



DIVISION 15 MECHANICAL SPECIFICATIONS

15320-1 FIRE PUMP SYSTEM & ACCESSORIES

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. This section includes provision, delivery, installation and startup of one (1) skid mounted diesel engine-driven fire pump system including but not limited to one (1) fire pump with drive and associated controller one (1) electric driven jockey pump each with drive and associated controller with interconnecting piping and wiring for installation at (Project name) (Project location). Skid mounted fire pump system shall be manufactured by A-C Fire Pump , 10661 Newkirk Street, Dallas, Texas 75220, and be labeled for its intended use.
- B. Related Sections:
 - a. Section ***** Pipe & Fittings
 - b. Section ***** Electric Motors

1.2 QUALITY ASSURANCE

- A. Comply with NFPA 20 requirements
- B. System shall bear the ETL label for packaged fire pump systems based on NFPA 20.
- C. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified or denoted on the drawings.
- D. The skid mounted fire pump shall be assembled by the pump manufacturer. An assembler of fire pump skids not engaged in the design and construction of fire pumps shall not be considered as a fire pump manufacturer. The manufacturer shall assume “Single Source Responsibility” for the complete fire pump system.
- E. Fire pump system components assembled and affixed onto a structural steel framing assembly as designed under direction of a qualified Professional Engineer, fabricated by welders qualified in accordance with ASME BPVC code section 9, and assembled at a Listed and Approved Manufacturing facility. After completion, the Assembly is shipped as a unit to the installation site. The Packaged Fire Pump Assembly may be assembled onto the structural steel framing assembly either with or without an environmental enclosure constructed from non-flammable materials.
- F. Test pumps, drives and controllers, at the factory to ensure the performance as specified and as required by NFPA 20. Copies of certified factory test data shall be available for comparison during field acceptance tests. (System shall be tested as a complete unit at the factory after



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fabrication and before shipping. All test results shall be recorded and sent to the buyer for his records)

- G. The manufacturer shall carry a minimum product liability insurance of \$2,000,000 per occurrence with an aggregate product liability of \$6,000,000.
- H. Test all electrical components for proper installation, connection and operability.
- I. Furnish all material that is new and unused and free from defects in workmanship and material.
- J. Manufactures Qualifications:
 - a. Pump manufacturer and system assembler shall be the same
 - b. Minimum of 20 years' experience in production and assembly of fire pumps and fire pump systems
- K. Provide services of qualified manufactures representative to assist in the installation and complete checkout and startup of equipment.
- L. Manufacturer or supplier shall have the capability to provide repair, maintenance and parts supply service for all furnished components.
- M. Do not commence fabrication and assembly of packaged system until review of all submittal data by Owners Representatives is completed and written release to production is received.
- N. A/E and Owners Representative shall be able to inspect construction of packaged pump system at the manufactures facility with 72 hour notice.

(Optional)

- O. The International Building Code includes Seismic criteria which must be complied with. Materials, design, construction and workmanship provided for this system must meet all code requirements and a statement to this affect must be included in with quotation. Where conflicting requirements occur between other codes or standards, the more stringent requirements shall apply.
- P. All equipment and piping shall be provided with seismic restraints in accordance with Seismic Hazard Level (SHL) ___ of the Seismic Restraint Manual.



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- Q. Seismic design per International Building code: Seismic design Category (), Soil site (), Seismic Use Group (), and Importance Factor ().

1.3 SUBMITTALS

- A. Submit each item in this article according to the conditions of the contract and specifications sections.
- B. Submit manufacturer's installation instructions under provisions of General Conditions.
- C. Product data including certified performance curves and related capacities of selected models, weights, furnished specialties and accessories. Indicate pumps operating point on curves.
- D. All submittal information shall be in an electronic format and a hard copy shall be made available if requested

1.4 DELIVERLY, STORAGE AND HANDLING

- A. Protect all equipment, connection surfaces, piping, wiring, fluid passages and working parts from damage during shipment, handling and storage.
- B. The packaged pumping system shall be factory assembled and shipped as a complete unit unless shipment in sections is absolutely required or unless shipping restrictions or equipment limitations dictate that smaller portions must be shipped.
- C. Deliver equipment and accessories to the specified location for unloading.
- D. Store material in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- E. Repair or replace all items damaged during shipment and delivery.

1.5 WARRANTY

Warrant that all supplied components will function as specified and as a complete functional system in accordance with all applicable codes and free from defects in design, assembly, manufacture and workmanship for a minimum of twelve (12) months after startup or eighteen (18) months after shipment whichever occurs first.



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PART 2- PRODUCTS

2.1 SYSTEM COMPONENTS

C. Fire Pump:

1. Quantity: ___ diesel engine (s) driven
2. Design: Pumps shall furnish not less than 150 percent of rated capacity at not less than 65 percent of total rated head
3. Maximum shutoff head: The shutoff head shall not exceed 140 percent of rated head.
4. Operating Conditions:
 - a. Capacity () GPM
 - b. Rated Pressure: ()PSI
 - c. Total discharge head (TDH): ()
 - d. Voltage (4160/2300/575/460/230/380)
5. Pump Type:
 - a. A-C Fire Pump Model 8100, 8200, 9100 series, Centrifugal, Horizontally split case, Flex coupled, Base Mounted, CIBF
 - b. A-C Fire Pump model 1580, Centrifugal, Single stage, Close coupled, Vertical inline, Vertical back pullout design, CIBF
 - c. A-C Fire Pump Model 2000, Centrifugal, Top centerline discharge, Flex coupled, Base mounted, Back pullout design, CIBF
 - d. A-C Fire Pump Model Vertical Turbine , Open Line shaft, CIBF or NI Al BZ for sea water.
6. Pump Materials:
 - a. Casing: (Cast iron)(Ductile iron)
 - b. Impeller: Bronze
 - c. Shaft: Steel
 - d. Stuffing Box Packing: Teflon Impregnated Yarn
 - e. Shaft Sleeve: Bronze
 - f. Seal Tubing: Brass
 - g. Connections: (Flanged class 125, ASME B16.1) (Flanged class 250, ASME B16.1)
 - h. Bearings: Steel
7. Provide fire pump accessories in accordance with NFPA 20 including but not limited to:
 - a. One automatic air release valve
 - b. One pump discharge gauge, range (0-300 with shutoff cock)(0-600 with shutoff cock)
 - c. One compound pump suction gauge, range -30-0-200 with shutoff cock
 - d. Common rigid structural steel baseplate (elevated as required) for each pump and its associated drive
 - e. Flexible drive coupling, with OSHA approved guard
 - f. One manufactures nameplate for pump, stating:
 - 1) Pump capacity



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- 2) Total head
- 3) Pump RPM
- 4) Manufacturer's model and serial number
- 5) Casing working pressure
8. Acceptable manufacture's A-C Fire Pump
9. Pump Design and Construction: Pump shall be UL Listed and FM Approved

D. Jockey (Pressure maintenance) Pump:

1. Quantity: ()
2. Configuration: (Vertical) (Horizontal)
3. Type: Centrifugal or multistage diffuser, direct drive by electric motor
4. Materials:
 - a. Casing: Cast iron and stainless steel
 - b. Shaft: Steel
 - c. Trim and impeller: Bronze or stainless steel
5. Operating Conditions:
 - a. Capacity: () GPM
 - b. Total head (TDH): () PSIG
 - c. Maximum Shutoff Head: () PSIG
 - d. Speed: 3500 RPM Maximum
 - e. Voltage: (575/460/230/380) (120/1/60)
6. Provide accessories including but not necessarily limited to:
 - a. Common structural steel baseplate for pump and drive elevated as required
 - b. Motor: (ODP) (TEFC), 1.15 service factor, Nema design B, (208-230/460/3/60) (120/1/60)
7. Manufacturer's nameplate stating:
 - a. Pump capacity
 - b. Total head
 - c. Manufacture's model number and serial number
8. Acceptable manufactures: A-C Fire Pump

E. Diesel Engine Drive (s):

1. Quantity: ()
2. Type: direct drive, designed for operation on diesel fuel for fire pump service, in accordance with NFPA 20
3. Horse Power Rating: Not less than 110 percent of maximum brake horsepower (after derating for temperature and elevation in accordance with NFPA 20, required to drive the pump at rated speed.
4. Engine Manufacturer: Clarke, Cummins, or Caterpillar
5. Provide accessories for each drive including but not limited to the following:

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- a. Adjustable governor capable of regulating speed within range of 10 percent between shutoff and maximum load conditions of pumps.
 - b. Overspeed shutdown device
 - 1) Designed to stop engine at 20 percent above rated speed
 - 2) Position: Supervised so automatic controller will show overspeed trouble signal until shutdown device is manually reset
 - 3) Manual reset
 - c. Speed Switch:
 - 1) Function: Signal engine running and crank termination.
 - 2) Source of Power: Source other than engine generator or alternator.
 - d. Instrument Panel including but not limited to
 - 1) Tachometer
 - 2) Oil pressure gauge
 - 3) Water temperature gauge
 - 4) Hour meter
 - 5) Ammeter
 - e. Cooling System:
 - 1) Type: closed circuit.
 - 2) Water source: Discharge side of pump.
 - 3) Components:
 - a) Engine drive circulating pump.
 - b) Heat exchanger.
 - c) Engine jacket temperature regulator or thermostat.
 - d) Two manual shut off valves for cooling water supply.
 - e) Strainer for cooling water supply.
 - f) Pressure regulating valve for cooling water supply.
 - g) Pressure gauge for engine side of cooling water supply before last manual valve.
 - h) Valved bypass around circuit from inlet side of first valve to outlet side of second manual valve.
 - i) Visible open waste cone if required.
 - f. Water cooled jacketed exhaust manifold.
 - g. Jacket water heater, 120 VAC, single phase, 60 hertz.
 - h. Flexible metallic fuel lines, with necessary protection.
 - i. In line fuel filter.
 - j. Oil pressure safety switch.
 - k. Air cleaner.
 - l. Engine driven oil pump.
 - m. Enclosed control wiring.
 - n. Electric starter with voltage regulator.

- o. Two heavy duty (24 volt) (12 volt) (lead acid) (nickel-cadmium) batteries, with corrosion resistant battery rack and cables as required; charged from engine generator or alternator and automatic trickle charger
- p. (Residential) (Industrial) grade engine exhaust silencer with spark arrestor, flexible exhaust connection, ventilated thimble (as required) and suitable factory painted or galvanized supports for supporting silencer. A flexible connector with flange connections shall be provided at the engine. Flexible sections shall be stainless steel suitable for diesel-engines exhaust gas at 1000 degree F minimum
- q. Horizontal factory painted double wall carbon steel UL labeled fuel storage tank, with legs, level gauge, low level fuel switch, vent with flame arrestor, and necessary connections for fill, outlet and fuel return. The fuel tank shall have a capacity at least equal to 1 gal per horsepower(5.07 L per KW), plus 5 percent volume for expansion and 5 percent volume for sump per NFPA 20
- r. Fuel tank piping shall be carbon steel (stainless steel) with lockable valve in supply line, there shall be no shutoff valve in the return fuel piping

F. Diesel Fire Pump Controller:

- 1. The Fire Pump Controller shall meet the requirements of NFPA 20.
- 2. The controller shall have twin battery chargers meeting NFPA 20 requirements. The battery chargers shall have reverse polarity protection/indication and be capable of recharging a completely discharged battery within 24 hours. The chargers shall auto detect the input voltage of either 120 VAC or 220 VAC and shall be able to be programmed for either 120 VDC or 24 VDC output
- 3. A solid state pressure transducer shall be installed in a bulkhead in the enclosure bottom so that all plumbing connections are made external to the controller. The controller piping and pressure system shall be rated for pressures up to 600 psig within +/- 1.5 % accuracy.

G. Jockey Pump Controller

- 1. Function: Cycling jockey pump to maintain system pressure of () psig; pump shall start at () and shut off at ().
- 2. Jockey pump controller
- 3. controller
- 4. The jockey pump controller shall be of the (Full Voltage Starting) type
- 5. The controller shall be rated NEMA 1 *Optional* (NEMA 3R, Rain tight, Weatherproof) (NEMA 4, Watertight)(NEMA 4X, Watertight, Corrosion resistant)(NEMA 12, Industrial use, dust-tight, oil tight)
- 6. The jockey pump shall have as a minimum but not limited to the following alarms:
 - a. Power Failure
 - b. Phase Reversal
 - c. Pump Running

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- H. The jockey pump shall have as a minimum but not limited to the following standard features:
1. Horsepower rated disconnect switch, fuse block and fuses
 2. Horsepower rated motor contactor and overload relay
 3. Minimum run timer to prevent short cycling of pump
 4. HAND-OFF-AUTO selector switch to allow manual operation of the pump.
 5. 0-300 psi pressure switch suitable for freshwater applications.
- I. Station Base (*chose A or B*)
1. **(Option A)** All the equipment including but not limited to pumps, motors, valves, instrumentation and controls shall be mounted on a common steel base of open construction to form a complete operating pumping system. Peripheral structural members shall be from channel or wide flange beam ASTM 36. Internal structural members shall be from channel or rectangular tubing ASTM 36, all welded per the AICS Manual of Steel Construction, part 4, "Welded Joints". Provisions shall be made in the station base for loading and offloading and handling the station at the site. Lift eyes shall be designed to eliminate trip hazard once the station has been set in place.
 2. **(Option B)** All the equipment including but not limited to pumps, motors, valves, instrumentation and controls shall be mounted on a common steel base of open construction to form a complete operating pumping system. Peripheral structural members shall be from channel or wide flange beam ASTM 36. Internal structural members shall be from channel or rectangular tubing ASTM 36, all welded per the AICS Manual of Steel Construction, part 4, "Welded Joints". Provisions shall be made in the station base for loading and offloading and handling the station at the site. Lift eyes shall be designed to eliminate trip hazard once the station has been set in place. The base shall be covered in 3/16" deck plate with structural steel plate mounted under pumps and motors. All deck and structural plate shall be continuously seal welded to peripheral structural members, and skip welded to from the bottom to the internal structural members
- J. Piping (*chose A or B*)
1. **(Option A)** All piping shall be constructed from ASTM A105 or ASTM A53 standard weight pipe. The package piping shall consist of fabricated welded steel and / or cast iron fittings in and out of pumps. All piping shall be sized per NFPA 20. All welded pressure bearing piping must be fabricated with full penetration welds. Use of backing rings will not be permitted. Qualification of the welding procedures and performance of the welders shall comply with the requirements of ASME code, Section IX. All frame welds shall be performed by ASME qualified welders per Section IX of the ASME Code. All piping valves and fittings shall be in accordance with NFPA 20. Supports shall be provided for all suction and discharge piping. All pipe supports shall be designed to allow for the removal of any individual sections without adding additional stress to adjoining sections.

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- (Option B)** All piping shall be constructed from ASTM A105 or ASTM A53 standard weight pipe. The package piping shall consist of fabricated welded steel and / or cast iron in and out of the pumps. All piping shall be sized per NFPA 20. All welded pressure bearing piping must be fabricated with full penetration welds. Use of backing rings will not be permitted. Qualification of the welding procedures and performance of the welders shall comply with the requirements of ASME code, Section IX. All frame welds shall be performed by ASME qualified welders per Section IX of the ASME Code. After fabrication and before coating piping shall be blasted inside and out to SSPC SP 10, near white metal and hot dip galvanized. All piping, valves and fittings shall be in accordance with NFPA 20. Supports shall be provided for all suction and discharge piping. All pipe supports shall be designed to allow for the removal of any individual sections without adding additional stress to adjoining sections.

K. Fire Pump Fittings

- Fire pump fittings shall include at a minimum the following: an automatic air release valve, compound suction and discharge gauges (3.5 inch dials) supplied and sized per NFPA 20 All piping shall be sized per NFPA 20.
- Valves shall be UL and ULC listed and FM approved, with 175-psig minimum pressure rating. Valves shall have (250-psig minimum) (300-psig minimum) if valves are components of a high pressure system.
- Where the suction pipe and pump suction flange are not of the same size they shall be connected by an eccentric tapered reducer or increaser installed in such a way as to prevent air pockets.
- A listed OS&Y gate valve with tamper switch shall be installed in the suction piping. The OS&Y valve shall be rated for the maximum working water pressure of the system. Valve shall be manufactured out of ASTM A126 class B cast iron and have flanged ends. Valve shall have outside stem & yoke, full flow port, replaceable disc.
- A listed check valve shall be installed in the discharge piping. Valve shall comply with UL 312 unless noted. (Flanged end valves NPS 2" and larger swing type, cast iron body, flanged ends and 175 psig CWP rating) (Wafer end valves NPS 2" and larger, spring type, ductile or cast iron with twin disc, wafer ends, and 250 psig CWP rating)
- A listed indicating gate valve or butterfly valve shall be installed on the fire protection side of the pump discharge check valve. (The OS&Y valve shall be rated for the maximum working water pressure of the system. Valve shall be manufactured out of ASTM A126 class B cast iron and have flanged ends. Valve shall have outside stem & yoke, full flow port, replaceable disc, fusion bonded epoxy coating and be operated by handwheel.) (The butterfly valve shall be (Lug Style body) (Wafer Style body) comply with UL 1090 with integral indicating device, gear operator shall be indoor/outdoor rated and ends shall match connecting piping with molded in seat)



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7. All drains shall be piped to a common point for connection to a buyer supplied floor drain per NFPA 20.

Chose the following options as required

L. Fire Pump Accessories

1. Hose Valve Header: System shall be equipped with hose valve header and valves. The hose valve header shall be sized per NFPA 20 2007 edition Table 5.25(a). Hose valve header shall be manufactured from cast iron or fabricated from ASTM A105 or ASTM A53 standard weight pipe. The test header shall be equipped with listed valves the number and size of hose valves for testing shall be as specified in Table 5.25(a). Hose valves shall be listed, 2-1/2" National Standard Thread, equipped with caps and chains unless otherwise specified. The hose valve header shall be equipped with and listed isolation valve and a minimum 3/4" drain piped to a common point.
2. Main Relief Valve: Where a total of 121 percent of net rated shutoff (churn) pressure plus the maximum static suction pressure, adjusted for elevation, exceeds the pressure for which the system components are rated a pressure relief valve shall be installed. The pressure relief valve shall be located between the pump and the pump discharge check valve and be so installed so it can be readily removed for repairs without disturbing the piping. The pressure relief valve shall be a spring loaded or pilot-operated diaphragm type. The relief valve shall discharge into and open pipe or into a cone or funnel secured to the outlet of the valve. If a closed type cone is used, it shall be provided with means for detecting motion of water through the cone. The pressure relief valve shall be UL Listed and FM Approved
3. Flow meter loop: System shall be equipped with a flow meter loop size in accordance with NFPA 20 2007 edition Table 5.25(a). The metering device shall be of the venture type with grooved connections and installed per manufactures directions.. The flow meter loop shall be complete with meter control and meter throttle valves. Valves shall be of the (OS&Y gate) (indicating butterfly) type.
4. City Water Bypass: The system shall be equipped with a city water bypass arrangement sized in accordance with NFPA 20 2007 edition table 5.25(a). The bypass shall be supplied with two isolation valves and one check valve. Isolation valves shall be (OS&Y gate) (indicating butterfly) valves and be listed. Check valves shall be of the (flanged) (wafer) type and be listed.
5. Fire Department Connection: System shall be equipped with a (4") (6") fire department connection. The FDC shall be equipped with a listed check valve. The fire department connection shall have a minimum of two 2-1/2" threaded connections.
6. Suction control valve: The fire pump suction control valve shall modulate to maintain a minimum pressure at the pump suction regardless of demand. It shall control the pump discharge in relation to the suction head available and not allow suction head to fall below a pre-set minimum. The main valve shall be hydraulically-operated, pilot

controlled, diaphragm-type, globe or angle pattern. The valve shall have flanged ends and be rated for CWP (Class 150) (Class 300). The pilot control shall be direct-acting, adjustable, spring loaded, diaphragm-type valve designed for modulating service to permit flow when controlling pressure exceeds spring setting. Remote sensing line shall be piped from valve body to suction supply. The valve shall be designed to allow for repair and servicing without removing the valve body from the line. The valve shall be FM approved.

7. Backflow prevention: (A double check detector assembly shall be installed on the fire pump system when connected to a potable water supply. The unit shall be a complete assembly including epoxy coated body, resilient seated OS&Y shut off valves and cocks. The unit shall be UL Listed/FM Approved with UL/FM OS&Y shutoff valves. The auxiliary line shall consist of an approved backflow preventer and water meter.)(A reduced pressure detector assembly shall be installed on the fire pump system. The unit shall be a complete assembly including epoxy coated body, resilient seated OS&Y shut off valves and cocks. The unit shall be UL Listed/FM Approved with UL/FM OS&Y shutoff valves. The auxiliary line shall consist of an approved backflow preventer and water meter.)
8. Floor drain: the system shall be provided with a floor drain per NFPA 20 2007 edition. The drain shall be installed flush with the floor level and routed through the skid peripheral structural members and terminated within 4 inches of the skid.

M. Painting:

After fabrication and before shipping paint all surfaces including but not limited to the main piping and structural members, excluding the fuel lines, enclosure fire sprinkler lines and jockey pump piping as follows:

Chose option as required

1. Mild Exposure Surface Preparation – SSPC-SP1 solvent cleaning. Remove all surface contaminants such as dirt, grease, milling oil, or any other latent chemicals that may reduce adhesion. First Coat – PPG Amershield Polyester Urethane applied at 3-5 MDFT directly to prepared substrate
2. Moderate Exposure Surface Preparation – SSPC-SP10 abrasive blasting to a near white metal finish resulting in a 1.5 to 2.5 mil surface profile. First Coat - PPG Amershield Polyester Urethane applied at 3-5 MDFT directly to prepared substrate
3. Severe Exposure Surface Preparation – SSPC-SP10 abrasive blasting to a near white metal finish resulting in a 1.5 to 2.5 mil surface profile. First Coat – PPG Amercoat 68HS Zinc Rich Epoxy at 3-4 MDFT directly to prepared substrate. Second Coat - PPG Amershield Polyester Urethane applied at 3-5 MDFT directly to the zinc rich epoxy.

N. Testing:

The fire pump will be factory performance tested in accordance with the requirements of NFPA, UL and FM. The fire pump and jockey pump controllers will be electrically tested prior to shipment. Additionally, the entire package system will be hydrostatically tested at the factory at a pressure rating per NFPA 20 Section 11-1.1 for a minimum of 2 hours. A copy of the test procedures shall be provided upon request.

PART 3- ENCLOSURE
(Reference Enclosure Specifications)

PART 4-EXECUTION

4.1 INSTALLATION

- A. Place, assemble, install and place into operational readiness complete pumping system and building as specified in this section, in accordance with A-C Fire Pump's recommendations, Drawings, FM and NFPA 20 .
 - 1. FIELD QUALITY CONTROL
 - a. Manufactures field representative shall supervise installation of all items and equipment as specified in this section
 - b. Manufactures field representative and/or Contractor shall inspect jobsite conditions 72 hours before shipment of packaged pump module to assure field conditions compatible with system layout.
 - c. Manufactures field representative shall conduct and document acceptance tests and startup of equipment specified in this section and shall ensure conformance to acceptance requirements of NFPA 20 edition and FM Data Sheet 3-7N/13-4N.
 - d. Manufactures representative shall instruct Owners personnel in proper system operation and maintenance.
 - e. Manufactures representative shall commission equipment and certify to Owner in writing that all installation, maintenance instruction, tests, adjustments, repairs and startup are complete and that all components are ready for continuous operation.

4.2 START UP AND COMMISSIONING

- A. The system manufacturer or his representative shall provide commissioning of the complete packaged pumping system. The commissioning shall include a check of proper installation by the installing contractor, system check out, adjustment and complete start-up. The commissioning will occur only when all hook-ups, tie-ins and terminations have been completed and signed off on the manufacturers start-up request form by the installer.



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- B. The commissioning will require the system manufacturer or his representative to provide on-site training for the Owners personnel on the operation and maintenance of the packaged pumping system.

4.3 TRAINING

- A. System manufacturer or his representative shall be available for site instructional training
- B. Provide training, operation, maintenance and trouble shooting of unit
- C. Provide instruction for a minimum of () hours
- D. Provide required educational materials for a minimum of three (3) personnel.
- E. Provide minimum 10-day notice of start-up and training.

(End of Section)



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A-C Fire Pump

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a xylem brand