

SECTION 11341 - GRINDERS

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing in-line grinders, together with all cutters, drives, motors, valves, mounts, supports, controls, accessories, spare parts, and appurtenances necessary to make the equipment complete.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
 - 1. Section 11000 Equipment General Provisions
 - 2. Section 16485 Local Control Panels

1.3 CODES

- A. The WORK of this Section shall comply with the current editions of the following codes as adopted by the City of San Diego Municipal Code:
 - 1. Uniform Mechanical Code
 - 2. National Electrical Code

1.4 SHOP DRAWINGS AND SAMPLES

- A. The following shall be submitted in compliance with Section 01300:
 - 1. Manufacturer's product data showing materials of construction.
 - 2. Control panel diagram, as well as elevation of local control panel, showing panel-mounted devices. Furnish details of enclosure type, single line diagram of power distribution, and current draw of panel. Furnish list of all terminals required to receive inputs or to transmit output from the local control panel.
 - 3. Wiring diagram of field connections with identification of terminations between local control panels, junction terminal boxes and equipment items.
 - 4. Materials of construction.
 - 5. Motor data.
 - 6. Complete electrical schematic diagram.
 - 7. Dimensions and weights.

8. Installation instructions, anchorage details.

1.5 TESTING OF PROPOSED SUBSTITUTIONS

- A. In addition to the requirements of Section 01600, a grinder comparison test shall be conducted to establish equality between any proposed substitution and the named grinder manufacturers.
- B. The test, conducted at no additional cost to the OWNER, at a site selected by the CONTRACTOR, shall involve a standard batch of materials loaded into the proposed substitution equipment and product equipment from either of the named grinder manufacturers. Samples of the batch ground by both grinders shall be analyzed for particle size.
- C. A list of materials to be included in the standard batch will be available from the CONSTRUCTION MANAGER one week before the test.
- D. The CONTRACTOR shall notify the CONSTRUCTION MANAGER two weeks in advance of the test. Both the OWNER and the CONSTRUCTION MANAGER reserve the right to witness the test.
- E. To be an acceptable substitution, the proposed substitution must satisfy the requirements of this Section and produce particle fineness and uniformity of size equal to or exceeding the particle sizes of the named product.

1.6 SERVICES OF MANUFACTURER

- A. **Inspection, Startup, and Field Adjustment:** An authorized representative of the manufacturer shall visit the site for not less than [] day to furnish the indicated services.
- B. **Instruction of OWNER'S Personnel:** The authorized service representative shall also instruct the OWNER'S personnel in the operation and maintenance of the equipment including step-by-step troubleshooting procedures with necessary test equipment for not less than [1] day.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. The grinders shall be capable of grinding continuously [raw sewage] [raw sludge] [digested sludge] prior to pumping. The grinders shall be automatically operated to run in conjunction with the corresponding feed pumps. Grinder construction shall be of corrosion resistant materials selected for resistance to pitting due to cavitation and corrosion due to galvanic action.

2.2 CONSTRUCTION

- A. Each grinder shall be of the in-line configuration with [6-inch] flanged end connections. It shall have two counter-rotating shafts with mechanical seals, stainless steel spacers, and intermeshing cutters. The motor shall be a heavy-duty, 480-volt, 3-phase, 60-Hz [3.0] hp, constant speed type with a maximum speed of 1800 RPM, suitable for outdoor installation. The grinders shall be capable of running dry and shall not require an external water source.

- B. Cutter and spacer shafts shall be 4140 heat treated hexagon steel with a tensile rating of not less than 149,000 psi.
- C. End housings, transition flanges, and covers shall be Class 30 grey iron.
- D. Side rails shall be ASTI A 536 ductile iron.
- E. Cutters and spacers shall be 4130 heat treated alloy steel, surface ground for uniformity and through-hardened to a minimum 43-48 Rockwell "C".

2.3 EQUIPMENT

- A. **Bearings and Seals:** The radial and axial loads of the shafts shall be borne by two sealed tapered roller bearings with an L-10 bearing life of 100,000 hours. The bearings shall be provided with a separately sealed bearing chamber. The radial and axial loads of dual shafted units shall be borne by four sealed Conrad-type ball bearings, which shall be rated by the bearing manufacturer with a minimum basic dynamic load rating of 7,050 lbs. The bearings shall be protected by a combination of a labyrinth device and end face mechanical seals. Face materials must be minimum of tungsten carbide to tungsten carbide or stellite to stellite, not requiring an external flush. The mechanical seal shall be rated at 60 psi continuous duty by the seal manufacturer. The bearings and seals shall be housed in replaceable wear sleeves that support and align the bearings and seals, or the bearings, seals and shafts shall be housed in replaceable cartridges that support and align the bearings.

- B. **Cutting Assembly:** The inside configuration of the cutters and spacers shall be hexagonal so as to fit the shafts with a total clearance not to exceed 0.025 inches across the flats to assure positive drive and to increase the compression strength of the spacers.

The two shafts shall counterrotate with the driven shaft operating at approximately 2/3 the speed of the drive shaft. The cutter shall exert a minimum of [430] lbs per HP continuously and [1380] lbs per HP at momentary load peaks at the tooth tip.

- C. **Speed Reducer:** The reducing gear shall be a planetary type, grease filled, "heavy shock" load classification for 24 hour service with a service factor of 2.1.

- D. **Couplings:** The high-speed shaft of the dual-shafted grinder shall be directly coupled with the reducer and motor using a two piece coupling.

- E. **Lifting Lugs:** Grinder housings shall be provided with lifting lugs.

2.4 OPERATION

- A. When the grinder is in operation and an overload or jamming condition occurs, the grinder shall automatically reverse shaft rotation to clear the condition and return to the original rotation. If the overload condition has cleared, the grinder shall resume normal operation. If the overload condition has not been cleared, the grinder shall automatically repeat the clearing sequence. If a third overload condition occurs within 30 seconds of the first overload condition, the grinder shall automatically reverse to release the jam, shut down, and energize an alarm relay with dry contacts.

- B. The grinder shall come equipped with a HAND-OFF-AUTO switch on the control panel and start/stop pushbuttons. In the "OFF" position, the grinder shall not operate. In the "HAND" position, the grinder shall be started and stopped by the panel-mounted start/stop buttons. In the "AUTO" position, the grinder shall be started and stopped by signals from dry contacts connecting to the feed equipment.
- C. In the event of an overload clearing sequence, a timer shall be activated. If the grinder has not resumed normal operation within a specified time period, the pump shall be shut off. The delay period shall be as recommended by the grinder manufacturer. The period shall not be more than 30 seconds longer than the clearing time of the grinder.
- D. If the unit encounters an overload condition and power failure occurs, the overload indicators will reactivate when power resumes.

2.5 CONTROL PANEL

- A. The electrical work for the control panel shall be in accordance with Division 16. The panel shall be in a FRP UL 508 enclosure with NEMA rating in accordance with the area designations of Section 16050 and wired to provide the sequence of operation indicated. Identified terminal strips shall be provided for the interconnection of external conductors. All control devices on individual equipment items shall be ready for service after connection of conductors to equipment, controls, and local control panel. The local control panel shall automatically restart the equipment after a power failure.
- B. The local control panel shall be provided with motor starter and panel-mounted START/STOP pushbuttons, status and alarm lights for each grinder, and a dry contact for relaying a common grinder alarm signal from individual alarms wired in parallel to equipment indicated elsewhere. The panel shall be provided with dry contacts for relaying grinder running status to equipment specified elsewhere. Terminals shall be provided at the panel to receive the start/stop signals from equipment indicated elsewhere.
- C. All equipment and local control panels shall operate on 480-volt, 3-phase power.
- D. Panel shall have indicator lights for power on, overload, and run conditions. Panel shall also have momentary contact pushbutton switches to perform start and stop/reset operations.

2.6 OPERATING CONDITIONS

- A. Grinders shall conform to the following requirements:

Identification Number	- []
Number of Units	- []
Location	- []
Service	- []
Solids Concentration, percent	- []
Design Flow, gpm	- []
Headloss, psi, maximum	- []
Motor horsepower, maximum	- []
Pipe diameter, in.	- []

2.7 LUBRICATION

- A. The CONTRACTOR shall have the manufacturer supply the lubrication and all necessary sealing fluids for initial testing as well as those required for one year of operation.

2.8 TOOLS AND SPARE PARTS

- A. The CONTRACTOR shall supply one set of any special tools necessary for adjustment or maintenance; one set of gaskets and one set of cutters, one seal assembly, and one bearing assembly.

2.9 PROTECTIVE COATING

- A. All equipment and piping shall be coated in accordance with Section 09800.

21.0 MAINTENANCE POLICY

- A. The manufacturer shall provide a "Free Labor" reconditioning service for the mechanical portion of the equipment described in this Section. Under the service agreement, the OWNER will be charged for the transportation to and from the repair facility, and for the parts used in reconditioning.

2.11 MANUFACTURERS

- A. Products shall be of the following manufacturer and type (or equal):
 - 1. Disposable Waste Systems, Inc., "Muffin Monster".

PART 3 -- EXECUTION

3.1 GENERAL

- A. Grinders shall be installed in strict accordance with the manufacturer's written instructions and shop drawings.

3.2 FIELD TESTING

- A. Upon completion of the installation, each grinder shall be tested for satisfactory operation without excessive noise, vibration, and overheating. All equipment shall be adjusted and checked for alignment, clearances, supports, and adherence to safety standards.

** END OF SECTION **