SUBMERSIBLE ELECTRIC PUMP SPECIFICATIONS

I PUMP DESIGN PERFORMANCE

A. The work under this section shall consist of providing all pumping equipment including the hydraulically driven axial flow pumps, drive units, and all piping, appurtenances and mechanical system as shown on the drawings and as specified herein. The manufacturer shall be ISO9001-2008 certified. Pumps shall be manufactured by MWI Corporation, 201 N Federal Hwy., Deerfield Beach, FL 33441-3624 or pre-approved equal. Manufacturer must provide QC manual with the bid.

B. Basic Design conditions:

1. Number of Pumps: _____
2. Pumping Capacity: _____ GPM each
3. Total Dynamic Head: _____ FT
4. Pump Speed: _____ RPM
5. Motor Power: _____ HP

II PUMP ASSEMBLY

A. General Construction Requirements

1. The pump and submersible electric motor assembly shall conform to the following mechanical characteristics:

a. Motor rotor and pump propeller are both mounted on a single shaft.

b. Motor stator housing is attached and registered to the bearing box.

c. Lower thrust bearing shall be either multiple angular contact ball bearings or a single deep groove ball bearing to carry thrust and radial shaft loads.

d. Upper motor bearing shall be a deep groove ball bearing.

2. Pump and motor assembly shall be suited for continuous submerged service to a depth of 60 feet.

B. Pump Construction

1. Major pump components shall be manufactured of steel conforming to ASTM A242/588, AISI 1045, and AISI 300 Series stainless steel only.

2. The propeller bowl assembly section shall be a single stage, assembled unit consisting of venturi housing and propeller hub manufactured largely from ASTM A242/588 steel, and the propeller blades manufactured of AISI 300 Series stainless steel. Propeller shaft shall be AISI 1045 steel with stainless steel inlay at the seal surface. The thrust bearing assembly shall be contained in a machined bearing housing centrally supported by flow straightening vanes in the propeller bowl assembly.

3. The venturi shall be fitted with a removable housing liner of AISI 300 Series stainless steel of not less than the pitch length of the propeller. The propeller shall be balanced and secured firmly to the taper shaft with alignment key and locknut. The propeller shaft shall conform to ASME Code for transmission shafting to transmit full load torque and shall have additional safety factor for shockloads.

4. BEARINGS - The motor/pump shaft shall be located by an upper deep groove ball bearing for radial support and lower dual angular contact bearings or a single deep groove ball bearing for radial and thrust support. The shaft bearings shall be sealed, grease lubricated, and designed for an L_{10} life of 50,000 hours. The thrust bearing/shaft assembly shall be contained in a machined bearing housing centrally supported by flow straightening vanes in the propeller bowl assembly. The bearings shall be protected against water and sand particle intrusion with a lip seal and mechanical seal.

5. SEALS - Each pump shall be provided with two mechanical rotating shaft seal systems operating independently. Seals shall be a rubber bellows, non-pusher type, with non-crimped rotating faces. Seals shall run in an oil reservoir. Lapped seal faces must be hydrodynamically lubricated. The lower seal unit, between the pump and oil chamber, shall contain one stationary and one positively driven rotating ring. The upper seal unit, between the oil sump and motor housing, shall contain one stationary ring and one positively driven rotating ring. Each interface shall be held in contact by its own spring system. A lip seal between the lower mechanical seal and impeller shall be provided. Both mechanical seals shall be comprised of a carbon rotating ring and a ceramic stationary ring. The seals shall require neither maintenance nor adjustment, but shall be easily inspected and replaced. The following seal types shall not be considered acceptable nor 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 units.

6. WELDMENTS - All manufacturers weldments shall be continuous and full penetration. All flanges shall be welded inside and out. All slag shall be removed and undercutting shall not exceed 15% of material thickness.

7. The non stainless steel components shall be painted with coal tar epoxy.

C. Motor Requirements

1. Motor Characteristics

a.	Power:	[ ] HP
b.	Voltage:	[ ] Volts / 3 Phase
c.	Frequency:	[ ] Hz
d.	Service Factor:	1.15
e.	Minimum L_{10} Bearing Life:	50,000 hours
f.	Insulation Class:	F
g.	Time Rating:	Continuous
h.	Type	Squirrel Cage Induction
i.	Air Filled	
j.	Stator Winding shall be Vacuum Pressure Impregnated.	

2. Material of Construction

a.	Motor Casing:	AISI 300 Series stainless steel
b.	Motor wire junction box:	AISI 300 Series stainless steel
c.	Nuts & Bolts:	AISI 300 Series stainless steel
d.	Lifting Loop:	AISI 300 Series stainless steel

3. Cable Entry and Seal

a. Power and instrumentation cables shall enter the side of the motor. Cable shall be encased in conduit to protect it from potentially damaging substances in the pumped liquid. The assembly shall be located in the pump top and direct the cable radially sideways out of the pump housing. 25 feet of power and instrumentation cable shall be provided above the cable entry.

b. The primary cable seal shall be comprised 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 be compressed by the entry body. The secondary cable seal shall be a elastomer material pored and set around the individual cables. The cable entry junction chamber and motor shall be separated by a stator lead isolation plate and bearing holder which shall isolate the motor interior from foreign material gaining access through the pump top.

c. The junction chamber shall be sealed from the motor by an elastomer grommet compression fitting for each cable.

4. Thermal / Moisture Protection

Three motor winding thermostats shall be in the stator windings, one sensor in each stator phase. Each pump shall be equipped with moisture detection in three locations; the oil chamber; the motor housing; and the junction box. The moisture detection system shall operate an alarm and stop the pump. A relay compatible with the moisture detection system shall be provided by the pump manufacturer.

III PUMP TESTING

A. Head, Capacity, Efficiency

1. Tests shall consist of checking the unit at its rated speed, head, capacity, efficiency, brake horsepower, and at such other conditions of head and capacity to properly establish that the equipment meets the performance requirements. Certified copies of test data shall be submitted to the Owner prior to shipment. Certification shall be by a registered professional engineer regularly employed by the pump manufacturer. The Standards of the Hydraulic Institute shall govern the procedures and calculations for these tests. The Owner shall have access to the raw test data and calculations and may witness the tests.

B. Electrical Integrity Test

1. A motor and cable insulation test for moisture content and insulation defects utilizing a Megger on the motor leads shall be performed prior to pump submergence.
2. Prior to submergence, the pump shall run dry to establish correct rotation and mechanical integrity.
3. The pump shall run for 30 minutes submerged a minimum of two meters under water.
4. After operational test is completed, the insulation shall be retested. A written report stating the foregoing tests have been conducted shall be submitted to the Owner with each pump at the time of shipment.