



PORTABLE HYDRAULIC PUMP GUIDE TECHNICAL SPECIFICATIONS

1.0 GENERAL

The work under this section shall consist of providing all pumping equipment including the hydraulically driven axial flow pump(s) with diesel portable drive unit(s), all hydraulic piping, appurtenances and mechanical systems as specified herein.

2.0 DESIGN DATA

The contractor shall furnish with the bid, guaranteed pump performance curves based on shop tests of pumps in accordance with procedures as specified by Standards of Hydraulic Institute. The pump curves shall be certified by a Professional Engineer, registered in the state where the tests are conducted. Any bid not including such curves shall be considered invalid.

1. Quantity of pumps
2. Design Capacity Ea. G.P.M. (m³/sec) (minimum)
3. Operation Head: Design TDH ft.(m)

The pump and drive equipment to be furnished under this contract shall be made by a manufacturer regularly engaged in such work and who has furnished like equipment and specialties for at least five (5) similar installations which have been continuously operating successfully for not less than five (5) years. Evidence of this experience and data on the equipment and its operation in those installations shall be made available to the owner at their request to determine whether the equipment and specialties offered meet the requirements of these specifications.

3.0 MATERIALS AND DESIGN

The pumps to be furnished under this specification shall be hydraulically driven, axial flow propeller, completely submersible type with propeller bowl assembly, hydraulic motor assembly, suction bell assembly, and discharge tube and head assembly,

3.1 SUCTION BELL - The suction bell shall be manufactured from alloy steel, 3/16" thick min. and conforming to ASTM A242, and shall have an inlet diameter of 1.5 times the propeller diameter. The inlet bell shall be constructed to minimize vortex formation by maintaining equal pressures and velocities across the entrance. Bars shall be placed across the bell mouth to prevent entrance of large sticks, togs or debris. Inlet bell face shall be parallel to the water surface and the intake bell discharge pipe shall be on a 45' angle.

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3.2 PUMP BELL - The propeller bowl assembly section shall be a single stage, shop assembled unit consisting of a venturi-housing, stainless steel liner, propeller shaft, bearings and stainless steel or manganese bronze propeller. The venturi-housing shall be manufactured from ¼ in thick alloy steel conforming to ASTM A242 and shall be fitted with a machined, removable housing liner of 300 series stainless steel of not less than 3/16" thickness and a liner of not less than the pitch length of the propeller.

3.3 PROPELLER AND SHAFT - The pump propeller blades shall be manufactured using ASTM A304 stainless steel or cast manganese bronze. The propeller shall be balanced and secured firmly to the shaft with an alignment key and locknut. The propeller shaft shall be machined from solid stainless steel bar stock and shall conform to ASME Code for transmission shafting to transmit full load torque and shall have additional safety factor for shock loads.

3.4 BEARINGS - The propeller shaft shall be supported and contained in place with multiple angular contact bearings. The shaft bearings shall be designed for an L10 life of 50,000 hours and lubricated by low-pressure hydraulic oil. The propeller shaft and bearing assembly shall be contained in a machined bearing housing centrally supported by flow straightening vanes in the propeller bowl assembly and shall be protected against sand particle intrusion. The bearings shall be designed to accept thrust in either direction. A non-reverse rotation mechanism will be included.

3.5 DISCHARGE TUBE AND HEAD ASSEMBLY - The discharge tube and head assembly shall be abrasive resistance steel conforming to ASTM A242 with a minimum wall thickness of 3/16" and a standard ANSI flange. The complete pump assembly shall be painted inside and outside with bitumastic enamel equal to Zophar Triple A.

3.6 HYDRAULIC MOTOR - the hydraulic motor assembly section shall consist of the assembly housing, hydraulic motor, propeller shaft coupling and inlet and outlet port pipe connections. The assembly housing shall be manufactured from a minimum of 3/16" thick alloy steel conforming to ASTM A242. The housing assembly shall contain a hydraulic motor coupled to the propeller shaft.

The hydraulic motor, bearings, shaft and coupling shall be enclosed and sealed to permit totally submerged operation in any position. The hydraulic motor shall be provided with inlet and outlet pipes extending from the hydraulic motor through the assembly housing and terminating with quick coupling connections. The hydraulic motor shall be mounted on the discharge side of the propeller to minimize NPSH requirements, avoid clogging of the intake and induce more efficient oil cooling.

4.0 DIESEL DRIVE UNIT

Each pump shall be supplied with a complete trailer mounted unit with individual diesel power unit as specified herein. The drive unit shall be manufactured and tested at the same factory as the pumping unit to provide a single source of responsibility and for the proper coordination of all components of the system. The unit shall consist of a hydraulic oil reservoir, a fixed displacement hydraulic pump, a diesel engine, inter-connecting piping, valves and accessories mounted on a steel base with lifting eyes.

A. Hydraulic pump shall be a fixed displacement vane type unit capable of continuous operation.

B. The diesel power source shall be a minimum of _____BHP at 1,800 rpm having a continuous duty rating. The unit shall be fully equipped with radiator, batteries and cable, safety shutdown switches and exhaust system with residential type muffler or sound attenuating system.

C. Power units shall be factory assembled and skid-mounted. Hydraulic equipment shall include but not be limited to: a full flow oil filter, adjustable pressure relief valves at each pump outlet, pressure and temperature gauges, quick connect couplings and safety shut down controls for low oil pressure and high oil temperature. All systems shall be assembled, piped and tested prior to delivery to the site.

D. A hydraulic system-monitoring device to allow diagnosing hydraulic system behavior even while pump is still submerged shall also be included.

E. The drive system shall include a "clutch" starting system which allows the prime mover to start under a no-load condition and gradually engage the load over a 3 to 5 second time period. The "clutch" system shall be used to gradually disengage the load prior to shut-off of the prime mover.

F. Sufficient hydraulic oil cooling capacity shall be provided to sustain direct sunlight radiation as well as ambient temperatures up to 122' F (50'C).

5.0 HYDRAULIC PIPE AND HOSE

A. Hydraulic lines connecting the power unit to the pumping unit shall be a combination of black steel pipe and reinforced hose and shall be installed as specified herein. The black steel pipe shall be supplied by others.

B. All reinforced supply hose shall be double wire braided and shall have a minimum safe working pressure of 2500 psi. All pipe fittings shall be socket weld type (with socket weld to thread fittings at conversion point of pipe to reinforced hose). All quick connect couplings shall be provided at connection points of drive unit, water pump, hard piping, and hoses. Supply piping shall be a minimum of ___ " in diameter in 24 inch lengths, return piping shall be a minimum of ____ " in diameter in 24 inch lengths, and case drain hose shall be a minimum of 3/4" in diameter. Internal velocities shall not exceed 15 fps.

6.0 PUMP TESTING

A. Each pump and hydraulic power transmission system shall be factory pressure tested to maximum design psi for a minimum of 90 minutes at design operating temperatures with every plumbing connection checked for possible leaks. In the event a leak is observed or detected, it shall be repaired and the test shall be repeated until all leaks are eliminated.

B A field-test shall be witnessed by the _____. All plumbing fittings and hydraulic equipment shall be inspected for leakage. Should leakage be detected or observed, repairs shall be made and tests performed again until all leaks or losses are detected and repaired.

7.0 INSTALLATION AND SUPERVISION

A. The contractor shall coordinate construction of station and installation of the pumps with the owner. All construction and installation shall be in conformance with the specifications and the pump manufacturer's recommendations.

B. The contractor and pump manufacturer shall provide for final inspection and testing of the system and shall make necessary adjustments to the control system prior to the actual start-up tests. Start-up tests and demonstration shall be performed by the pump manufacturer's representative and the contractor, and witnessed by the owner. Three (3) sets of operating and maintenance manuals and start-up procedures shall be provided to the owner. The Contractor shall have pump manufacturer train and instruct owner's operator on all equipment.

8.0 WARRANTY

The hydraulic pump system and controls shall be warranted for I year by the manufacturer against defects in material and workmanship, under normal use and service from the date of shipment from the factory as described in the warranty certificate.

