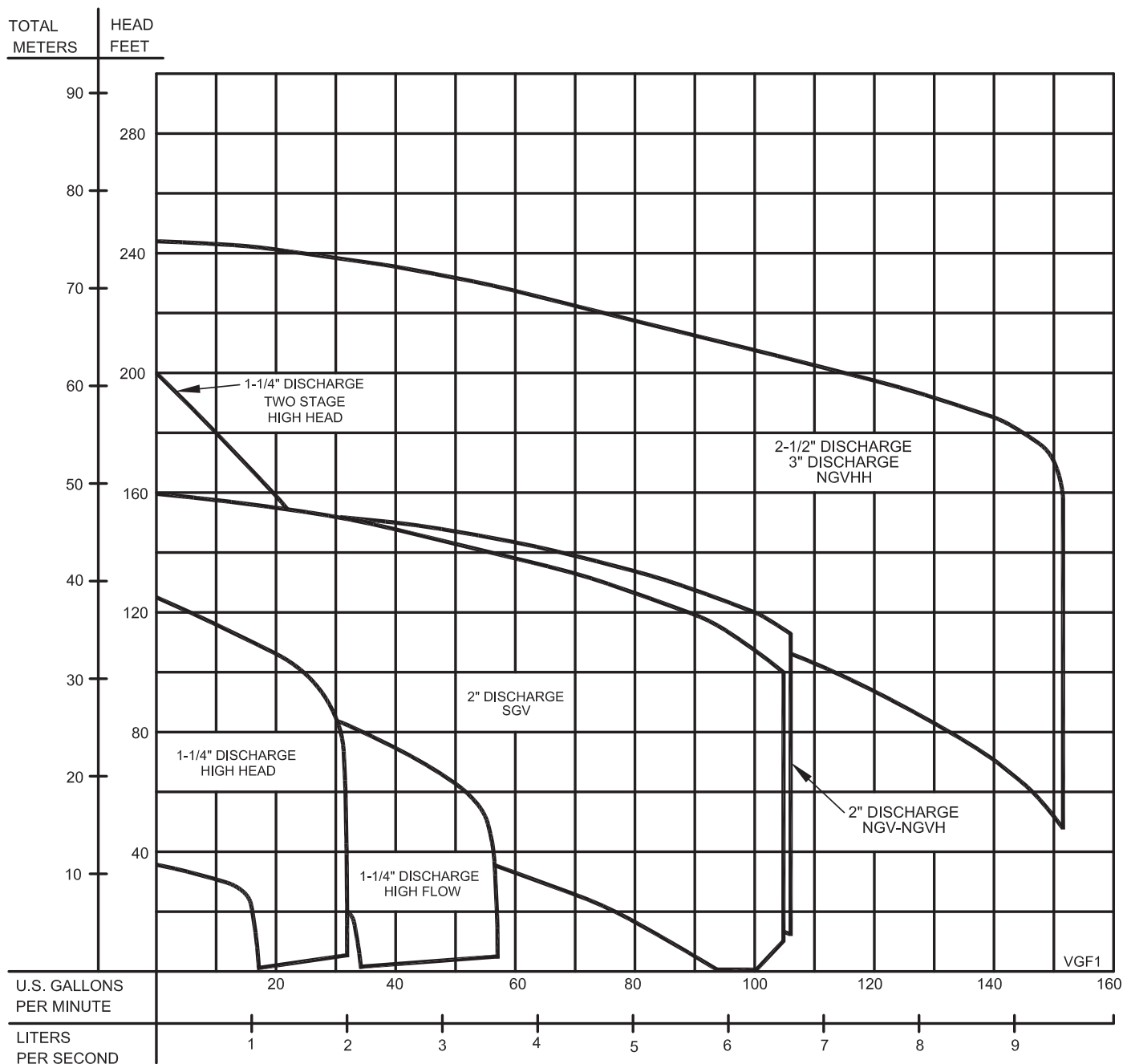




Specifications

Submersible Razor Grinder Pumps ZSGV, 2HP, Double Seal, Oil-Filled

BARNES®

www.cranepumps.com

Effluent/Grinder Pumps

SCOPE: Furnish and install _____ submersible grinder pump (s). Each pump shall be capable of delivering the following performance points, _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH, with a shut off head of _____ TDH (minimum). The pump motor speed shall be 3450 RPM, 2 HP (maximum), _____ Phase, 60 Hertz, _____ Volts. The pump (s) shall be manufactured by a company regularly engaged in the manufacture and assembly of similar units for a minimum of five (5) years. The pump (s) shall be Barnes® Pumps model ZSGV _____.

DESIGN: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 104° F continuous, 160°F intermittent and shall be capable of running dry for extended periods.

CONSTRUCTION: The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump (s) shall be powder coated with an epoxy primer and polyester top coat. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 1.25 inch NPT in the vertical position using a threaded bolt on discharge flange. A movable fitting with C-Channel connection is also acceptable.

The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of ASTM A-48 cast iron construction. The impeller shall be capable of being trimmed to meet specific performance characteristics.

The pump shall be a two bearing design consisting of an upper ball bearing carrying the thrust loads, and lower ball bearing for the purpose of carrying the thrust loads and radial loads. Sleeve bearings or ball bearings will not be considered equal. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

GRINDER: The grinder mechanism shall be specifically designed for use in a grinder pump. The mechanism shall consist of an axial cutter that is locked for rotation by a shaft key. The cutter is fixed axially by a socket head cap screw. The cutter plate is held in place by a press fit. The entire cutting mechanism shall be recessed, protecting the mechanism. All grinding mechanism components, including both the cutter plate and radial cutter shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground for a fine cutting edge. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly shall operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.

ELECTRIC MOTORS: Single-phase motors shall be of the capacitor start, capacitor run design, 208-240 volt, and single phase, 2 HP. The motor shall meet the performance requirements of a NEMA L speed-torque curve. The motor shall be designed to be non-overloading throughout the entire pump curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of the bearings, making it capable of operating in a totally, partially, or non-

submerged condition for extended periods of time without damage due to heat being generated. Oil used must be able to be disposed of as non-hazardous waste. Air-filled motors shall not be acceptable. The motor shaft shall be of 416 stainless steel.

For single phase pumps, an automatically resetting, heat sensing thermal device that interrupts current flow if excessive temperature and/or current is detected shall provide protection against excessive temperature.

The pumps shall be equipped with _____ ft. of type SOW power cord. The power cord and motor shall be connected via quick disconnect pin terminals located within the motor housing. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cord entry. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between terminal block and the motor housing. The plug assembly shall be guaranteed by the manufacturer to meet UL approval for submersion.

For three phase pumps, Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel

MECHANICAL SEAL: The unit shall utilize a double mechanical shaft seal arrangement and shall operate in an oil atmosphere. The materials of construction shall be silicon carbide for the rotating face and silicon carbide for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

WARRANTY: The pump shall include a three year limited warranty as standard.

PUMP TEST: The pump manufacturer shall perform the following inspections and tests:

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made per CSA criteria.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.

If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E and U of Hydraulic Institute standards.

DOCUMENTATION: The manufacturer, if requested, will supply a minimum of _____ sets of standard submittal data;

Standard submittal data consist of:

- a. Pump catalog data;
- b. Pump performance curve;
- c. Break Away Fitting (BAF) data;
- d. Access frame data;
- e. Typical installation drawing;
- f. Control panel data
- g. Panel wiring schematic;
- h. Accessory data;
- i. Installation & Operation Manuals with Parts List

SCOPE: Furnish and install _____ submersible grinder pump (s). Each pump shall be capable of delivering the following performance points,
 _____ U.S. GPM at _____ TDH;
 _____ U.S. GPM at _____ TDH;
 _____ U.S. GPM at _____ TDH,
 with a shut off head of _____ TDH (minimum). The pump motor speed shall be 3450 RPM, 2 HP (maximum), _____ Phase, 60 Hertz, _____ Volts. The pump (s) shall be manufactured by a company regularly engaged in the manufacture and assembly of similar units for a minimum of five (5) years. The pump (s) shall be Barnes® model _____.

DESIGN: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 160°F intermittent and shall be capable of running dry for extended periods.

PUMP CONSTRUCTION: The volute, seal plates and motor housing shall be constructed of high quality ASTM-A-48 class 30 cast iron. The pump (s) shall be painted with a water based air dry enamel of 2.0 mil minimum thickness. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 1.25 inch NPT in the vertical position.

The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of 85-5-5-5 bronze or ASTM-A-48 cast iron construction and machined for threading to the motor shaft. The impeller shall be capable of being trimmed to meet specific performance characteristics. The grinder mechanism shall consist of a radial cutter threaded and locked on the motor shaft by a washer in conjunction with a countersunk flat head cap screw, and a shredding ring containing a minimum of fifteen flow passages for SGVF series and seven flow passages for SGVH series, with cutting edges. The shredding ring shall be reversible to provide twice the cutting edge life. Both the shredding ring and radial cutter shall be constructed of 440C stainless steel hardened to a min. Rockwell C55 and shall be finish ground for a fine cutting edge. Two-stage cutter mechanisms requiring external adjustment for proper clearance are not acceptable.

The unit shall utilize a tandem mechanical shaft seal arrangement and shall operate in an oil atmosphere. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

Single phase motors shall be of the capacitor start, capacitor run design and the three phase motors shall be of the dual-voltage 240/480 design. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability. Motor designs incorporating shrink or press fit assembly between the stator and motor housing shall not be acceptable. The motor shall be constructed with the windings operating in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated.

Air-filled motors shall not be acceptable. The motor windings shall be of Class B insulation. The motor shall meet the standard NEMA design L for single phase and NEMA design B for three phase. The motor shaft shall be of 416 stainless steel. Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel for all models except the 200 and 240 volt, single

phase SGV*2022L and SGV*2002L. The 200 and 240 volt, single phase models shall provide protection against excessive temperature through the use of an in-line heat/current sensor. The sensor shall be connected in series with, and attached to the motor windings 240 volt, single phase pumps requiring a sensor to be wired in series with the contactor coil shall not be acceptable. The pump shall have a three bearing design consisting of an upper ball bearing, an intermediate ball bearing restrained for the purpose of carrying the thrust loads, and a lower bronze sleeve bearing to carry radial loads and prevent shaft deflection imposed by the pump impeller and grinder operation. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

The pump shall be equipped with _____ ft. of type SOW power cord and connected to the motor via quick disconnect pin terminals. Threaded cord grip type cord entries are not acceptable. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the housing and to provide strain relief at the point of cord entry. A stainless steel clamp shall compress the PVC molding against the cord jacket to prevent water from entering the jacket. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with the motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between the terminal block and the motor housing when the cord plug is removed.

PUMP TEST: The pump manufacturer shall perform the following inspections and tests:

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made per CSA criteria.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.

If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E and U of Hydraulic Institute standards.

START-UP: The pump (s) shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed and returned to the manufacture before final acceptance of the pump(s).

DOCUMENTATION: The manufacturer, if requested, will supply a minimum of _____ sets of standard submittal data; Standard submittal data consist of:

- a. Pump catalog data;
- b. Pump performance curve;
- c. Break Away Fitting (BAF) data;
- d. Access frame data;
- e. Typical installation drawing;
- f. Control panel data
- g. Panel wiring schematic;
- h. Accessory data;
- i. Installation & Operation Manuals with Parts List

Specifications

Submersible Vortex Grinder Pumps SGV, 3, 5, 7.5HP, Double Seal, Oil-Filled

BARNES®

www.cranepumps.com

Effluent/Grinder Pumps

SCOPE: Furnish and install _____ submersible grinder pump (s). Each pump shall be capable of delivering the following performance points, _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH, with a shut off head of _____ TDH (minimum). The pump motor speed shall be _____ RPM, _____ HP (maximum), _____ Phase, 60 Hertz, _____ Volts. The pump (s) shall be manufactured in North America by a company regularly engaged in the manufacture and assembly of similar units for a minimum of five (5) years. The pump (s) shall be Barnes® Pumps model _____.

DESIGN: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic sewage, including plastic, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping, gravity interceptor, or treatment facility. The temperature limitation of the liquid being pumped is 160 °F (71°C) intermittent and shall be capable of running dry for extended periods of time. Pump(s) shall be suitable for long term submergence in sewage. Grinder pump(s) shall be U.L. Listed to Standard 778 and CSA Listed to Standard 108.

PERFORMANCE: In order to insure proper operation in all conditions, pump(s) must provide, without overheating in continuous operation, maximum head condition required by the system. Pump(s) must also be capable of operating at zero or negative heads without damage to the pump(s)

CONSTRUCTION: The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump(s) shall be painted with air dry enamel of 2 mil minimum thickness. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 2.00 inch NPT in the vertical position. The pump impeller shall be of the recessed, vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of 85-5-5-5 bronze construction and machined for threading to the motor shaft. The impeller shall be capable of being trimmed to meet specific performance characteristics. The pump shall be a three bearing design consisting of an upper ball bearing, an intermediate ball bearing restrained for the purpose of carrying the thrust loads, and an oil lubricated lower bronze sleeve bearing to carry radial loads and prevent shaft deflection imposed by the pump impeller and grinder operation. The oil lubricated sleeve bearing shall be located between two mechanical seals. Lip type seals are not acceptable. Designs reducing the number of bearings or substituting sleeve bearings for ball bearings will not be considered equal.

GRINDER: The grinder mechanism shall be specifically designed for use in a grinder pump. Garbage disposal cutting mechanisms are not acceptable. The mechanism shall consist of a radial cutter threaded and locked on the motor shaft by a washer in conjunction with a counter sunk flat head cap screw, and a matching shredding ring. Grinding shall be accomplished by a slicing action as opposed to a chopping action. Chopping-type cutter mechanisms will not be allowed. Grinder design shall be able to alternately engage cutters at start and shall exert a minimum cutting force of 30 pounds, thus eliminating the need for excessive motors. The shredding ring shall be reversible to provide twice the cutting life. All grinding mechanism components, including both the shredding ring and radial cutter and its impeller (if required), shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground for a fine cutting edge. Two stage cutter mechanisms and/or those requiring external adjustment for proper clearance shall not be acceptable. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.

The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects", such as paper, wood, plastic, glass, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the discharge piping. The grinding mechanism must be capable of handling reasonable amounts of grit, often found in domestic sewage systems.

ELECTRIC MOTOR: Single phase motors shall be of the capacitor start, capacitor run, NEMA L design and three phase motors shall be of the dual-voltage 240/480, NEMA B design. The motor shall be designed to be non-overloading throughout the entire pump curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of the bearings, making it capable of operating in a totally, partially, or non-submerged condition for extended periods of time without damage due to heat being generated. Oil used must be able to be disposed of as non-hazardous waste. Air-filled motors shall not be acceptable. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability. Motor designs incorporating shrink or press fit assemblies between the stator and motor housing shall not be considered acceptable. The motor shaft shall be of 416 stainless steel. Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil to the control panel.

The pumps shall be equipped with type SOW power cable. The power cable is connected to the motor via quick disconnect pin terminals. Threaded cord grip type cord entries are not acceptable. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cable entry. A stainless steel clamp shall compress the PVC molding against the cable jacket to prevent water from entering the jacket. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between terminal block and the motor housing. The plug assembly shall be guaranteed by the manufacturer to meet UL approval for submersion.

MECHANICAL SEAL: The pump shall utilize a tandem mechanical shaft seal arrangement and shall operate in an oil atmosphere. Each seal shall be double floating, self-aligning rotary shaft seals to prevent leakage between the motor and pump. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, with 300 stainless steel hardware, with all elastomer parts of Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

PUMP TEST: The pump manufacturer shall perform the following inspections and tests:

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made per CSA criteria.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.

If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E and U of Hydraulic Institute standards.

START-UP: The pump (s) shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed before final acceptance of the pump (s).

SHOP DRAWINGS AND MANUALS: After receipt of notice to proceed, the manufacturer shall furnish the engineer a minimum of eight (8) sets of shop drawings detailing the equipment to be furnished including dimensional data and materials of construction. The engineer shall promptly review this data, and return two (2) copies to the manufacturer as approved, or approved as noted. Upon receipt of accepted shop drawings, the manufacturer shall proceed with order entry and fabrication of the equipment. Prior to completion of equipment delivery, the manufacturer shall supply four (4) copies of Operation and Maintenance Manuals to the owner, and one (1) copy of the same to the engineer.

DESIGN: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping, gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 104°F (40°C) continuous. The pump shall be capable of running dry for extended periods.

PERFORMANCE: In order to insure proper operation in all conditions, pump(s) must provide, without overheating in continuous operation, maximum head condition required by the system. Pump(s) must also be capable of operating at zero or negative heads without damage to the pump(s). The pump shall be tested and certified, by a third party agency to NSF46 standards.

CONSTRUCTION: The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump (s) shall powder coated with an epoxy primer and a polyester top coat. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 1.25 inch NPT in the vertical position using a threaded bolt on discharge flange. A movable fitting with c-channel connection is also acceptable.

The pump impellers shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impellers shall be of 85-5-5 construction and machined such that the upper and lower impeller are locked for positive rotation by a shaft key. Both impellers are dynamically balanced to ISO G6.3.

The pump shall be a two bearing design consisting of an upper ball bearing carrying the thrust loads, and lower ball bearing for the purpose of carrying the thrust loads and radial loads. Sleeve bearings or ball bearings will not be considered equal. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

GRINDER: The grinder mechanism shall be specifically designed for use in a grinder pump. The mechanism shall consist of an axial cutter that is locked for rotation by a shaft key. The cutter is fixed axially by a socket head cap screw. The cutter plate is held in place by a press fit. The entire cutting mechanism shall be recessed, protecting the mechanism. All grinding mechanism components, including both the cutter plate and radial cutter shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground for a fine cutting edge.

The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly shall operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.

ELECTRIC MOTOR: Single-phase motors shall be of the capacitor start, capacitor run design, 208-240 volt, and single phase, 2 HP. The motor shall meet the performance requirements of a NEMA L speed-torque curve. The motor shall be designed to be non-overloading throughout the entire pump curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of the bearings, making it capable of operating in a totally, partially, or non-submerged condition for extended periods of time without damage due to heat being generated. Oil used must be able to be disposed of as non-hazardous waste. Air-filled motors shall not be acceptable. The motor shaft shall be of 416 stainless steel. Capacitors shall be capable of being changed without draining motor oil.

An automatically resetting, heat sensing thermal device that interrupts current flow if excessive temperature and/or current is detected shall provide protection against excessive temperature.

The pumps shall be equipped with _____ ft. of type SOW power cord. The power cord and motor shall be connected via quick disconnect pin terminals located within the motor housing. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cord entry. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between terminal block and the motor housing. The plug assembly shall be guaranteed by the manufacturer to meet UL approval for submersion

MECHANICAL SEAL: The pump shall be equipped with double floating, self-aligning rotary shaft seal to prevent leakage between the motor and pump. The materials of construction shall be silicon carbide for both the rotating face and for the stationary face, lapped and polished to a tolerance of one light band, with 300 stainless steel hardware, with all elastomer parts of Buna-N.

PUMP TEST: The pump manufacturer shall perform the following inspections and tests:

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made per CSA criteria.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.

WARRANTY: The pump shall include a three year limited warranty as standard.

START-UP: The pump (s) shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed before final acceptance of the pump (s).

DOCUMENTATION: The manufacturer, if requested, will supply a minimum of _____ sets of standard submittal data;

Standard submittal data consist of:

- a. Pump catalog data
- b. Pump performance curve
- c. Break Away Fitting (BAF) data
- d. Cover data
- e. Typical installation drawing
- f. Control panel data
- g. Panel wiring schematic
- h. Accessory data
- i. Installation & Operation Manuals with Parts List

Specifications

Submersible Razor Grinder Pumps ZOGV, 2HP, Single Seal, Oil-Filled

BARNES®

www.cranepumps.com

Effluent/Grinder Pumps

SCOPE: Furnish and install _____ submersible grinder pump (s). Each pump shall be capable of delivering the following performance points, _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH, with a shut off head of _____ TDH (minimum). The pump motor speed shall be 3450 RPM, 2 HP (maximum), Single Phase, 60 Hertz, _____ Volts. The pump (s) shall be manufactured by a company regularly engaged in the manufacture and assembly of similar units for a minimum of five (5) years. The pump (s) shall be Barnes® Pumps model ZOGV _____.

DESIGN: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 104° F continuous, 160°F intermittent and shall be capable of running dry for extended periods.

CONSTRUCTION: The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump (s) shall be powder coated with an epoxy primer and polyester top coat. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 1.25 inch NPT in the vertical position using a threaded bolt on discharge flange. A movable fitting with C-Channel connection is also acceptable.

The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of ASTM A-48 cast iron construction. The impeller shall be capable of being trimmed to meet specific performance characteristics.

The pump shall be a two bearing design consisting of an upper ball bearing carrying the thrust loads, and lower ball bearing for the purpose of carrying the thrust loads and radial loads. Sleeve bearings or ball bearings will not be considered equal. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

GRINDER: The grinder mechanism shall be specifically designed for use in a grinder pump. The mechanism shall consist of an axial cutter that is locked for rotation by a shaft key. The cutter is fixed axially by a socket head cap screw. The cutter plate is held in place by a press fit. The entire cutting mechanism shall be recessed, protecting the mechanism. All grinding mechanism components, including both the cutter plate and radial cutter shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground for a fine cutting edge. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly shall operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.

ELECTRIC MOTORS: Single-phase motors shall be of the capacitor start, capacitor run design, 208-240 volt, and single phase, 2 HP. The motor shall meet the performance requirements of a NEMA L speed-torque curve. The motor shall be designed to be non-overloading throughout the entire pump curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of

the bearings, making it capable of operating in a totally, partially, or non-submerged condition for extended periods of time without damage due to heat being generated. Oil used must be able to be disposed of as non-hazardous waste. Air-filled motors shall not be acceptable. The motor shaft shall be of 416 stainless steel.

For single phase pumps, an automatically resetting, heat sensing thermal device that interrupts current flow if excessive temperature and/or current is detected shall provide protection against excessive temperature.

The pumps shall be equipped with _____ ft. of type SOW power cord. The power cord and motor shall be connected via quick disconnect pin terminals located within the motor housing. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cord entry. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between terminal block and the motor housing. The plug assembly shall be guaranteed by the manufacturer to meet UL approval for submersion.

For three phase pumps, Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel

MECHANICAL SEAL: The pump shall be equipped with double floating, selfaligning rotary shaft seal to prevent leakage between the motor and pump. The materials of construction shall be silicon carbide for both the rotating face and for the stationary face, lapped and polished to a tolerance of one light band, with 300 stainless steel hardware, with all elastomer parts of Buna-N.

WARRANTY: The pump shall include a three year limited warranty as standard.

PUMP TEST: The pump manufacturer shall perform the following inspections and tests:

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made per CSA criteria.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points. If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E and U of Hydraulic Institute standards.

DOCUMENTATION: The manufacturer, if requested, will supply a minimum of _____ sets of standard submittal data; Standard submittal data consist of:

- a. Pump catalog data;
- b. Pump performance curve;
- c. Break Away Fitting (BAF) data;
- d. Access frame data;
- e. Typical installation drawing;
- f. Control panel data
- g. Panel wiring schematic;
- h. Accessory data;
- i. Installation & Operation Manuals with Parts List

SCOPE: Furnish and install _____ submersible grinder pump (s). Each pump shall be capable of delivering the following performance points,
_____ U.S. GPM at _____ TDH;
_____ U.S. GPM at _____ TDH;
_____ U.S. GPM at _____ TDH,
with a shut off head of _____ TDH (minimum). The pump motor speed shall be 3450 RPM, 2HP (maximum), _____ Phase, 60 Hertz, _____ Volts. The pump (s) shall be manufactured by a company regularly engaged in the manufacture and assembly of similar units for a minimum of five (5) years. The pump (s) shall be Barnes® model _____.

DESIGN: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 77° F continuous, 160°F intermittent and shall be capable of running dry for extended periods.

PUMP CONSTRUCTION: The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump (s) shall be painted with a water based air dry enamel of 2.0 mil minimum thickness. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 1.25 inch NPT in the vertical position.

The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of 85-5-5 bronze or ASTM A-48 class 30 cast iron construction and machined for threading to the motor shaft. The impeller shall be capable of being trimmed to meet specific performance characteristics.

The grinder mechanism shall consist of a radial cutter threaded and locked on the motor shaft by a washer in conjunction with a countersunk flat head capscrew, and a shredding ring containing a minimum of seven flow passages with cutting edges. The shredding ring shall be reversible to provide twice the cutting edge life. Both the shredding ring and radial cutter shall be constructed of 440C stainless steel hardened to a min. Rockwell C55 and shall be finish ground for a fine cutting edge. Two-stage cutter mechanisms requiring external adjustment for proper clearance are not acceptable.

The unit shall utilize a single mechanical shaft seal arrangement and shall operate in an oil atmosphere. The materials of construction shall be silicon-carbide for the rotating and stationary faces, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

Single phase motors shall be of the capacitor start, capacitor run design. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability. Motor designs incorporating shrink or press fit assembly between the stator and motor housing shall not be acceptable. The motor shall be constructed with the windings operating in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated.

Air-filled motors shall not be acceptable. The motor windings shall be of

Class B insulation. The motor shall meet the standard NEMA design L for single phase. The motor shaft shall be of 416 stainless steel. Protection against excessive temperature shall be provided by an overload switch in series with the stator windings. The pump shall have a two bearing design consisting of an upper and lower ball bearing. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

The pump shall be equipped with _____ ft. of type SOW power cord and connected to the motor via quick disconnect pin terminals. Threaded cord grip type cord entries are not acceptable. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the housing and to provide strain relief at the point of cord entry. A stainless steel clamp shall compress the PVC molding against the cord jacket to prevent water from entering the jacket. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with the motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between the terminal block and the motor housing when the cord plug is removed.

PUMP TEST: The pump manufacturer shall perform the following inspections and tests in accordance with Hydraulic Institute type B standards before shipment from the factory:

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cord insulation test for moisture content or insulation defects shall be made per UL criteria.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.
4. A written report shall be available showing the aforementioned tests have been performed in accordance with the specifications.

START-UP: The pump (s) shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed before final acceptance of the pump (s).

DOCUMENTATION: The manufacturer, if requested, will supply a minimum of _____ sets of standard submittal data; Standard submittal data consist of:

- a. Pump catalog data;
- b. Pump performance curve;
- c. Break Away Fitting (BAF) data;
- d. Access frame data;
- e. Typical installation drawing;
- f. Control panel data
- g. Panel wiring schematic;
- h. Accessory data;
- i. Installation & Operation Manuals with Parts List

Specifications

Submersible Grinder Pumps

NGV & NGVH, Tandem Seal, Oil-Filled

BARNES®

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Effluent/Grinder Pumps

FILE: SPEC3-13

SCOPE: Furnish and install _____ submersible grinder pump (s). Each pump shall be capable of delivering the following performance points, _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH; _____ U.S. GPM at _____ TDH, with a shut off head of _____ TDH (minimum). The pump motor speed shall be _____ RPM, _____ HP (maximum), _____ Phase, 60 Hertz, _____ Volts. The pump (s) shall be manufactured by a company regularly engaged in the manufacture and assembly of similar units for a minimum of five (5) years. The pump (s) shall be Barnes® model _____.

DESIGN: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 104 degrees F continuous and shall be capable of running dry for extended periods.

PUMP CONSTRUCTION: Unit (s) shall be CSA listed for Class I, Groups C & D, Division 1, hazardous locations. The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. [The pump (s) shall be painted with (amide amine modified polymer satin gloss epoxy with 10 mil minimum thickness)]. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 2 inch NPT in the vertical position or 2/2.50/3 inch 125 pound slotted flanged to accommodate ANSI or ISO piping flange.

The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of ASTM A-48 class 30 cast iron construction and machined for threading to the motor shaft. The impeller shall be capable of being trimmed to meet specific performance characteristics.

The grinder mechanism shall consist of a radial cutter threaded and locked on the motor shaft by a washer in conjunction with a countersunk flat head cap screw, and a shredding ring containing a minimum of fifteen flow passages with cutting edges. The shredding ring shall be reversible to provide twice the cutting edge life. Both the shredding ring and radial cutter shall be constructed of 440C stainless steel hardened to a min. Rockwell C55 and shall be finish ground for a fine cutting edge. Two-stage cutter mechanisms requiring external adjustment for proper clearance are not acceptable.

The unit shall utilize a tandem mechanical shaft seal arrangement and shall operate in an oil atmosphere. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

Single phase motors shall be of the capacitor start, capacitor run design and the three phase motors shall be of the dual-voltage 230/460 design. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor shall be constructed with the windings operating in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of

time without damage due to the heat being generated.

Air-filled motors shall not be acceptable. The motor windings shall be spike resistant with of Class F insulation and Class H wire. The motor shall meet the standard NEMA design L for single phase, NEMA design B for three phase and be inverter duty rated per NEMA MG1 Part 31. The motor shaft shall be of 416 stainless steel. Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel.

The lower bearing shall be of the double row ball type to accept radial and thrust loads, and the upper bearing of the single row ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

THREE PHASE: The pump shall be equipped with (30/50/75/100) ft. of a CSA-qualified submersible plug-n-play quick connect power cable constructed in accordance with type W guidelines and shall include the moisture and temperature sensor leads. The cable entry system shall consist of an expanding rubber plug held in place by a cast stainless steel plate indicating voltage and max amps.

SINGLE PHASE: The pump shall be equipped with (30/50/75/100) ft. of a CSA-qualified submersible plug-n-play quick connect power cable constructed in accordance with Type W guidelines and shall include the moisture and temperature sensor leads. The cable entry system shall consist of an expanding rubber plug held in place by a cast stainless steel plate indicating voltage and max amps.

PUMP TEST: The pump manufacturer shall perform the following inspections and tests:

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made per UL/ CSA criteria.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.

If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E and U of Hydraulic Institute standards.

START-UP: The pump (s) shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed before final acceptance of the pump (s).

DOCUMENTATION: The manufacturer, if requested, will supply a minimum of _____ sets of standard submittal data; Standard submittal data consist of:

- a. Pump catalog data;
- b. Pump performance curve;
- c. Break away fitting data;
- d. Access frame data;
- e. Typical installation drawing;
- f. Control panel data
- g. Panel wiring schematic;
- h. Accessory data;
- i. Installation & Operation Manuals with Parts List

SCOPE: Furnish and install _____ submersible grinder pump (s). Each pump shall be capable of delivering the following performance points, _____ U.S. GPM at _____ TDH;
_____ U.S. GPM at _____ TDH;
_____ U.S. GPM at _____ TDH,
with a shut off head of _____ TDH (minimum). The pump motor speed shall be _____ RPM, _____ HP (maximum), Three Phase, 60 Hertz, _____ Volts. The pump (s) shall be manufactured by a company regularly engaged in the manufacture and assembly of similar units for a minimum of five (5) years. The pump (s) shall be Barnes® model _____.

DESIGN: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 104 degrees F continuous and shall be capable of running dry for extended periods.

PUMP CONSTRUCTION: Unit (s) shall be CSA listed for Class I, Groups C & D, Division 1, hazardous locations. The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. [The pump (s) shall be painted with (amide amine modified polymer satin gloss epoxy with 10 mil minimum thickness)]. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 125 pound 2.50 or 3 inch slotted flanged to accommodate ANSI or ISO piping flange.

The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of ASTM A-48 class 30 cast iron construction and machined for threading to the motor shaft. The impeller shall be capable of being trimmed to meet specific performance characteristics.

The grinder mechanism shall consist of a radial cutter threaded and locked on the motor shaft by a washer in conjunction with a countersunk flat head cap screw, and a shredding ring containing a minimum of fifteen flow passages with cutting edges. The shredding ring shall be reversible to provide twice the cutting edge life. Both the shredding ring and radial cutter shall be constructed of 440C stainless steel hardened to a min. Rockwell C55 and shall be finish ground for a fine cutting edge. Two-stage cutter mechanisms requiring external adjustment for proper clearance are not acceptable.

The unit shall utilize a tandem mechanical shaft seal arrangement and shall operate in an oil atmosphere. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

The three phase motors shall be of the dual-voltage 230/460 design. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability.

The motor shall be constructed with the windings operating in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of

time without damage due to the heat being generated.

Air-filled motors shall not be acceptable. The motor windings shall be spike resistant with of Class F insulation and Class H wire. The motor shall meet the standard NEMA design B for three phase and be inverter duty rated per NEMA MG1 Part 31. The motor shaft shall be of 416 stainless steel. Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel.

The lower bearing shall be of the double row ball type to accept radial and thrust loads, and the upper bearing of the single row ball type for radial loads. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

THREE PHASE: The pump shall be equipped with (30/50/75/100) ft. of a CSA-qualified submersible plug-n-play quick connect power cable constructed in accordance with type W guidelines and shall include the moisture and temperature sensor leads. The cable entry system shall consist of a expanding rubber plug held in place by a cast stainless steel plate indicating voltage and max amps.

PUMP TEST: The pump manufacturer shall perform the following inspections and tests:

1. A check of the motor voltage and frequency shall be made as shown on the name plate.
2. A motor and cable insulation test for moisture content or insulation defects shall be made per UL/ CSA criteria.
3. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.

If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E and U of Hydraulic Institute standards.

START-UP: The pump (s) shall be tested at start-up by a qualified representative of the manufacturer. A start-up report as provided by the manufacturer shall be completed before final acceptance of the pump (s).

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