

**FLYGT PSS RESIDENTIAL GRINDER PUMP PACKAGE STATION  
PSS MP3085 30X96 Specification**

**SECTION**

**GRINDER PUMP STATION FOR LOW PRESSURE SEWER COLLECTION SYSTEM**

**PART 1 GENERAL**

**1.01 SCOPE OF WORK**

- A. Furnish \_\_\_\_\_ new complete factory-built and tested submersible Grinder Pump Station(s), each consisting of a FLYGT MP3085 3 HP 230 volt single phase centrifugal grinder pump, turnkey basin package, level control system, Nema 4X fiberglass control panel, Nema 4X junction box, stainless steel lifting chain, 1 ¼" ball & check valves and schedule 80 discharge pipe.
- B. The contractor shall determine the grinder pump equipment needed at each service connection to assure proper operation of the grinder pump units at total dynamic head (TDH) conditions determined by the hydraulic analysis without extended runtimes exceeding the normal operating range of the pumps. The hydraulic analysis shall be based on the rational method of operation of the pumping units discharging into the same force main. Grinder pumps shall be centrifugal type pumps. Grinder pumps shall be specifically designed and intended for service in pressure sewer systems. All pumps supplied on the project for this service shall be of the same manufacturer.
- C. The Contractor will provide a complete hydraulic design for each pressure sewer collection system with bid proposal. The hydraulic design will confirm the size of the pressure sewer services and force mains engineered. Pipe type, actual pipe I.D., C-factor and centrifugal hydraulic characteristics of each grinder pump shall be noted and documented for clarification.

**1.02 DESCRIPTION OF SYSTEM**

- A. The new pump system shall consist of a 30" diameter fiberglass basin wet well with submersible wastewater grinder pump and alarm panel, and discharge connection and appurtenances.
- B. All the equipment specified herein is intended to be engineered equipment for macerating and pumping all material in normal domestic wastewater.

**1.03 QUALIFICATIONS**

- A. All of the equipment furnished herein shall be the product of a manufacturer experienced in the design and manufacture of grinder pumps designed for use in low pressure sewer collection systems. All parts shall be properly stamped for identification and location as shown in the Operation and Maintenance Manuals furnished.

Nameplates giving the name of the manufacturer, the rated capacity, head speed and all other pertinent data shall be attached to each packaged pump station.

- B. All equipment furnished under this Specification shall be new and unused, shall be the standard product of pump manufacturer having a successful record of manufacturing and servicing the equipment and systems specified herein.
- C. Any pump manufacturer not specified, but wishing to be pre-approved as an acceptable supplier shall submit a complete hydraulic analysis based on the design detailed in the drawings prior to bid date. All manufacturers must have been in the business of manufacturing grinder pumps for a minimum of ten years. Manufacturer must demonstrate to the satisfaction of the Engineer that the proposed pumping equipment will meet system flows and heads required. In addition, pre-submittal must also demonstrate to the satisfaction of the Engineer that the equipment being proposed meets or exceeds all performance and safety requirements, materials of construction and user benefits of the specified equipment. All bids utilizing manufacturers not pre-approved will be considered non-responsive.

#### **1.04 SUBMITTALS**

- A. After receipt of notice to proceed, the manufacturer shall furnish the Engineer a minimum of four (4) sets of shop drawings of all materials required to establish compliance with the specifications. Submittals shall include the following
  1. Auto CAD drawing illustrating details of PSS fiberglass package pump station with discharge elevation, basin diameter and depth with side and top view.
  2. PSS package station components, shut-off and ball check valves, anti-siphon valve {if applicable} discharge rail assembly, stainless steel lifting chain, Nema 4X junction box, 3 float level controls, float bracket, 4" sch. 40 inlet flange, and 30" fiberglass basin cover.
  3. MP3085 3 HP 230 volt single phase grinder pump spec sheet with motor and performance curve.
  4. A-ITT3085-172S simplex Nema 4X fiberglass control panel drawing, wire schematic and spare parts list. Individual electrical control panel components cut sheets.
  5. Certified agreement to the conditions of warranty.
  6. Flygt engineering report illustrating the hydraulic design analysis utilizing the MP3085 grinder pump hydraulic pump curve.
  7. Drawings included with the hydraulic design analysis showing the location and ground elevation at each service connection or building to be served by each grinder pump unit.
  8. Wet well elevation depth below ground surface.
  9. Service lateral length and size between grinders pump station and force main as shown on the drawings.

10. Force main elevations as shown on the drawings and profile sheets with consideration for bends, valves, fittings, etc; pump characteristics; design force main diameter and coefficient of friction for PVC or HDPE pipe.
11. Details of the simplex centrifugal pump serving each residence or business.
12. Flygt Hydraulic Analysis Report, to include each force manifold pumping system, and grinder pump station discharge, which shall include sizing of each grinder pump unit, based upon the criteria of these specifications, manufacturer's recommendations, industry standards, and pertinent regulations and guidelines that certify these have been met.
13. Furnish all submittals within 30 days of receipt of notice to proceed

## **1.05 OPERATING INSTRUCTIONS**

- A. Four (4) copies of an operating and maintenance manual for the grinder pump station shall be furnished to the Owner and one (1) copy to the Engineer prior to completion. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operating and maintenance personnel familiar and unfamiliar with such equipment.
- B. A factory service technician or factory trained service technician, who has complete knowledge of proper operation and maintenance, shall be provided for one (1) day onsite to instruct representatives of the Owner and individual homeowners on proper operation and maintenance. If there are difficulties in the operation of the equipment due to the manufacturer's design or fabrication, additional service shall be provided at no cost to the Owner.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS AND EQUIPMENT**

- A. The pumps and equipment covered by this Section are intended to be of robust designs and proven ability as manufactured by reputable firms having extensive experience in the production of such pumps and equipment. The pumps and equipment furnished shall be designed and constructed in accordance with the best practice and methods.
- B. All parts shall be so designed and proportioned as to have liberal strength and stiffness and to be especially adapted for the work to be done. Ample room and facilities shall be provided for inspection, repairs and adjustment.
- C. Brass or stainless steel nameplates giving the name of the manufacturer, the rated capacity, head, speed, serial number, model number, horsepower, voltage, amperes and all other pertinent data shall be attached to each pump.

## 2.02 SUBMERSIBLE GRINDER PUMP STATION

### A. General

1. The grinder pump station shall be a Flygt model PSS MP3085 30X96, or pre-approved equal.
2. The grinder pump station shall utilize a Flygt model MP3085.172 high-head centrifugal # 61-257-00-1460 or pre-approved equal.

### B. Performance Requirements

1. The pumps shall be capable of delivering 47 GPM against a rated total dynamic head of 80.8 feet (34.97 PSIG). At zero head, the output shall be 62.6 GPM minimum. The pumps shall be suitable for any operation along it's performance curve in PSS application.

### C. Station Configuration

1. Basins shall be supplied in a wet well configuration. The wet well must have storage volumes according to the following table:

Volumetric Range	Capacity in Gallons
OFF level from bottom	21.35
OFF level to ON level	73.20
ON level to ALARM level	18.30
ALARM level to INLET level	33.55
Total Storage Capacity	292.80

### D. Wiring

1. Pump power and float level control wiring shall be field installed by a certified electrician. All electrical cables penetrating or passing through the conduit flange of the pump station must be water-tight and sealed by the electrician prior to start up. Color coded 14/7 insulated wire for power cord, 18/2 insulation wire for {3} float level sensors.
2. The pump power cable shall be connected directly into the Nema 4X junction box and spliced connected to the appropriate color coded wire gage for proper terminal strip placement. If direct burial cable is utilized in lieu of conduit, a waterproof electrical connector certified to NEC will be required at the conduit. Direct burial cable must be factory approved prior to installation to assure proper wire / terminal strip placement.

E. Check Valve

1. Pump discharge pipe shall be equipped with a factory-installed gravity-operated ball check valve. The valve will provide a fully ported passageway when open and shall introduce a friction loss of less than six inches of water at maximum rated flow. Working parts shall be made of heavy duty cast iron. 300 series stainless steel and non-wicking fabric reinforced neoprene flap to ensure corrosion resistance, repeatability and dimensional stability.

F. Redundant Check Valve

1. Each basin package will require a redundant check valve for installation provided by the contractor in the service lateral between the grinder pump station and the low pressure main. Valves shall be 1.25 inch NPT and only require ½ pound of backpressure for complete closure.
2. Redundant check valve will be identified on a separate line item bid sheet and be provided by the contractor.

G. Liquid Level Detection

1. Level detection for controlling pump and alarm operation shall be accomplished by use of a three mechanical float switches. Switches utilized in the system shall be hermetically sealed in a submersible watertight protective housing with a weight attachment.
2. Level detection device shall be Flygt NF20W1500W type design to protect switch from solids, greases, oils, fats and corrosive sewer gases. Float switch will be 2.74 inch diameter x 4.83 inch long high impact, corrosion resistant, polypropylene housing for use in sewage and water up to 140F (60C).
3. The level switch assembly shall be provided with type 18 gauge, 2 conductors, (UL, CSA) SJOW, water-resistant (CPE) cable. Max electrical of 5 amp, 125/250 VAC, 50/60 Hz. 100% tested prior to shipment. Mechanical switch shall be guaranteed by the manufacturer to meet UL approval for submersion.
4. The level control shall be suspended by a float bracket and easily adjustable for proper height requirements in the field.

H. Shut-Off Valve

1. The pump discharge pipe connection shall be equipped with a factory-installed manual gate valve. Gate valve shall be fully ported, constructed of bronze with stainless steel ball, stainless steel stem and hardware, and Teflon seats, with a minimum rated pressure of 150 PSI. An extension valve handle will be supplied for manual operation from top of basin secured with a stainless steel support bracket.

I. Anti-Siphon Valve

1. The pump shall be constructed for a positively primed, flooded suction. As added assurance that the pump cannot lose prime, even under negative head conditions in the discharge piping, provision for a PVC Anti-Siphon valve will be made available after the check valve.

J. Fiberglass PSS M3085 30x96 Basin {Filament Wound Process }

1. Basin – The fiberglass basin shall be made of a white polyester resin saturated glass filament wound process to obtain maximum axial and hoop modulus strength. The placement of E-type continuous glass fiber shall be computer controlled under constant tension during the manufacturing process. The finished resin saturated filament tank wall shall have 65% glass content and be inert and acceptable to the environment. The basin shall be watertight.
2. Inner Surface – The inner surface shall be smooth and resin rich, free of cracks, exposed fibers, porosity and crazing.
3. Exterior Surface – The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. If a pigment is added, color should be relatively equal throughout. Foreign inclusions, dry spots, pinholes or pits, de-laminations, large dimples not meeting thickness requirements, and air bubbles are not acceptable.
4. Inner Layer – The inner layer shall be resin saturated continuous E-type glass fiber.
5. Tank Wall – The tank wall consisting of the inner surface, inner layer, and exterior surface should not have a minimum wall thickness of less than .10 inches (see minimum thickness chart). The tank wall thickness may increase as the depth or diameter changes to meet design and test requirements. The tank must be designed to withstand wall collapse or cracking, based on an assumption of saturated soil, hydrostatic pressure of 120 lbs. per cu. Ft. The tank must be designed to withstand or exceed two (2) times the assumed loading on any depth of basin. Length of tank (depth of bury) to be specified on purchase order with wall thickness approval calculations to be supplied by manufacturer upon request.
6. Tank Bottom – The basin bottom shall be of sufficient thickness (see minimum thickness chart) to withstand applicable hydrostatic uplift pressure with a safety factor of two (2). In saturated conditions, the center deflection of the empty basin bottom shall be less than 3/8" (elastic deflection) and shall not interfere with bottom pump mounting requirements. Any mounting studs, plates, cap screws into tank bottom should be stainless steel and resin covered except for threads. Any inserts should be stainless steel or brass and resin covered except for threads.

7. Tank Collar (Anti-Flotation) – A means to counteract buoyancy forces shall be provided on the tank bottom in the form of a ring, and shall extend a minimum of 3" beyond the O. D. of the basin wall. Thickness shall be uniform, but increased as needed to prevent cracking or failure, assuming two times applied load as tank dimensions increase. Wall and collar should be blended with a radius not to exceed 1 ½" beyond wall O.D. Tank.
8. Tank Manufacturer to provide calculations verifying acceptable wall stress/thickness upon request.
9. Top Flange – The top flange should be parallel to the tank bottom/collar and perpendicular to the tank wall. Corrosion resistant nuts shall be embedded in the top flange for securing the basin cover. The nuts shall be totally encapsulated to prevent turning (minimum turning torque should not be less than 30 foot/lbs.), pullout and corrosion.

## 2.03 PUMPS

### A. Design

1. Each grinder pump shall be a heavy duty pump used as a grinder. Each grinder pump shall contain special cutters to reduce sewage to fine slurry. The stationary cutter shall consist of hardened 316 "L" stainless steel and the rotary cutter shall consist of chrome alloyed cast iron.
2. The cutter materials shall provide maximum corrosion and abrasion resistance. The remaining portion of the grinder pumps, with the exception of seal materials and wet end, shall be similar to the heavy duty pumps used in larger pump stations for daily operation.
3. The MP3085 Grinder pump shall be automatically and firmly connected to the discharge connection, guided by no less than two stainless steel guide bars extending from the top of the station to the discharge connection. There shall be no need for personnel to enter the wet-well. Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable. No portion of the pump shall bear directly on the sump floor.
4. Each pump shall be equipped with a 3HP, 13 amp submersible electric motor connected for operation on 230 volts, 1 phase, 60 hertz, 3 wire service, with 15 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA Approval.
5. The pump discharge pipe shall be supplied with a mating stainless steel 1 ¼ inch discharge connection and be capable of delivering \_\_\_\_ GPM at \_\_\_\_ TDH. An additional point on the same curve shall be \_\_\_\_ GPM at \_\_\_\_ feet total head. Shut off head shall be \_\_\_\_ feet (minimum). Each pump shall be fitted with \_\_\_\_ feet of stainless steel lifting chain. The working load of the lifting system shall be 50% greater than the pump unit weight.

B. Performance

1. In order to ensure proper operation under all conditions, pump must provide, without overheating in continuous operation, the maximum head condition required by the system. Pump must also be capable of operating at zero or negative heads without damage to the pump.

C. Construction

1. Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. All exposed nuts or bolts shall be AISI type 304 stainless steel or brass construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.
2. Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall jeopardize the integrity of the system and shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.
3. Motor cooling system is sufficiently cooled by the surrounding environment or pumped media. Water jackets is not required nor are oil filled motors.

D. Cable Entry System

1. The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary using the same entry seal. Epoxies, silicones, or other secondary sealing systems make it difficult to replace power cable and shall not be considered acceptable.

E. Electric Submersible Motor

1. The pump motor shall be a NEMA B type design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180 C (356 F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.

The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 40 C (104 F) and capable of no less than 15 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches set to open at 125 C (265 F) shall be embedded in the stator end coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection as optional and shall be connected to the PSS control panel. The motor and pump shall be designed and manufactured by the same source.

2. The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40 C (104 F) ambient and with a temperature rise not to exceed 80 C. A performance chart shall be provided upon request showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.
3. The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater. The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

F. Bearings

1. The pump shaft shall rotate on two bearings. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single deep groove ball bearing. The lower bearing shall be a two row angular contact bearing to compensate for axial thrust and radial forces. Sleeve or single row lower bearings are not acceptable.

G. Mechanical Seal (2x), Pump Shaft, Impeller, Volute, Protection

1. Each grinder pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, ceramic ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary carbon seal ring and one positively driven rotating ceramic seal ring. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor depend on direction of rotation for sealing.

The position of both mechanical seals shall depend on the shaft. Mounting of the lower mechanical seal on the impeller hub will not be acceptable. For special applications, other seal face materials shall be available.

2. The following seal types shall not be considered acceptable or equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces. No system requiring a pressure differential to offset pressure and to affect sealing shall be used. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate dry without damage while pumping under load. Seal lubricant shall be FDA Approved, nontoxic.
3. Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be stainless steel - ASTM A479 S43100-T. If a shaft material of lower quality than stainless steel – ASTM A479 S43100-T is used, a shaft sleeve of stainless steel – ASTM A479 S43100-T is used to protect the shaft material. However, shaft sleeves only protect the shaft around the lower mechanical seal. No protection is provided in the oil housing and above. Therefore, the use of stainless steel sleeves will not be considered equal to stainless steel shafts.
4. The impeller {s} shall be of gray iron, Class 35B, dynamically balanced, single shrouded design having a long throughlet without acute turns. The impellers {s} shall be capable of handling fine slurry from the special cutters. Impeller {s} shall be taper collet fitted and retained with an Allen head bolt. All impellers shall be coated with an acrylic dispersion zinc phosphate primer.
5. Pump volute {s} shall be single-piece grey cast iron, Class 35B, non-concentric design with smooth passages large enough to pass any media that may enter the impeller. Minimum inlet and discharge size shall be as specified.
6. Protection for all stators shall have the option to incorporate thermal switches in series to monitor the temperature of each phase winding. At 125 C (260 F) the thermal switches shall open, stop the motor. A leakage sensor shall be available as an option to detect water in the stator chamber. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will send an alarm and, if desired, stop the motor. Use of voltage sensitive solid state sensors and trip temperature above 125 C (260 F) shall not be allowed. The thermal switches and FLS shall be connected to a mini CAS (Control and Status) monitoring unit. The Mini CAS is designed to be mounted in the control panel.

## **2.04 AUTOMATIC CONTROL / ALARM PANEL**

### **A. General**

1. The simplex pump controls shall be housed in a NEMA 4X Fiberglass enclosure with a red alarm light, H-O-A switch, audible alarm with push to silence switch, and pump run light. The enclosure shall be mounted type with exterior mounting tabs and sized to house all the required components and allow adequate space for testing and maintenance as necessary. The enclosure shall have back plate mounting studs, padlocking provisions, door latches and continuous hinge, all of stainless steel. The door gasket shall be a seamless foam-in-place type.

The panel shall have a formed aluminum switch mounting plate. All control switches and indicator pilot lights shall be mounted on the switch mounting plate.

All conduit entrances shall be made in a NEC approved manner. The conduits to the wet well shall have approved seal-off fittings installed and properly sealed to protect the control panel from adverse damage from the wet well.

All components shall be securely mounted to the back plate with plated machine screws through machine thread tapped holes in the back plate. The screws shall be of adequate size for the device being secured.

### **B. Power Distribution**

1. The panel power distribution shall include all components as indicated below and be completely wired with stranded conductors having a minimum of 90 degree insulation rating and an ampacity rating a minimum of 125% of the motor ampere rating. All power wiring shall be neatly routed and totally accessible. All conductor terminations shall be as recommended by the device manufacturer and be secure to provide adequate electrical conductivity.

### **C. Pump Motor / Control Circuit Breakers and Electrical Components**

1. The pump breakers shall be thermal magnetic trip devices and provide for individual motor disconnect and overload / short circuit protection as required by the NEC rating for motor branch circuit protection. The voltage rating shall match that of the panel incoming service. The 120 volt common control circuit shall be protected by a circuit breaker. Breakers shall be Square D type "QOU".
2. The motor starters shall be full voltage non-reversing I.E.C. rated three (3) pole devices with three (3) pole overload relay protection. They shall provide the electrical start / stop control and running overload protection for each pump and have 120 volt operating coils. Contactors and overloads shall be Square D type "LC1D and "LRD".

3. "Hand-Off-Auto" switch shall be provided for each motor and mounted on the formed aluminum switch bracket.
4. All pilot lights shall be mounted on the aluminum switch bracket and be supplied as follows: Pump Run Light – Green
5. Alarm light shall be constructed of shatter-resistant lexan. The light shall be rated NEMA 4X and be supplied with a heavy duty one piece porcelain lamp holder and 25 watt rough service bulb. The light will be mounted on top of the enclosure and shall be as manufactured by Federal Signal – model PPL 358. Under high level conditions, the light shall glow bright and flash, via a solid-state flasher and the electronic piezo horn shall sound. The light & horn shall go out automatically after water level drops below the high level elevation.
6. Terminal strips shall be provided for all wiring termination. The control panel assembly shall be complete factory tested and shall be "UL" 508A listed and labeled. The control panel described in these specifications shall be manufactured by CSI Controls, Ashland, OH specifically for Flygt.
7. The pump level control shall be mechanical float switches. 1<sup>st</sup> float – Pump off, 2<sup>nd</sup> float – Pump On, 3<sup>rd</sup> float – High level alarm.

## **2.05 SPARE PARTS**

- A. A complete set of manufacturer's recommended spare parts shall be provided for each group of pumps operating in the system.
- B. All spare parts shall be properly protected for long periods of storage and packed in containers which are clearly identified with indelible markings as to the contents.

## **2.05 CORROSION PROTECTION**

- A. All materials exposed to wastewater shall have inherent corrosion protection: i.e., coated cast iron, fiberglass, polyethylene, engineered polypropylene copolymer, stainless steel, bronze, PVC or CPVC.

## **2.06 SAFETY**

- A. The grinder pump station shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the grinder pump and panel shall be listed by Underwriters Laboratories.
- B. The grinder pump station shall meet accepted standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low pressure sewer system applications.

## **2.07 PRODUCT HANDLING**

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from time of shipment.

- B. Factory assembled parts and components shall not be dismantled for shipment.
- C. Finished surfaces of all exposed pump openings shall be protected.
- D. After hydrostatic or other tests have been completed, all trapped water shall be removed prior to shipment and proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.
- E. Each box or package shall be properly marked to show its contents.

## **2.08 LIMITED WARRANTY**

- A. The manufacturer shall provide a warranty on materials and workmanship for a period of twenty-four (24) months after notice of Owner's acceptance, but no greater than twenty-seven (27) months after receipt of shipment. The Owner will return any equipment found defective to the manufacturer for inspection and validation of the defect. Defective equipment will be repaired or replaced at manufacturer's discretion and shipped back to Owner at no charge.

## **PART 3 EXECUTION**

### **3.01 FACTORY TESTING**

- A. Each grinder pump shall be submerged and operated for 5 minutes (minimum). Actual appurtenances and controls which will be installed in the field, shall be 100% factory tested. The pump performance test shall cover three (3) different points of operation on its curve, with the maximum pressure not less than that required by the system design.

### **3.02 INSTALLATION**

- A. The grinder pump station and related components shall be installed in accordance with the manufacturer's recommendations.

### **3.03 TRAINING & START UP SERVICES**

- B. Conduct one (1) operation and maintenance seminar on site for the benefit of Owner(s) and operating personnel. Owner to provide building facilities for conducting seminar. The grinder pump station exactly as furnished for the project including all appurtenances and product handling, shall be provided and demonstrated. Seminar time and date will be mutually agreed upon between the owner and manufacturer.
- C. An authorized Flygt service technician will perform start up on the residential grinder pump station. The owner responsible for maintaining the Low Pressure Sewer System will be present during this start up. Start up procedure is to be conducted and scheduled between the engineer, authorized Flygt service technician and owner of maintaining the pressure sewer system.

END OF SECTION