Typical Specifications
Moyno® Annihilator™
Series 4, In-line Design

Project Reference: ____________________________
Equipment Reference: _______________________
Consulting Engineer: _________________________

Part 1 GENERAL DESCRIPTION

1.1 Work Included: This section of the specification covers the sewage grinder to be installed as shown on the Plans.

The sewage grinder shall be of the dual shaft, counter-rotating design capable of continuous operation, processing wet or dry. Each unit shall include the grinder, gear reducer, drive motor and control panel.

1.2 Related Sections

1.3 Submittal Requirements
- Product Bulletin
- Certified Dimensional Drawings
- Motor Performance and Electrical Data
- Planetary Gear Reducer Performance Data & Drawings
- Grinder Control Panel Drawing and Wiring Diagram

1.4 Quality Assurance
A. The Regulatory Agency requirements shall be:
   - AISI 4140 Heat Treated Hexagon Steel.
   - AISI 4130 Heat Treated Alloy Steel.
   - Material hardness: 45-50 Rockwell “C.
   - National Electrical Manufacturer’s Association Standards (NEMA).

B. All equipment furnished under this section shall (1) be of a single manufacturer who has been regularly engaged in the design and manufacture of the equipment for at least five (5) years, and (2) be demonstrated to the satisfaction of the engineer that the quality is equal to equipment made by those manufacturers named herein.

1.5 Spare Parts
A. Spare parts for the equipment furnished shall be as recommended by the manufacturer as part of this contract.

B. All special tools unique to the specified equipment shall be provided.

1.6 Warranty
The manufacturer shall provide unconditional warranty with parts and labor for one year from the day of start-up or 18 months from the day of shipment, whichever is longer.
Part 2 PRODUCTS

2.1 Acceptable Manufacturer
The grinder shall be as supplied by Moyno, Inc., a Unit of Robbins & Myers, Inc.

2.2 Sewage Grinder
A. General
1. Number of Units: ____________________________
2. Model Number: ______________________________
3. Type: The in-line Grinder shall be of the motor driven, double shaft design stacked with intermeshing cutters and spacer cutters positioned on the shafts to form a helical pattern. The shafts shall be constructed of 2"Hexagonal, 4140 steel and counter-rotate at 60 and 36 RPM. The shafts shall contain intermeshing cutters and spacer cutters. Single shaft devices utilizing a single cutter bar with stationary cutters or double shaft devices without cutting teeth on the spacers will not be acceptable.
4. The running Torque per Horsepower shall be:
   a. Continuously at 1,000 inch pounds minimum.
   b. Momentary Load Peaks at 3,200 inch pounds.
5. In-line configuration with Inlet and outlet size ________________.
6. Fluid Description ________________________________.
7. Percent Solids ________________________________.
8. Capacity ____________________________________.
9. Drive Type __________________________ (electric, hydraulic, submerged electric).

B. Each unit of equipment shall be identified with a corrosion resistant nameplate securely affixed in a conspicuous place. Nameplate information shall include: equipment model number, serial number, supplier name and location.

C. Grinder Construction
1. Each grinder shall consist of the following main components: (a) flange housing; (b) cutter cartridge, and (c) drive assembly.
2. The cutter cartridge shall be of the two-shaft design and be capable of continuous operation, processing wet or dry.
3. Two-shaft design shall consist of two parallel shafts alternately stacked with individual intermeshing cutters and spacers cutters positioned on the shaft to form a helical pattern. The shafts shall counter-rotate with the idler shaft operating at approximately two-thirds (2/3) the speed of the drive shaft. Twin-shaft grinders that do not include spacer cutters will not be acceptable.
4. The cutter stack can be tightened externally by adjusting a socket head cap screw through an easy access opening provided on the bottom support.
5. **Flange Housing**
   A. The housings shall be a solid one-piece structure made of ductile iron, ASTM A 536-85. The housing is capable of remaining in-line if removal of the cutter cartridge and drive assembly is required.

   B. The inside profile of the housing shall be concave to follow the radial arc of the cutters to direct larger particles toward the cutters and assure fineness of grind. The concave housing surface shall maintain a clearance not to exceed 1/4” (8-mm) between the major diameter of the cutter and the concave arc of the housing.

   C. The flange housing shall be provided with a gasketed, covered access port for equipment inspection and drainage.

6. **Cutter Cartridge**
   A. The cutter cartridge and drive assembly can be removed from the flange housing as a complete assembly. The cutter cartridge consists of cutters, spacer cutters, shafts, bearing seal cartridges, gears, lips seals, and cast housings.

   B. The cutters on one shaft shall consist of the 7-tooth reversible design and the 5-tooth reversible design on the other shaft. The spacer cutters shall be on both shafts. The cutters and spacer cutters shall be installed in a helical pattern on both shafts.

   C. The cutters and spacer cutters shall be manufactured of 4130 steel; heat treated to 45-50 Rockwell C and surface ground for uniformity. To maintain particle size, the height of the cutter tooth shall not exceed 1/2 inch above the root diameter. The cutter root diameter overlap shall not be less than 1/16 inch nor greater than 1/4 inch to maintain the best possible cutting efficiency while incurring the least amount of frictional loss. The Grinder shall consist entirely of cutting elements to insure fineness of grind and minimal particle size. Grinders without cutting teeth on the spacers shall not be acceptable.

   D. The shafts of the twin-shaft grinder shall be AISI 4140 heat-treated hexagonal steel with a tensile strength rating of 149,000 PSI.

   E. The Grinder shafts shall be supported on each end by heavy duty, double sealed Conrad type bearings protected by single mechanical seals. The bearings and seals shall be mounted on separate stainless steel sleeves. The seal cartridge must be protected by a replaceable component that provides a tortuous path to deflect solids from contacting the assembly. The mechanical seal faces shall be made of silicon carbide. O-rings shall be made of fluoroelastomer. Products requiring occasional lubrication or flushing of the seals shall not be accepted.

   F. The mechanical seal shall be rated at 100 psig continuous duty.

   G. The top housing shall have a pressure release grease fitting set at a maximum of 10 psig to allow for lubrication of the shaft gears.

7. **Drive Assembly**
   A. The gear reducer shall be grease lubricated, planetary type with “heavy shock” load classification. The gear reduction shall be 29:1 ratio. The drive shaft of the grinder shall be directly coupled with the gear reducer using a two piece coupling.

   B. The motor shall be (3-HP or 5-HP), 1750 –RPM, 3/60/230/460 volts, TEFC enclosure. The motor efficiency shall be 84% at full load.
6. **Top Housing Gear Lubrication**: The top housing shall have a pressure release grease fitting set at a maximum of 10 psi to allow for semi-annual lubrication of the shaft gears.

D. **Motor Controller**: The motor controller shall utilize a solid state design. A transformer shall supply all low and intermediate control voltages. All transformer legs shall be fuse protected. The controller shall provide the following functions:

a. The controller shall be equipped with a “Hand,” “Off,” “Automatic” switch. In the “Off” position, the electric motor shall not run. In the “Hand” position, the panel controls are used. In the “Automatic” position, the Grinder shall start when two (2) terminals are closed and stop when they are opened. The Grinder can only be reset from the local panel controls.

b. Operate in a normal ON/OFF mode.

c. Full load protection.

d. Jam or overload protection. The control panel shall be provided with a Program Controller. The Program Controller shall include a 0 to 5 reversing cycle adjustment to allow for optimum operation of the Grinder under varying conditions. Control panels without a Program Controller will not be accepted. Upon the Grinder encountering a jam or “overload” condition, the controller shall stop the Grinder and reverse its rotation to clear the obstruction. If the jam is cleared, the controller shall return to normal operation. If the jam condition still exists, the controller shall go through two additional cycles within 30 seconds (3 times total) before signaling a Grinder overload condition. Upon a Grinder overload condition, the controller shall shut the Grinder off and activate an alarm circuit. Under normal operating conditions the controller shall be set at three (3) reversing cycles.

e. Motor Controller Hardware:
   (1) U.L., approved enclosure, NEMA 4X fiberglass reinforced polyester 20"H x 16"W x 8"D.
   (2) Indicator lights for Line Active, Overload, and Run conditions.
   (3) Momentary contact push-button switches to perform Start and Stop/Reset operations.
   (4) Overload terminals shall be provided for remote, overload and/or alarm indication.

E. **Electrical Requirements**: (3-HP or 5-HP), three phase, 60 Hertz, ______ Volts.

F. **Paint**: The Grinder shall be supplied with a standard shop coat of epoxy primer.