SPECIFICATIONS SERIES WET WELL MOUNTED PUMP STATION WITH TWO NON-CLOG SERIES PUMP SETS

GENERAL

The contractor shall furnish and install one factory-built, automatic pumping station known generally as an above gound suction lift sewage pump station. The station shall be complete with all needed equipment, factory-installed on a welded steel base with fiberglass cover.

The principal items of equipment shall include four vertical, close-coupled, motor driven, vacuum primed, nonclog pumps; valves; internal piping; central control panel with circuit breakers; motor starters and automatic pumping level controls; heater; ventilating blower; priming pumps with a compatible pump prime detection system and appurtenances; and all internal wiring.

2. OPERATING CONDITIONS

Each pump shall be capable of delivering 260 GPM of raw water or wastewater against a total dynamic head of 81 feet. The minimum acceptable pump efficiency at this condition shall be 53 %. Due to the energy conservation requirements, the minimum efficiency will be enforced. The maximum allowable speed shall be 1760 RPM. The minimum rated horsepower of each pump motor shall be 15 HP. The maximum static suction lift shall be 20 feet. Two pumps operating in series shall deliver 260 GPM at 164' TDH.

All openings and passages shall be large enough to permit the passage of a sphere three (3) inch in diameter. The anticipated operating head range is from 123 feet minimum to 168 feet maximum. The pump motors shall not be overloaded beyond their nameplate rating, at the design conditions, nor at any head in their respective operating

3. CONSTRUCTION

The station shall be constructed in one complete factory-built assembly. It shall be sized to rest on the top of the wet well as detailed on the drawings. The supporting floor plate shall be minimum 1" thick steel with reinforcing, as required, to prevent deflection and ensure an absolutely rigid support.

The pump station shall be enclosed by a two piece hinged fiberglass cover. The cover shall have a suitable drip-lip around the edge and shall be provided with a hasp and staple connection to the floor plate to allow the pump chamber to be locked with padlocks.

Each cover shall be attached with a multi segment stainless steel hinge, constructed of 7 gauge Type 304 stainless steel with a 3/8" diameter stainless steel pin and supporting at least 75% of the width of one end. Stainless steel bolts with tamperproof heads and a full width 3/8" thick anodized aluminum backing plate shall anchor the hinge to the fiberglass cover.

Dual high-pressure gas struts shall be provided to counteract the dead weight of the cover assembly and limit the maximum lifting force required for opening to less than 20 pounds. The cover shall be self-latching upon opening, with a manually operated release for closing. Duplex heavy gauge safety chains shall be provided to prevent overextension. All hardware and components of the cover assembly that are exposed to the weather shall be constructed of corrosion resistant materials

A 1/4" thick sliding aluminum manway cover located exterior to the fiberglass pump chamber shall be provided, complete with padlocking provisions. The manway shall be an integral part of the station floor plate and provide access to the wet well.

The pump volutes and discharge piping shall be mounted in relation to the floor plate as detailed on the drawings.

Enclosures utilized to house the valve train and/or controls which are defined under OSHA Article 29CFR, Part 1910 as a Confined Space shall not be acceptable.

A stanchion with lifting arm shall be provided to lift each pump. The lifting arm shall have a hook over the center of the motor to support a hoist for removal of the motors, impellers and pumps from the station. Hoist will be provided by others.

4. WELDING

All steel structural members shall be joined by electric arc welding with welds of adequate section for the joint involved.

PROTECTION AGAINST CORROSION

All structural steel surfaces shall be factory blasted to remove rust, mill scale, weld slag, etc. All weld spatter and surface roughness shall be removed by grinding. Surface preparation shall comply with SSPC-SP6 specifications. Immediately following cleaning, a single 6-mil dry film thickness of **VERSAPOX**® epoxy resin shall be factory applied. This coating shall be as formulated by Smith & Loveless for abrasion and corrosion resistance. The bottom of the steel support plate shall also be coated as specified.

Stainless steel, aluminum and other corrosion resistant surfaces shall not be coated. Carbon steel surfaces not otherwise protected shall be coated with a suitable non-hardening rust preventative compound. Auxiliary components, such as the electrical enclosure, ventilating blower and vacuum pumps, shall be furnished with the original manufacturer's coating.

Finish coating shall be accomplished prior to shipment of the station from the factory and shall comply fully with the intent of these specifications. A touch-up kit shall be provided by the pump station manufacturer for repair of any mars or scratches occurring during shipping and installation. This kit shall contain detailed instructions for use and shall be the same material as the original coating.

6. MAIN PUMPS

The pumps shall be four (4) inch vertical, centrifugal non-clog type of heavy cast-iron construction, especially designed for the use of mechanical seals and vacuum priming. In order to minimize seal wear caused by linear movement of the shaft, the shaft bearing nearest the pump impeller shall be locked in place so that end play is limited to the clearance within the bearing. To minimize seal wear resulting from shaft deflection caused by the radial thrust of the pump, the shaft from the top of the impeller to the lower bearing supporting the impeller shall have a minimum diameter of 1-7/8" for motor frame sizes 213 through 286; 2-1/8" for motor frame sizes 324 and 326; and 3" for frame 364 and larger. The dimension from the lowest bearing to the top of the impeller shall not exceed 6".

The oversized shaft incorporating oversized bearings and heavier bearing frame construction provides for extended mechanical seal, bearing and overall pump/motor life. Since the larger shaft with the specified minimum overhang is the key to heavier, more rigid construction throughout, no deviation from the specified shaft diameter or tolerances will be allowed.

The bearing nearest the impeller shall be designed for the combined thrust and radial load. The upper bearing shall be free to move in a linear direction with the thermal expansion of the shaft and shall carry only radial loads.

The shaft shall be solid stainless steel through the mechanical seal to eliminate corrosion and abrasive rust particles. Removable shaft sleeves will not be acceptable if the shaft under the sleeve does not meet the specified

The pump shall have an adapter providing a large water reservoir above the impeller to provide for positive exclusion of air from the impeller. The seal shall be inside this area to assure lubrication. Pumps which do not use hollow priming adapters for positive lubrication of the seal will not be acceptable.

The pump shall be constructed so as to permit priming from the lower pressure area behind the impeller. Priming from high-pressure connections, which tends to cause solids to enter and clog the priming system, will not be acceptable. The priming bowl shall be transparent, enabling the operator to monitor the priming level.

The pump shall be arranged so that the rotating element can easily be removed from the casing without disconnecting the electrical wiring or disassembling the motor, impeller, backhead or seal, so that any foreign object may be removed from the pump or suction line.

The pump shaft shall be sealed against leakage by a single mechanical seal constructed so as to be automatically drained and primed each time the pump is drained and primed. Water which lubricates the mechanical seal shall be automatically drained from around the seal if the pump loses prime in order to allow both the pump and the seal to be drained, thereby preventing freezing and breakage of the seal during power outages in sub-freezing

The seal shall be of carbon and ceramic materials with the mating surfaces lapped to a flatness tolerance of one light band. The rotating ceramic shall be held in mating position with the stationary carbon by a stainless steel spring. The entire seal assembly shall be held in place by a bronze seal housing to prevent excessive heat build-up.

Use of cast-iron or other ferrous material for the seal housing which will rust and damage the seal, shortening its life, will not be acceptable.

The pump volute shall be furnished with mounting lugs and bolted to the station floor plate, forming a gas-tight

NON-CLOG TWO-PORT IMPELLER PUMP (OPTION)

The pump impeller shall be of the enclosed two-port type made of close-grained cast-iron and shall be balanced. The eye of the impeller as well as the ports shall be large enough to permit the passage of a sphere three (3) inch in diameter in accordance with nationally recognized codes. The impeller shall be keyed with a stainless steel key and secured to the motor shaft by a stainless steel cap screw equipped with a Nylock or other suitable self-locking device. The impeller shall not be screwed or pinned to the motor pump shaft and shall be readily removable without the use of special tools. To prevent the buildup of stringy materials, grit and other foreign particles around the pump shaft, all impellers less than full diameter shall be trimmed inside the impeller shrouds. The shrouds shall remain full diameter so that close minimum clearance from shrouds to volute is maintained. Both the end of the shaft and the bore of the impeller shall be tapered to permit easy removal of the impeller from the shaft.

MOTORS

The pump motors shall be vertical, solid shaft, NEMA P-base, squirrel-cage induction-type, suitable for three (3) phase, 60 hz cycle, 460 volt electric current. They shall have Class F insulation, suitable for temperatures up to 105°C. The insulation temperature shall, however, be maintained below 80°C. The motors shall have normal starting torque and low-starting current, as specified by NEMA Design B characteristics. They shall be open dripproof design with forced air circulation by integral fan. Openings for ventilation shall be uniformly spaced around the motor frame. Leads shall be terminated in a cast connection box and shall be clearly identified.

The motors shall have 1.15 service factor. The service factor shall be reserved for the owner's protection. The motors shall not be overloaded beyond their nameplate rating, at the design conditions, nor at any head in the operating range as specified under Operating Conditions.

The motor-pump shaft shall be centered, in relation to the motor base, within .005". The shaft runout shall not

The motor shaft shall equal or exceed the diameter specified under "main pump", at all points from immediately below the top bearing to the top of the impeller hub.

A bearing cap shall be provided to hold the bottom motor bearing in a fixed position. Bearing housings shall be provided with fittings for lubrication as well as purging old lubricant.

The motor shall be fitted with heavy lifting eyes or lugs, each capable of supporting the entire weight of the pump

SUPER DUTY MOTORS

The pump motors shall be Premium Efficiency type, per NEMA MG-1 table 12-12, Inverter Ready per NEMA Part 31.4.4.2, with cast-iron frames, and be UL Recognized and CSA Approved. The motor windings shall be 200 C Inverter Spike-Resistant magnet wire and the rotors shall have an epoxy coating for corrosion protection.

10. CONTROLS

The control equipment shall be mounted in a NEMA Type 1 steel enclosure. The circuit breakers, starter reset buttons and control switches shall be operable without removing the access cover.

A grounding-type convenience outlet shall be provided on the side of the cabinet for operation of 115-Volt AC

Thermal magnetic air circuit breakers shall be provided for branch disconnect service and short circuit protection of all motor control and auxiliary circuits.

Magnetic across-the-line starters with under-voltage release and overload coils for each phase shall be provided for each pump motor to give positive protection. Each single-phase auxiliary motor shall be equipped with an overcurrent protection device in addition to the branch circuit breaker, or shall be impedance protected. All switches shall be labeled and a coded wiring diagram shall be provided.

A time delay relay shall be provided to cause the second stage pump of each set to start and come up to speed before the first set is started. This is to prevent starting a pump with pressure on the seal.

11. LEVEL CONTROL SYSTEM

A. FLOAT SWITCH LEVEL CONTROLS

To control the operation of the pumps with variations of liquid level in the wet well, a minimum of three (3) displacement switches shall be provided. A 30' cord shall be provided with each switch. The cord shall have a corrosion-resistant vinyl jacket and be multi-stranded in order to prevent fatigue.

An automatic alternator with manual switch shall be provided to change the sequence of operation of the pumps every eight hours. Alternating the pumps at less than eight-hour intervals will not be

Provisions shall also be made for the pumps to operate in parallel should the level in the wet well continue to rise above the starting level for the low level pump.

B. PUMPLOGIX™ MICROPROCESSOR LEVEL CONTROL SYSTEM (ALTERNATE)

The liquid level in the wet well shall be monitored by a submersible hydrostatic pressure transducer with stainless steel sensor diaphragm, providing a 4-20 mA signal to the pump control unit. The body of the transducer shall be made of 316 stainless steel. The pressure transducer shall have a permanent hermetically sealed connection to a polyethylene insulated cable, which shall support the transducer 6" from the bottom of the wet well, and shall pass through a cord grip seal in the station base. The pressure transducer unit shall be rated for wastewater or potable water service, and for operation in explosion hazardous areas.

Three (3) displacement switches shall be provided to automatically operate the pump in back-up mode, in case of failure of the digital control system or the submersible level transducer. The back-up system shall be entirely independent of the digital system. A 30' color-coded cord shall be provided with each switch. The cord shall have a corrosion-resistant vinyl jacket and be multi-stranded in order to prevent fatigue. The displacement switch cords and the cable for the submersible pressure transducer shall enter the wet well through cord grip seals.

To control the operation of the pumps with variations of liquid level in the wet well, and the high and low water alarm functions, a specially preprogrammed, dedicated microprocessor-based control system shall be provided. The controller shall interface with the wet well level transducer, integral panel display unit, motor starters, and alarm functions as required.

The digital controls shall operate on 24 volts or less, to eliminate shock hazard. The 24-volt power supply shall be overload protected to be "crowbar safe" and will return to operation when a short is removed.

To reduce exposure to corrosive environments and ensure the control system's reliable, long-term operation, the controller shall have a sealed, user-friendly, graphical interface. The interface shall be comprised of a rotary knob, switches and five (5) columns of ultra-bright, daylight-viewable red LED's. Four (4) 40-segment, 4" columns of LED's shall show the wet well level, the pump on and off control bands, and the high and low alarm setpoint bands. All LED's within a control band shall be illuminated when operating under normal power. A fifth LED column shall indicate the controller's configuration, status and active alarms. Alarms shall consist of high alarm, low alarm and input signal out of range. Monitor functions shall include control power and normal system operation. Discrete LED's shall show the activation of the differential pump control stages.

The controller shall provide easy, convenient indication and adjustment of the operating setpoints and controller configuration without the need for tools. For ease of operation and configuration, multiple indicating columns are required. Controllers that provide fewer columns; thus, limiting the viewing of relevant and necessary station information, are specifically precluded by this specification.

The pump control circuits shall be forced OFF by power loss. Upon power restoration, the controller shall enable the pumps in an adjustable time-step sequence as required to meet the demand.

The controller shall continuously indicate the status of the selected alternation sequence and control modes. The controller shall provide 1st On/1st Off, Fixed, and Auto Rotate alternation sequences.

Integral span, offset, and damping adjustments shall be easily adjustable. The controller shall have a configurable security lockout feature.

The controller shall contain a level simulation function that allows manual manipulation of the displayed process variable. While simulating, the controller shall display both the actual wet well level and the simulated level.

The controller shall contain an RS-232 communication port and have capabilities for connection to a SCADA (Supervisory Control and Data Acquisition) system using Modbus® protocol. The complete assembly shall be designed for use in UL508 Industrial Control Panels.

It is the specific intention of this functional requirement that a controller shall be provided with features as described herein. Additionally, this controller shall be a fully integrated assembly. That is, the furnishing of similar functions using multiple setpoint modules, a custom-configured programmable logic controller (PLC) or extensive relay/timer logic to accomplish control sequences, etc., is specifically precluded by this specification and is not acceptable.

12. HIGH WET WELL LEVEL ALARM (NOTE: SPECIFIED HIGH WET WELL LEVEL ALARM FLOAT INCLUDED IN ALTERNATE CONTROL SPECFICATIONS)

An adjustable mercury displacement switch shall be provided to sense a high water level condition. The switch shall hang into the wet well and shall activate a contact to indicate the high water condition.

13. PUMP FAILURE ALARM

To sense failure to deliver normal flow, each pump set shall be provided with a sealed sensor switch and red LED "On" indicating light, mounted in a protective ABS enclosure. The enclosure shall be mounted with an adjustable universal mounting bracket to the external arm of each discharge check valve. The mounting bracket shall allow the adjustment of the sensor switch with a single locking pivot adjustment. The LED indicating light shall facilitate accurate setting of the switch, as well as indicate operation. The sensor switch shall monitor the movement of the check valve arm and thereby detect failure of the pump to delivery normal operating flow when called on to run. An auxiliary time delay relay shall be provided to prevent an alarm signal during pump startup period. Systems which do not shut down the companion pump will not be acceptable.

14. VACUUM-PRIMING SYSTEM

A vacuum priming system shall be furnished to prime the main pumps. The system shall be as shown on the vacuum priming schematic and shall include two (2) vacuum pumps, providing 100 percent standby. Vacuum pumps shall have corrosion-resistant internal components. The vacuum priming system shall be complete with large port vacuum control solenoid valves, vapor filters to protect the solenoid valves, SONIC START** prime level sensor, float-operated check valves to protect the vacuum pumps, and all necessary shut-off valves as shown on the piping schematic. The float-operated check valves shall have a transparent body for visual inspection. All hoses and tubing used in the priming system shall be at least 3/8" nominal diameter.

The solenoid valves used in the vacuum priming system shall be of the high flow, direct acting brass body type, with threaded ports, NBR seals and 300 Series stainless steel plunger, rod, plate and springs. The minimum orifice diameter shall be 5/16". The solenoid valves shall be UL Listed, with Class F coil rating and of suitable voltage and thermal capacity for the application.

Each solenoid valve shall be protected by a vapor filter, installed in the vacuum line between the valve and the priming dome. The vapor filter shall be constructed of corrosion resistant materials and shall have a minimum filtration area of 2.74 square inches and be suitable for operation from 25" Hg to 100 PSI. They shall be readily replaceable without the use of special tools.

Liquid level in the pump priming chamber shall be monitored by a **SONIC START**® resonant frequency liquid level probe. The probe shall be equipped with a piezoelectric drive and sensitive circuits to detect frequency shifts when the probe is covered by liquid. The probe shall be completely sealed and have a 316L stainless steel housing for corrosion resistance. It shall be provided with a wiring connector molded of PolyPhenylSulfone, an amorphous high performance thermoplastic for impact and chemical resistance. The probe shall have a plug-in connector to facilitate easy removal.

The **SONIC START** probe shall be provided with light emitting diodes. This diagnostic tool shall indicate connectivity, prime status or a fault condition. Systems utilizing an electrode, mechanical means such as a float, or that require any type of electrical or moving parts inside the priming chamber, which may accumulate debris, short out, bind or fail will not be acceptable.

The priming system shall automatically provide positive lubrication of the mechanical seal each time a main pump is primed. To prevent excessive stoppage due to grease accumulation, no passageway in the priming system through which the pumped liquid must pass shall be smaller than the equivalent of a 2-1/2" opening.

The vacuum priming system shall have two field selectable modes of operation. In the "On-Demand" mode, the priming system will operate only after a pump is called on to run, and if it is not primed. Once primed, the pump will be allowed to run. In the "Constant Prime" mode, both pumps are kept primed continuously, and ready to start immediately when called for.

15. ENVIRONMENTAL EQUIPMENT

A ventilating blower shall be provided, capable of delivering 650 cfm at 0.1" static water pressure, in order to remove the heat generated by continuous motor operation. The ventilating blower shall be turned on and off automatically by a preset thermostat. A louvered opening shall cover the discharge. A 500-Watt electric heater controlled by a preset thermostat shall be furnished. The heater shall be rigidly mounted in the station to prevent

16. MAIN PIPING

The first stage pump suctions shall be drilled and tapped for a 125-pound American Standard flange for ready connection of the suction riser. The discharge line from each first stage pump shall be fitted with a flanged outlet connected to the suction flange of the corresponding second stage pump. The discharge line from each second stage pump shall be connected to a clapper-type check valve and eccentric plug valve. Size, location and quantity of check valves and plug valves shall be as shown on the drawings. The check valve shall be of the spring-loaded type with external lever arm and an easily replaced resilient seat for added assurance against vacuum leaks. Check valves shall have stainless steel shaft with replaceable bronze shaft bushings and shall be sealed with an adjustable Teflon seal. An operating wrench shall be provided for the plug valves.

Protrusions through the floor plate shall be gas-tight where necessary to effect sealing between the equipment chamber and the wet well. The pump station manufacturer shall extend the suction and discharge connections below the floor plate at the factory, so that field connections can be made without disturbing the gas-tight seals.

The manufacturer of the pump station shall provide a compression-type sleeve coupling for installation in the common discharge pipe. Provisions shall also be made for tying the coupling to the station floor plate.

The attached pump specification and checklist must be met in total. There are many reasons for incorporating a good pump specification. For example, the stainless steel shaft with tapered impeller attachment is provided to minimize corrosion, extend seal life and provide ease of impeller removal and seal replacement without the use of

All items specified are for long life, durability and maintainability of the pumping equipment. Deviations from the pump specifications will not be allowed.

A checklist is also provided to insure that the proper pumping system is provided to the owner.

17. FACTORY TESTS

All components of the pump station shall be given an operational test at the pump station manufacturers facility to check for excessive vibration, for leaks in the piping or seals and correct operation of the automatic control and vacuum priming systems and all auxiliary equipment. Installed pumps shall take suction from a deep wet well, simulating actual service conditions. The control panel shall undergo both a dry logic test and a full operational test with all systems operating.

Factory test instrumentation must include flow measuring with indicator; compound suction gauge; bourdon tubetype discharge pressure gauge; electrical meters to measure amperes, volts, kilowatts and power factor; speed indicator and a vibrometer capable of measuring both amplitude and frequency.

18. SPARE PARTS

A complete replacement pump shaft seal assembly shall be furnished with each pump station. The spare seal shall be packed in a suitable container and shall include complete installation instructions. A spare volute gasket and seal gasket shall be provided.

An instructional video presentation on the pump mechanical seal system in DVD format shall be included. The DVD shall contain a presentation on the following subjects: purpose and location of the mechanical seal, signs of a defective mechanical seal, how to remove the mechanical seal, troubleshooting seal failure causes, seal components, required tools, how to reinstall the seal, and how to place the pump back into service. The video shall include footage of an actual seal replacement.

19. INSTALLATION AND OPERATING INSTRUCTIONS

Installation of the pump chamber shall be done in accordance with the written instructions provided by the

Operation and maintenance manuals which will include parts lists of components and complete service procedures and troubleshooting guide, shall be furnished in quadruplicate (4 copies).

20. START-UP

The manufacturer or manufacturers' representative shall provide the services of a factory-trained start-up technician for a maximum period of one day on-site to perform initial start-up of the pump station and to instruct the owner's operating personnel in the operation and maintenance of the equipment.

The manufacturer of the station shall warrant for one (1) year from date of start-up, not to exceed (18) eighteen months from date of shipment, that the structure and all equipment provided will be free from defects in material and workmanship. Warranties and guarantees of the suppliers of various components in lieu of a single source responsibility by the manufacturer will not be accepted. The manufacturer shall assume prime responsibility for the warranty of the station and all components.

In the event a component fails to perform as specified or is proven defective in service during the warranty period, the manufacturer shall repair or replace, at his discretion, such defective part. The manufacturer shall further provide, without cost, such labor as may be required to replace, repair or modify major components such as the steel structure, main pumps, main pump motors and main piping manifold. After start-up service has been performed, the labor to replace accessory items, such as the blower, priming pumps, alternator, etc., shall be the responsibility of others.

The repair or replacement of those items normally consumed in service, such as seals, grease, light bulbs, etc., shall be considered as part of routine maintenance and upkeep.

It is not intended that the manufacturer assume responsibility for contingent liabilities or consequential damages of any nature resulting from defects in design, material, workmanship or delays in delivery, replacement or otherwise.

22. BID SUBMITTAL

This submittal shall include all necessary information for the proper determination of the acceptability of the proposed substitution and shall not necessarily be limited to the following.

- Complete description of the equipment, system, process, or function, including a list of system components and features, drawings, catalog information and cuts, manufacturer's specifications, including materials description.
- Performance data and curves, and horsepower requirements.
- Outside utility requirements, such as water, power, air, etc.
- Functional description of any internal instrumentation and control supplied including list of parameters monitored, controlled or alarmed.
- Addresses and phone numbers of nearest service centers and a listing of the manufacturers or manufacturer's representatives services available at these locations, including addresses and phone numbers of the nearest parts warehouses capable of providing full parts replacement and/or repair
- A list of five (5) installations in the states where similar equipment by the manufacturer is currently in similar service; include contact name, telephone number, telephone number, mailing address of the municipality or installation, engineer, owner and installation contractor; if five installations do not exist, the list shall include all that do exist, if any.
- Detailed information on site, architectural, structural, mechanical, plumbing, electrical, and control and all other changes or modifications to the design and construction work necessary to adapt the equipment or systems to the arrangement shown and/or functions described on the drawings and in the technical specifications. This shall include plan view and section sketches illustrating any additional space requirements necessary to provide the minimum adequate clear space within and around the equipment for operation and maintenance, as shown on the Drawings and specified.
- All differences between the specifications and the proposed substitute equipment shall be clearly stated in writing under a heading of "differences".
- Other specific submittal requirements listed in the detailed equipment and material specifications.

A completed and signed copy of the "Pump Station Certification Affidavit" which follows.

DATE: 01-10-08 DRAWN: CHECKED: REVISIONS DATE 1 03-04-08 2 | 03-31-08 3 | 04-14-08 4 | 04-25-08 SCALES HORIZ: AS SHOWN VERT: AS SHOWN COMM. NO. 030066

> SHEET NO. 11 OF 19

 \circ

ERS C

S

৵ ৣ

INEERS SUF ENTERPRIS

ے لیا

BERKI

TH ES

SOUT STIE

 $\mathbf{\sim}$

, С. Ц.

AK SS GE

STL INES ERAC

WES USII EWEI

S B

PUMP IFICA

SEWAGE SPEC

AX AX