



**Bell & Gossett**  
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## SPECIFICATIONS

SBG4XWSZ R1

# 4XWS 50 Hz EXPLOSION PROOF SUBMERSIBLE SEWAGE PUMP

CLASS 1, DIVISION 1, GROUPS C AND D HAZARDOUS LOCATIONS

### GENERAL

- Furnish and install \_\_\_\_\_ Bell & Gossett, Series 4XWS, Class 1, Groups C & D Explosion Proof pumps for use in hazardous locations.
- Pump(s) will be Bell & Gossett, Order Number 4XWS \_\_\_\_\_.
- Pump(s) will be rated \_\_\_\_\_ HP, 1.15 Service Factor, 1750 RPM, for \_\_\_\_\_ GPM, at \_\_\_\_\_ feet of Total Dynamic Head.
- Pump(s) and controls will be designed to operate on a \_\_\_\_\_ Phase, \_\_\_\_\_ Volts, \_\_\_\_\_ Hertz power supply.

### QUALIFICATIONS

All pump manufacturer's shall be pre-qualified by the engineer in order to qualify as acceptable manufacturers. Pre-qualification shall be no later than two (2) weeks prior to the published bid date for this project. Failure to do so will be grounds for disqualification after the bid opening date. All decisions of qualification shall reside with the engineer of record at time of bidding.

### PUMP DESIGN

Pump(s) shall have four (4) inch, ANSI 125# discharge flange(s) and be capable of handling sewage containing non-abrasive 3" maximum solids.

### IMPELLER

The impeller shall be semi-open, non-clog with ejector (pump out) vanes on the top of the impeller for protection of the lower mechanical seal and hydraulic balance. The standard impeller is ASTM A48, Class 30, gray cast iron. An optional impeller of cast silicon bronze, ASTM B584 C87600 is available. Due to design, only single plane computerized spin balancing is required for smooth operation. The impeller shall be slip fitted to the shaft and key driven. The impeller shall be held in place by a corrosion resistant stainless steel bolt and impeller washer that shall secure the impeller against all axial loads imposed by the hydraulic conditions of operation.

### CASING

The casing shall be cast from ASTM A48, Class 30, gray cast iron of sufficient thickness to withstand a minimum of 1.5 times the shut off head pressure generated by the largest impeller available for this model in accordance with the current revision of Hydraulic Institute Standards. The discharge connection shall be a standard four (4) inch, ANSI 125 # flange designed for horizontal discharge. The casing shall be designed for connection to an optional wet pit slide rail assembly supplied by the pump manufacturer.

### WET PIT INSTALLATION SYSTEM

Each pump shall be connected to a dual rail (pipe) style slide rail system consisting of an ASTM A48, Class 30, gray cast iron base unit and a brass pump coupling to create a non-sparking disconnect for use in hazardous locations. The coupling shall bolt to the ANSI pump discharge flange and shall guide the pump assembly down the dual rails to the discharge base located at the bottom of the wet pit. There shall be no weight or other forces on the guide rail system which could cause binding of the coupling to the rail system. Sealing of the mating parts of the slide rail system shall be accomplished by metal to metal contact only. Use of O-rings or sealing devices shall not be allowed. The system design shall allow installation and removal of the pump(s) without the need for any personnel to enter the pit. The guide rails shall be standard schedule 40 galvanized or stainless steel pipe which shall be provided by the installation contractor.

### CORROSION PROTECTION

The pump shaft is 416 stainless steel. The casing is electro-coat painted with thermo-setting Acrylic Enamel and baked 30 minutes at 400°F after machining. All exposed motor parts are coated with an alkyd primer and epoxy ester finish coat of high grade paint to resist rust and corrosion. Fasteners are 316 stainless steel.

### CLASS 1, GROUPS C & D EXPLOSION PROOF MOTOR

Motors shall conform to the latest applicable requirements of NEMA, IEEE, ANSI and NEC standards. Motor shall be an air filled, squirrel cage, induction type, NEMA design B with copper windings. Two (2) normally closed automatic reset thermostats shall be connected in series and embedded in adjoining phases as required by U.L. Oil filled motors shall not be acceptable. Motors are designed for continuous submerged duty in water and sewage and designed for a minimum 15 minute duty continuous in air under full load operating conditions. The motor shall have Class F 155°C (310°F) insulation, a 1.15 Service Factor, and be listed as a Class 1, Groups C & D motor. This rating is for use in explosion proof, hazardous locations. All motors are manufactured in the United States of America with ratings based on a 40°C (104°F) ambient operating condition. Motors are CSA (Canadian Standards Association) and U.L. (Underwriters Laboratories) approved and nameplated accordingly.

50 Hertz Motors- Three phase motors shall be rated 380 volts.

All motors shall successfully operate under power supply variations per NEMA MG1-14.30. Multi-voltage motors are designed for easy field reconnection.

Motor bearings shall be ball, single row, deep groove, Conrad type, and shall have a Class 3 internal fit conforming to AFBMA Standard 20. Bearings shall be selected to provide a minimum L10 rating life of 17,500 hours. Specially adapted for vertical assembly both upper and lower bearings shall be prepacked and sealed for life with special high temperature grease rated for 150°C (302°F). The motor design limits the maximum bearing temperature rise to 60°C (140°F) under full load conditions.

Single Phase Motors - will be provided with a capacitor box containing a wiring diagram, capacitors, and all necessary connection leads with female flag terminals for fast, easy wiring in the field.

Each completed and assembled motor shall receive a routine factory test per NEMA and IEEE standards.

#### **POWER CABLE, CONTROL CABLE AND CAP**

The power cable and cap assembly shall be designed to prevent moisture from wicking through the cable assembly even when the cable jacket has been punctured. The power and control cable entry into the lead connection chamber shall be epoxy encapsulated for positive moisture sealing. Compression type fittings or connectors shall not be considered equal. A Buna-N power and control cable grommet shall be provided in addition to the epoxy sealed leads. Standard power leads are type SOW and SOOW, NEC rated for severe service. Control leads are 18/5, type SOW, NEC rated for severe service. Standard leads are 25 feet long, optional 50' long cables are available.

#### **MECHANICAL SHAFT SEALS**

Two independently mounted mechanical face type seals will be provided. The upper (inner) and lower (outer) seals shall be separated by an oil filled chamber. Double seal (back to back) configurations are not acceptable due to the potential for failure of both seals as a result of lodged solids. Similarly, bellows type and jacketed seal construction is also prohibited. The oil chamber shall act as a barrier to trap moisture and provide sufficient time for a planned shutdown in the event the moisture detection system signals moisture in the chamber. The oil shall also provide lubrication to the internal seal. Lower (outer) seals shall be designed for easy field replacement. The lower (outer) seal assembly will be designed to allow solids and particles to be thrown away from the seal face. In compliance with UL Standards for explosion proof motors a flame path shall be provided by a labyrinth slinger in the bottom flange to prevent the ignition of ambient gases. Under such conditions the seal design shall allow for pressure relief across either seal face. The standard upper (inner) seal has a carbon rotating face and a ceramic stationary face with Buna elastomers and 304 stainless steel metal parts. The standard lower (outer) seal has a carbon rotating face and a ceramic stationary face with Buna elastomers and 304 stainless steel metal parts.

Two optional lower (outer) seals are available for heavy duty applications with either:

Silicon carbide/silicon carbide faces, Viton elastomers and 304 stainless steel metal parts, or Silicon carbide rotary/tungsten carbide stationary faces, Viton elastomers and 304 SS metal parts.

#### **MOISTURE PROTECTION SYSTEM**

The motor contains standard dual moisture sensing probes that extend into the oil chamber located between the lower (outer) and upper (inner) seals. They detect the presence of moisture should the lower (outer) seal fail. The probes will also detect water in the motor chamber and provide a warning prior to water reaching the bearing or wound stator assemblies. The sensor leads must be connected to a moisture relay and alarm device located in a pump control panel.

#### **CONTROL PANEL - MANDATORY FEATURES**

To maintain warranty coverage and agency Listings the Control Panel must have:

Both three phase and single phase pumps shall require a control panel equipped with Class 10, quick-trip overload protection to protect the motor(s) from overload conditions.

In addition the single phase pump(s) are supplied with a capacitor box. It shall be wired to a separate control box using the wiring terminal strip in the box or the capacitors may be built into a stand alone control panel.

A Moisture Detection System in the panel connected via control leads W1 and W2 to a relay and alarm in the panel. The Moisture Detection System will warn of a seal failure or water in the motor chamber.

The motor's built-in Thermal Protection System consisting of two (2) normally closed on-winding thermostats must be connected to the pilot circuit of the motor starter to open the circuit before dangerous temperatures are reached. Control cable leads marked P1 and P2 are used for this connection.

Intrinsically Safe Relays must be used in a Class 1 environment to power the float switches. They eliminate the danger of a spark if a switch cord becomes damaged. Intrinsically Safe Relays are available as an option from most panel suppliers. Other level control systems are available and may be applicable for this service, consult with your control manufacturer.

Bell & Gossett can supply complete custom control panels with the capacitors, moisture sensing relays (a.k.a., seal fails), thermal connections, intrinsically safe relays and alarms already built-in for fast, easy installation.

#### **CONTROL PANEL - RECOMMENDED FEATURE**

Control Panels should have an option added for a Guaranteed Pump Submergence Float for Class 1 hazardous conditions. Many engineers specify a redundant OFF float or a Guaranteed Pump Submergence Circuit for Class 1 wet wells. This option provides a second OFF float as protection from "OFF" float failure or hang up which protects the pump(s) from running dry.

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