

SECTION 16622 EMERGENCY LIFT STATION BACKUP

PART 1 - GENERAL

1.01 Scope

- A. Backup Lift Station Pump Station (as shown in details)

1.02 System Description

- A. Provide a standby backup system for Lift Station Operation in the event of a power failure.
- B. Provide fully automatic operation so that unit takes full load within 10 seconds after power failure.

1.03 Submittals

- A. Shop drawings: Complete rating and dimensional data including RPM, numbers of cylinders, fuel consumption rates, piston displacement and piston speed.
- B. Submit installation instructions.

1.04 Record Drawings

Provide record drawings plus operation and maintenance instructions, spare parts listing, service facilities and record of start-up tests.

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2.01 Backup Fuel Driven Lift Station Pump

A contractor shall furnish and install a backup fuel driven self-priming centrifugal pump at the lift station.

2.02.1 General

- A. The backup engine (either natural gas or diesel) driven pump shall be a complete preassembled unit to include a solids handling pump, diesel engine, priming system, base with integral fuel tank, sound attenuated canopy, automatic start and stop system and junction box with terminals to facilitate connection to the Bay County Lift Station SCADA system.
- B. The unit shall be manufactured by a Manufacturing Company with at least a 5 year proven track record.

2.02.2 Centrifugal Pump

- A. The centrifugal pump shall be a horizontal end suction solids handling centrifugal type.
- B. The pump casing shall be constructed of class 30 cast iron with back pullout design.
- C. The impeller shall be open vane and constructed of class 30 cast iron.
- D. The wearplates shall be fully adjustable and replaceable, fabricated of cast iron. Wearplate clearances shall have no relationship to the ability of the pump to achieve a prime.
- E. Seals shall be high pressure, mechanical, self-adjusting type with silicon carbide faces capable of withstanding suction pressures up to 73 psi. The mechanical seal shall be cooled and lubricated in the liquid bath reservoir, requiring no maintenance or adjustment. Pump shall be capable of running dry, with no damage, for periods up to 24 hours. All metal parts shall be of stainless steel. Elastomers shall be Viton.
- F. The pump shall be capable of running dry indefinitely.
- G. Shaft shall be constructed of stress proof steel, machined and polished to transmit full drive output.
- H. Shaft sleeve shall be AISI 416 stainless steel. Sleeve designed to be renewable with o-ring and positively locked to prevent rotation on the shaft
- I. Bearing frame shall be constructed of class 30 cast iron.
- J. Bearings shall be of sufficient size to withstand the radial and axial thrust loads incurred during service. Bearings shall have a minimum B-10 bearing life of 20,000 hours. Bearing shall be grease lubricated.
- K. Centrifugal pump shall be capable of handling up to 3" diameter non-compressible spherical solids.
- L. The pump shall be furnished with a liquid filled vacuum gauge for system diagnostics.

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2.02.3 Engine

- A. The engine shall be a water cooled natural gas or diesel engine, tier III EPA Certified, sized appropriately for the conditions specified. John Deere motor is preferred or approved equivalent.
- B. The engine shall drive the pump via an elastomeric torsion drive coupling.
- C. The engine shall contain an industrial type battery with 120-volt battery charger.
- D. A 12-volt starter and alternator charging system shall be provided.
- E. An industrial type muffler shall be provided.
- F. Engine shall have an electronic type governor. Engine speed shall be adjustable to operate the pump between maximum and minimum design operation speeds.
- G. Engine shall have manual variable speed throttle control.
- H. Engine shall have safety shutdown switches for low oil pressure and high coolant temperature.
- I. Instrument panel shall contain the following instrumentation and controls:
 - 1. Throttle control
 - 2. Key switch
 - 3. Tachometer
 - 4. Hour meter
 - 5. Voltmeter
 - 6. Oil pressure gauge
 - 7. Temperature gauge

2.02.4 Frame/Fuel Tank (Diesel Powered Only)

- A. The pump set shall be mounted on a combination frame/fuel tank constructed of steel. Fuel capacity shall be a minimum of 100 gallons, providing a minimum run time of 24 hours at rated speed.
- B. The frame shall incorporate an integral lifting bail capable of lifting the entire pump set.
- C. Fuel tank shall have two clean-out ports located at opposite ends of the tank.
- D. Fuel tank shall have a removable basket strainer mounted in the fill port and a lockable cap.

2.02.5 Priming System

- A. The priming system shall be fully automatic eliminating the need to pre-fill the pump casing with water to achieve initial prime. The priming system shall be capable of generating 28 feet of vacuum at sea level. It shall also be capable of operation using extended suction lines.

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- B. The priming system shall contain a device to prevent any bypass of the pumping fluid through the ejector and onto the ground. Units not meeting this requirement shall not be considered.
- C. The compressor shall driven off the auxiliary drive mounting flange of the engine. No belts or pulleys shall be used to drive the compressor.
- D. The compressor shall be cooled by the engine's coolant system and lubricated by the engine's pressurized oil system.
- E. The compressor shall contain a pressure relief valve for overpressure protection.
- F. The venture shall be constructed of bronze and be of modular design allowing for replacement of individual wear components.
- G. A flapper type discharge check valve shall be provided to prevent pulling air through the discharge during priming.
- H. The priming system shall incorporate a manual valve to permit the pump to operate under positive suction head conditions.
- I. The priming system shall be capable of automatically priming the pump with a 28 foot static suction lift with no water in the pump or suction piping.

2.02.6 Enclosure

- A. The entire unit including the pump and engine shall be completely enclosed in a lockable enclosure. Units not meeting this requirement shall not be considered.
- B. The enclosure shall reduce operating noise to a maximum of 70 dBa measured at 30 feet at full speed. Units not meeting this requirement shall not be considered.
- C. The enclosure shall be constructed of corrosion resistant 14 gauge sheet metal. Fiberglass or plastic enclosures shall not be considered.
- D. The enclosure shall be insulated with acoustic sound deadening material containing a facing material that is flame retardant, tear resistant and repels oil and water. Open cell foams that absorb water and are easily damaged shall not be considered.
- E. The acoustic sound deadening material shall be positively secured to the enclosure using mounting pins and retainers. Adhesive style mounting shall not be considered.
- F. The enclosure shall contain lockable hinged doors. A sufficient number of doors shall be provided to allow unrestricted access to all compartments for servicing without having to disassemble and remove panels. Enclosure that must be disassembled in order to facilitate routine maintenance shall not be considered.
- G. .
- H. The enclosure shall be constructed of modular panels, which can be readily disassembled and removed when major repairs are needed such as replacing the engine or pump.

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- I. An oil drain valve and hose shall be provided to facilitate draining the engine oil without having to take apart the enclosure.

2.02.7 Control System Panel

- A. An automatic engine controller shall be provided to start and stop the diesel or natural gas engine in response to varying liquid levels via float switches.
- B. The automatic start-stop engine controller shall be part of the main instrument panel and shall be mounted inside the lockable enclosure. Units requiring multiple control panels shall not be considered.
- C. The system shall contain a safety back-up feature allowing the unit to be operated manually and retain safety shutdown protection in the event of automatic engine controller failure.
- D. The automatic engine controller shall be fully field programmable and contain pass code protection.
- E. The automatic engine controller shall contain automatic and manual start modes.
- F. The automatic start-stop system shall contain two mechanically activated hermetically sealed liquid level control floats; one to turn the pump on and one to turn pump off. Single float designs that are prone to frequent cycling leading to excessive component wear shall not be considered.
- G. The floats shall be clearly marked, top or bottom, for easy installation into wet well. Floats shall be provided with a minimum of 40 feet of cable.

2.02.8 Junction Box

The backup natural gas or diesel driven pump shall be equipped with an integral junction box for single point connection to the lift station pump control panel. The junction box shall contain terminals for the following: standby pump start and stop float switches, standby pump "running" and "fault" SCADA system contacts, and 120v power for the battery charger. The standby pump "fault" contact shall be a combination of the pump auto start control panel alarm contacts and the battery charger alarm contacts. All contacts for connection to the SCADA system shall be dry contacts.

2.02.9 Painting

A minimum 5-mil thick layer of epoxy coated primer shall be applied to the entire pump set prior to the finish coat. A minimum 5-mil thick layer of industrial enamel paint shall be applied over the primer coat.

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PART 3 - EXECUTION

3.01 Preparation

Coordinate with ventilation, fuel supply, and exhaust, to provide an efficient and well-coordinated layout.

3.02 Installation

- A. Install unit complete and make operational.
- B. Install engine at sufficient height above base to permit dropping oil pan without

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removing unit.

- C. Provide vibration isolation of exhaust equipment to prevent transfer of vibration into enclosure.

3.03 Wiring and Connections

- A. Provide conduit, wiring and connections required and recommended by unit supplier.
- B. Install all control and alarm wiring in rigid steel conduit.
- C. Connect mechanical exhaust dampers in cooling and exhaust equipment to open dampers when unit is started, if necessary.

3.04 Field Quality Control

- A. Provide full load test utilizing portable test bank for four hours minimum.
- B. Record in 20 minute intervals during four hour test:
 - 1. Kilowatts
 - 2. Amps
 - 3. Voltage
 - 4. Coolant temperature
 - 5. Ambient temperature
 - 6. Frequency
 - 7. Oil pressure
- C. Test alarm and shutdown circuits by simulating conditions.
Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown and return to normal.
- D. If unit is diesel fueled, tank must be full when conveyed to the County Contractor responsible for all startup costs.
- E. Provide factory representative to demonstrate and train the County's personnel on complete operation of the unit.

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END OF SECTION