project.

* + - 1. SUSTAINABLE DESIGN SUBMITTALS
         1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design submittals.
         2. Manufacturer's Certificate:

Certify that products meet or exceed specified sustainable design requirements.

Insert material certifications list below to suit products specified in this Section and Project sustainable design requirements. Specific certificate submittal and supporting data requirements are specified in Section 018113.

Sustainable Sites Certificate: Certify paving materials Solar Reflectance Index (SRI).

Materials Resources Certificates:

Certify source and origin for [**salvaged**] [**and**] [**reused**] products.

Certify recycled material content for recycled content products.

Certify source for regional materials and distance from Project Site.

* + - * 1. Product Cost Data:

Submit cost of products to verify compliance with Project sustainable design requirements.

Exclude cost of labor and equipment to install products.

Provide cost data for following products:

Edit list of material cost data below to suit products specified in this Section and Project sustainable design requirements. Specific cost data requirements are specified in Section 018113.

Salvaged, refurbished, and reused products.

Products with recycled material content.

Regional products.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. CLOSEOUT SUBMITTALS
         1. Section 017716 - Contract Closeout: Requirements for submittals.
         2. Project Record Documents: Record actual locations and final orientation of equipment and accessories.
      2. QUALITY ASSURANCE

Include following paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
      1. QUALIFICATIONS

Coordinate following paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
        2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
      1. DELIVERY, STORAGE, AND HANDLING
         1. Section 016500 - Materials and Equipment: Requirements for transporting, handling, storing, and protecting products.
         2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         3. Handling:

Handle materials to prevent damage to interior or exterior surfaces.

Prepare pumps and accessories for shipment in such a manner as to prevent entry of foreign matter into product body.

* + - * 1. Storage:

Store materials according to manufacturer instructions.

Store products in areas protected from weather, moisture, or possible damage.

Do not store products directly on ground.

* + - * 1. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
         1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

1. PRODUCTS
   * + 1. ON-LOT SEWAGE GRINDER PUMPING UNITS
          1. Centrifugal Pumps:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=8785&mf=04&src=wd):

Crane Pumps and Systems, (937) 773-2442, 420 Third St., Piqua, OH 45356.

Environmental One Corp., (518) 346-6161, 2773 Balltown Rd., Niskayuna, NY 12309.

Goulds Water Technology, (866) 672-3669, 2881 East Bayard St. Ext., Seneca Falls, NY 13148.

Liberty Pumps, (585) 494-1817, 7000 Apple Tree Ave., Bergen, NY 14416.

Approved equivalent.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Progressing-Cavity Pumps:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=8786&mf=04&src=wd):

Flygt; A Brand of Xylem Inc., (914) 323-5700, 1 International Dr., Rye Brook, NY 10573.

Zoeller Company, (502) 778-2731, 3649 Cane Run Rd., Louisville, KY 40211.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - 1. CENTRIFUGAL GRINDER PUMPS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12449&mf=04&src=wd):

Goulds Water Technology, (315) 239-2499, 2881 East Bayard St. Ext., Seneca Falls, NY 13148.

Zoeller Company, (502) 778-2731, 3649 Cane Run Rd., Louisville, KY 40211.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Submersible grinder sewage pumps.

Field serviceable.

* + - * 1. Materials:

Pump Case, Motor Housing, and Bearing Housing: Cast iron.

Motor and Pump Shafts: Integral stainless steel.

Hardware: Stainless steel.

* + - * 1. Impeller:

Capable of passing minimum 3-inch- diameter sphere.

Type: Nonclog.

Material: [**Bronze**] [**or**] [**cast iron**].

Dynamically balanced.

Impeller Wearing Surface: Cast-polymer material designed for corrosion and wear resistance.

* + - * 1. Cutter Assembly:

Description:

Rotating type.

Stationary hardened stainless-steel shredding ring spaced in close annular alignment to driven impeller assembly.

Two hardened stainless-steel cutter bars.

Cutters capable of being reversed to provide sharp, unused cutting edges when original edges become dull.

Cutter assembly removable without dismantling pump.

Positioned immediately below pumping element.

Direct driven by motor shaft.

* + - 1. PUMP DISCHARGE PIPING
         1. Description:

Diameter: <\_\_\_\_\_\_\_\_> inches.

End Connections: Threaded.

* + - * 1. Material:

Galvanized steel.

Comply with ASTM A53, Grade B.

Type: Seamless.

Schedule: [**40**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Valves:

Gate:

[**Furnish in each pump discharge line, with stem extension as required for access**] [**As indicated on Drawings**].

End Connections: Threaded.

Body: Bronze.

Stem: Nonrising.

Disc: Wedge type.

Bonnet: Union.

Stem Seal and Bonnet O-Ring: PTFE.

Working Pressure: <\_\_\_\_\_\_\_\_> psig.

Check:

Type: Combination, horizontal, spring loaded.

Body: Iron.

Coupling: Hydraulically sealed.

Mounting: Bronze.

Pin and Spring: Stainless steel.

Disc: Renewable.

* + - 1. PUMP BASIN
         1. Basin:

Material: Fiberglass-reinforced polyester resin.

Nominal Wall Thickness: <\_\_\_\_\_\_\_\_> inches.

* + - * 1. Anti-Flotation Ring:

Formed integral with basin.

Concrete: As specified in Section [**033000 - Cast-in-Place Concrete**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

* + - * 1. Cover:

Material: Fiberglass-reinforced polyester resin.

Attachment: Bolted and gasketed.

Loading: Superimposed dead load and <\_\_\_\_\_\_\_\_>-lbf concentrated load at center.

* + - * 1. Inlet: Integrally formed or cast-iron calking-type hub or plastic pipe adapter fastened to basin with stainless-steel hardware.
      1. OPERATION
         1. Electrical Characteristics:

As specified in <\_\_\_\_\_>.

[**<\_\_\_\_\_\_\_\_> hp**] [**<\_\_\_\_\_\_\_\_> RLA**].

Voltage: <**\_\_\_\_\_\_\_\_**> V, [**single**] [**three**] phase, 60 Hz.

Maximum [**Fuse Size**] [**Circuit Breaker Size**] [**Overcurrent Protection**]: <**\_\_\_\_\_\_\_\_**> A.

Minimum Circuit Ampacity: <**\_\_\_\_\_\_\_\_**>.

Minimum Power Factor: <**\_\_\_\_\_\_\_\_**> percent at rated load.

* + - * 1. Motors:

As specified in Section 400593 - Common Motor Requirements for Process Equipment.

Type: Sealed submersible.

Windings: Open type, operating in dielectric oil.

Motor Leads: Pot in epoxy compound to form leakproof seal.

Shaft Seals:

Tandem carbon/ceramic mechanical type, with oil chamber between seals.

Mount electrode between seals to detect water leaking into seal chamber and to actuate light on control panel.

Bearings:

Upper and lower ball bearings to support rotor.

Comply with ABMA 9.

Lower bronze sleeve or ball bearing to take radial loads from impeller.

Bearing life is percentage of failure at rated hours; for example, L-10 life at 15,000 hours means 10 percent of bearings may be expected to fail at 15,000 hours.

Minimum L-10 Life: 15,000 hours.

* + - * 1. Control Panel:

As specified in Section 406700 - Control System Equipment Panels and Racks.

Factory mounted.

NEMA 250 Type [**3R**] <**\_\_\_\_\_\_\_\_**>.

Single-point power connection and grounding lug.

Circuit breaker and magnetic contactor with overload protection and reset button.

Terminal Strips: Controls, pumps, and alarms.

Circuit lightning protection.

Wire control circuits completely separate from power circuits.

Elapsed Time Meter: Nonresettable, to record run time to 99,999.9 hours.

High-Level Alarm Flashing Indicator Light:

Panel mounted.

Power: 100 W.

Provide guard.

* + - * 1. Liquid-Level Controls:

Description: Float-type [**mercury tube**] switches sealed in shock-resistant solid polyurethane float to control basin liquid level and to signal HIGH-LEVEL alarm.

Electrical Cords: Heavy neoprene-jacketed weighted cords, suspended from NEMA 250 Type 4 junction box.

Level Setting: Adjustable from top of basin.

Switches:

Simplex Operation: Three switches: one for PUMP START, one for PUMP STOP, and one for HIGH-LEVEL alarm.

Duplex Operation: Four switches: one for LEAD PUMP START, one for LAG PUMP START, one for PUMP STOP, and one for HIGH-LEVEL alarm.

* + - * 1. Disconnect Switch: Factory mounted in control panel.
        2. Operation Sequences:

Simplex Control Sequence:

When basin liquid level increases to [**PUMP START setting**] [**Elevation <\_\_\_\_\_\_\_\_>**], PUMP START switch energizes pump.

When sump liquid level decreases to [**PUMP STOP setting**] [**Elevation <\_\_\_\_\_\_\_\_>**], PUMP STOP switch de-energizes pump.

If basin liquid level continues to rise, HIGH-LEVEL alarm switch energizes alarm signal when liquid level reaches [**HIGH-LEVEL setting**] [**Elevation <\_\_\_\_\_\_\_\_>**].

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Duplex Control Sequence:

When basin liquid level increases to [**LEAD PUMP START setting**] [**Elevation <\_\_\_\_\_\_\_\_>**], LEAD PUMP START switch energizes lead pump.

When basin liquid level decreases to [**PUMP STOP setting**] [**Elevation <\_\_\_\_\_\_\_\_>**], PUMP STOP switch de-energizes lead pump.

When lead pump is de-energized, alternating relay indexes such that lag pump starts on next rise in basin liquid level.

If basin liquid level continues to rise to [**LAG PUMP START setting**] [**Elevation <\_\_\_\_\_\_\_\_>**], LAG PUMP START switch energizes lag pump.

When basin liquid level decreases to [**PUMP STOP setting**] [**Elevation <\_\_\_\_\_\_\_\_>**], PUMP STOP switch de-energizes both pumps.

If basin liquid level continues to rise, HIGH-LEVEL alarm switch energizes alarm signal when liquid level reaches [**HIGH-LEVEL setting**] [**Elevation <\_\_\_\_\_\_\_\_>**].

Remove paragraph if not a LEED project.

* + - 1. SUSTAINABILITY CHARACTERISTICS

Insert sustainable design characteristics in this Article to suit content of this Section and Project sustainable design requirements as specified in Section 018113.

* + - * 1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design compliance.
        2. Material and Resource Characteristics:

Recycled Content Materials: Furnish materials with maximum available recycled content [**including:**] [**.**]

Insert list of materials specified in this Section required to have recycled content.

<**\_\_\_\_\_\_\_\_**>.

Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project Site [**including:**] [**.**]

Insert list of materials specified in this Section required to be regional materials.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. ACCESSORIES
         1. Pump Guide Rails:

Material: Type 304 stainless steel.

Diameter: Manufacturer's standard for pump size, but not less than 1 inch.

* + - * 1. Top and Bottom Pilots: Stainless steel.
        2. Pump Guides and Guide Rail Supports: Stainless steel.
        3. Pump-Lifting Cable: Stainless steel.
        4. Fasteners and Hardware: Type 316 stainless steel.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify layout and orientation of pumps, accessories, and piping connections.
       2. INSTALLATION
          1. Coordinate final location of pump control panel with Director’s Representative <**\_\_\_\_\_\_\_\_**>.
          2. Excavation: As specified in Section 310000 – Earthwork.
          3. Install pump units and accessories where indicated on Drawings and according to manufacturer's instructions.
          4. Backfill: As specified in Section 310000 - Earthwork.
          5. Provide and connect piping, accessories, and power and control conduit and wiring to make system operational and ready for startup.
          6. Flush piping with clean water.
       3. FIELD QUALITY CONTROL
          1. Inspection: Check and adjust liquid-level control and alarm settings.
          2. Startup and Performance Testing:

Test each unit on clear water through minimum of four complete cycles under supervision of manufacturer's representative and in presence of the Director’s Representative.

Demonstrate that system performance, control functions, and alarms meet specified requirements.

Hydrostatically test system piping for leaks at <\_\_\_\_\_\_\_\_> psig.

* + - * 1. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products to be placed under this Section for not less than <**\_\_\_\_\_\_\_\_**> days on-Site for installation, inspection, field testing, startup, and instructing Facility personnel in maintenance of equipment. Coordinate with Director’s Representative.
        2. Equipment Acceptance:

Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

Make final adjustments to equipment under direction of manufacturer's representative. Coordinate with Director’s Representative.

* + - * 1. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.
      1. DEMONSTRATION
         1. Demonstrate equipment startup, shutdown, routine maintenance, alarm condition responses, and emergency repair procedures to Facility personnel. Coordinate with Director’s Representative.
      2. PROTECTION
         1. Conduct operations as to not interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas to the Work.
      3. ATTACHMENTS

When relying on separate schedules, tables, illustrations, or forms to specify product requirements, include list of each attachment. Include identical list of attachments in Project Manual table of contents.

Consider including schedule if Project includes more than one pump of each type.

Insert attachments following END OF SECTION. Consider following example when developing Project schedule.

* + - * 1. On-Lot Sewage Grinder Pumping Units Schedule:

GP-1:

Location: <**\_\_\_\_\_\_\_\_**>.

Type: <**\_\_\_\_\_\_\_\_**>.

Flow Rate: <**\_\_\_\_\_\_\_\_**>.

Discharge [**Pressure**] [**Head**]: <**\_\_\_\_\_\_\_\_**>.

Voltage/Phase: <**\_\_\_\_\_\_\_\_**> / <**\_\_\_\_\_\_\_\_**>.

GP-2:

Location: <**\_\_\_\_\_\_\_\_**>.

Type: <**\_\_\_\_\_\_\_\_**>.

Flow Rate: <**\_\_\_\_\_\_\_\_**>.

Discharge [**Pressure**] [**Head**]: <**\_\_\_\_\_\_\_\_**>.

Voltage/Phase: <**\_\_\_\_\_\_\_\_**> / <**\_\_\_\_\_\_\_\_**>.

END OF SECTION 333216