

Vertical turbine fire pumps

Specifications

Division 15 - Mechanical

Section 15320 Fire Pumps

1.00 Part 1 - General

1.01 Description of work:

- A. Provide pumps for fire suppression.

1.02 Section includes:

- A. Vertical Turbine Fire Pump

Related documents:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section.
 - Section *** - Submittals
 - Section *** - Pipe and Fittings
 - Section *** - Mechanical General Requirements
 - Section *** - Electric Motors
 - Section *** - Electrical General Requirements
 - Section *** - Fire Pump Controllers
 - Section *** - Jockey Pumps
 - Section *** - Controller – Jockey Pump

1.03 Quality assurance:

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.
- B. The fire pump shall be assembled by the pump manufacturer. An assembler of fire pumps not engaged in the design and construction of fire pumps shall not be considered as a fire pump manufacturer. The manufacturer shall assume "Unit Responsibility" for the complete fire pump. Unit responsibility shall be defined as responsibility for interface and successful operation of all system components supplied by the pumping system manufacturer.
- C. Ensure pump pressure ratings are at least equal to system's maximum operating pressure at point where installed, but not less than specified.
- D. The manufacturer shall have a minimum of 20 years experience in the design and construction of fire pump systems.

- E. The manufacturer shall carry a minimum product liability insurance of \$2,000,000 per occurrence, with an aggregate product liability of \$6,000,000.
- F. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. This pump start-up shall be by the pump manufacturer or a certified factory trained representative per NFPA 20, Section 11-2. This start-up shall include verification of proper installation, system initiation, adjustment and fine tuning. Start-up shall not be considered complete until the sequence of operation, including all alarms, has been sufficiently demonstrated to the owner or owner's designated representative. This job site visit shall occur only after all hook-ups, tie-ins, and terminations have been completed and signed off on the manufacturer's start-up request form.

1.04 Product handling:

- A. **Protection:** Use all means necessary to protect equipment before, during, and after installation in accordance with manufacturer's storage, installation and maintenance instructions.

1.05 Regulatory requirements:

- A. National Fire Protection Association (NFPA 20)
- B. Factory Mutual (FM)
- C. Institute of Electrical and Electronic Engineers (IEEE)
- D. National Electrical Manufacturers Association (NEMA)
- E. American Society for Testing and Materials (ASTM)
- F. National Electric Code (NEC)
- G. Occupational Safety and Health Administration (OSHA)
- H. ANSI/HI standards
- I. Underwriters Laboratories, Inc.

1.06 Submittal:

- 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 rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, and accessories. Indicate pump's operating point on curves.
- D. Hanging and support requirements should follow the recommendations in the manufacturer's installation instructions.

1.07 Operation and maintenance data:

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.

1.08 Delivery, storage, and handling:

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids. Materials damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- B. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

1.09 Warranty:

- A. Provide a minimum one (1) year warranty from the date of operation or eighteen (18) months from the date of shipment on the product, whichever comes first.

2.00 Part 2- Products

- A. The specifying engineer reserves the right to specify a primary supplier/lead spec manufacturer on all supplied schedule and specification documents. These primary suppliers have lead their respective industry in research and development and their products have had proven track records in the field. These primary suppliers, in the opinion of this engineering firm, produce a superior product to the alternately listed manufacturers. The contractor may choose to supply equivalent equipment as manufactured by the alternately specified manufacturer. This alternately specified equipment will be supplied on a deduct alternate basis and based on the approval of the supplied alternate manufacturer's submittals.

The use of a primary supplier and deduct alternates protects the specifying engineer's design concept, but allows for a check-and-balance system to protect the post-commissioning owner.

2.01 Vertical turbine pump for fire service

A. Scope

This specification covers a lineshaft turbine pump with above ground discharge, the lineshaft bearings lubricated by the water being pumped and furnished with suitable driver and accessories as specified herein. The pumping unit shall be designed and furnished in accordance with the latest Hydraulic Institute, NFPA-20 and UL/FM Standards.

B. Service Conditions

The pump shall be designed and constructed to operate satisfactorily with a reasonable service life, when installed in a dependable and adequate water resource location. The pump shall be the product of, and manufactured by AC Fire Pump. Other manufacturers will be considered providing the unit offered is an approved equal in all respects to the brand and model preferred by the customer. Factory pump curves for alternate pumps shall be submitted with the bid.

C. Operating Conditions

The pump will provide a rated capacity of _____ GPM at a bowl pressure of _____ PSI. At 150% of rated capacity, the pump shall develop at least 65% of its rated head and shall not exceed 140% of the rated head at zero capacity. The overall length of the pump will be _____ feet _____ inches. The pump shall be tested at the factory and a test curve shall be submitted showing the performance and horsepower requirements based on this test before final acceptance.

D. Pump Construction

1. **Bowl assembly:** The intermediate bowls, suction bell, and discharge bowl shall be flanged type constructed of close grained cast iron, and shall conform to ASTM designation A48, class 30. They shall be free from sand holes, blow holes, or other faults and must be accurately machined and fitted to close tolerances. The intermediate bowls shall have enamel or epoxy lined waterways for maximum efficiency and wear protection. All intermediate bowls shall be of identical design for interchangeability. A discharge bowl shall be used to connect bowls to the discharge column. All the bowls shall be fitted with sleeve type bearings of bronze alloy C89835.
2. **Impellers:** The impellers shall be constructed from ASTM B584 Silicon Bronze and shall be the enclosed type. They shall be free from defects and must be accurately cast, machined for optimum performance and minimum vibration. Impellers are to be balanced to grade G6.3 of ISO 1940 as minimum. They shall be securely fastened to the bowl shaft with taper locks of C1018 steel and key and split thrust ring of SS. The impeller running position shall be adjustable by shaft adjusting nut in the discharge head or on top of the hollow shaft driver.
3. **Suction:** The suction bell shall be provided with a non-soluble grease packed bronze bearing, and a bronze sand collar shall be incorporated in the pump design to protect this bearing from abrasives. The bearing housing shall have sufficient opening at the bottom for easy removal of the bearing. A bronze basket type strainer shall be attached to the suction bell. It shall have a free area of at least four times the flow area of the suction connection size and the opening shall be sized to restrict the passage of ½" solids.
4. **Wear Ring:** Bowl assembly shall be fitted with replaceable wear rings of C95200 bronze material in the suction bowl and intermediate bowls. Wear rings shall have the minimum practical clearance to the mating cylindrical surface of the impeller to provide adequate sealing independent of vertical positioning of the impellers.
5. **Shaft:** The bowl shaft shall be constructed from ASTM 582 type 416 stainless steel. It shall be precision turned and ground with surface finish better than 40 RMS and shall be supported by water lubricated bearings of C89835 bronze alloy.

E. Column Assembly - Water Lubricated

1. **Column pipe:** The column pipe shall be furnished in sections not exceeding a nominal length of 10 ft and shall be connected by threaded sleeve couplings or flanges. The length of the top and bottom sections shall not be more than 5 ft. It shall be of ASTM A53 grade A steel pipe and the weight shall be not less than schedule 30. The threaded pipe shall be with 8 threads per inch with 3/16" taper per foot thread and faced parallel to butt against the centering spiders to form accurate alignment. All column flange faces shall be parallel and machined for rabbet fit to permit accurate alignment. The inside diameter of the pipe shall be such that the head losses shall not be more than 5 feet per 100 feet of pipe.
2. **Lineshaft:** The lineshaft shall be furnished in interchangeable section not over ten feet in length, and shall be coupled with threaded steel couplings machined from solid steel bar. It shall have left-hand thread to tighten during pump operation. The diameter of the shaft shall be based on a combined shear stress of not more than 18% of the ultimate strength or not excess of 30% of the elastic limit in tension of the shafting material. The coupling shall be designed with higher safety factor than shaft. Lineshaft and coupling shall be of type 416 stainless steel. Centering spiders shall be furnished at each column pipe joint for shaft stabilization. Bearings shall be fluted rubber.

F. Discharge Head Assembly - Water Lubricated

1. **Discharge Head:** It shall be of the high profile type to allow shaft coupled above stuffing box and provided for mounting the driver and support the column and bowl assemblies it shall be of high-grade cast iron, ASTM A536 ductile iron. The above ground outlet shall be flanged to match ___ inch ANSI class 125 (for cast iron) or class 150 (for steel). It shall have a 1/2" NPT connection for a pressure gauge.
2. **Stuffing Box:** The stuffing box shall be cast iron and shall contain a minimum of five rings of packing with lantern ring. It shall have a pressure relief connection. The packing gland shall be a 316SS split type secured in place with non-corrosive studs and nuts. The bearing shall be C89835 bronze. A rubber slinger shall be secured to the shaft above the packing gland.

2.02 Accessories

A. The Vertical Turbine Fire Pump shall be furnished with the following fittings as standard:

1. Combination air release and vacuum break valve
2. 4" discharge pressure gauge

B. Other fittings and accessories may include the following based on the specification:

1. Hose valve test header
 - i. (___) hose valve with 2 1/2" NST
 - ii. (___) caps and chains for the above hose valves
2. Main relief valve
3. Closed waste cone
4. Flowmeter

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