

## SECTION 21 31 13

### FIRE PUMPS

#### PART 1 - GENERAL

##### 1.01 RELATED

- A. "General Requirements", Division 1 and Mechanical and Plumbing Basic Materials and Methods Spec Sections 22 05 00 and 23 05 00 of the Project Manual, and Division 21 13 13 "Fire Protection" pertain to and are hereby made part of the work of the Spec Section.

##### 1.02 REFERENCE STANDARDS

- A. NFPA 12 Standard for the Installation of Sprinkler System, current edition as adopted.
- B. NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protections, current edition as adopted.
- C. NFPA 14 Standard for the Installation for Standpipes and Hose Systems, current edition as adopted
- D. NFPA 70 National Electric Code, current edition as adopted.
- E. UL( FPED) – Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition
- F. UL 448 – Centrifugal Stationary Pumps for Fire-Protection Service; Underwriters Laboratories Inc.; current edition
- G. UL 778 – Standard for Motor-Operated Water Pumps; Underwriters Laboratories Inc.; current edition
- H. UL 1478 – Fire Pump Relief Valves; Underwriters Laboratories Inc.; current edition

##### 1.03 DESCRIPTION OF WORK

- A. The work under this Section includes furnishing all fire protection fire pumps and all required auxiliary equipment, specialties and all labor necessary to make the installation of the Fire Protection Fire Pump System as indicated on the drawings and specified herein.

##### 1.04 SYSTEM DESCRIPTION

- A. Provide a complete electric-drive fire pump unit and required auxiliary equipment to provide the required pressure for the fire protection system as indicated on the drawings.
- B. Diesel engine fire pumps are not allowed
- C. Limited Service Controllers are not allowed.

##### 1.05 QUALITY ASSURANCE

- A. Provide only U.L. (Underwriters Laboratories) listed and approved fire protection equipment including but not limited to fire pump, controller, electric jockey pump, electric motor driver and accessories.
- B. Code Compliance Products, General: Comply with local and state governing regulations which require the products used for fire protection fire pump systems to be selected from lists in certain published latest editions of standards or codes as indicated therein.
- C. Manufacturer: Except for products required to comply with recognized product listings, provide fire protection fire pump system products and accessories produced by a fire protection manufacturer with not less than 5 years experience in manufacturing similar products.
- D. Installer and Designer: A firm shall have at least 3 years of successful installation and design experience on project involving fire protection pump work. Installers and designers shall have a valid license with Denver Fire Department at the time of design and installation.
- E. NFPA Code: Comply with NFPA 13, entitled "Standard for the Installation of Sprinkler Systems".
- F. NFPA Compliance: Comply with NFPA 14 entitled, "Standard for the Installation of Standpipe and Hose Systems."

- G. Requirements: Entire fire protection system shall be designed, furnished, and installed in strict conformance to NFPA Chapter 13 and all related regulations and requirements.
- H. NFPA Code: Comply with NFPA 20, entitled, Standard for the Installation of Fire Pumps for Fire Protection.”
- I. NFPA Code: Comply with NFPA 70, entitled, “National Electrical Code”

## 1.06 SUBMITTALS

### A. General Requirements:

1. All submittals shall comply with DPS Design and Construction Standards.
2. The owner reserves the right to charge the Fire Suppression Contractor for multiple reviews by DPS if more than two (2) submittals (either for shop drawings or record drawings) are made by the Fire suppression contractor. The owner reserves the right to charge the contractor for multiple reviews of the same submittal (or of a rejected submittal) if more than two (2) submittals are made by the contractor.
3. Initial submission shall be no later than thirty (30) days after the Notice to Proceed. Before work commences, the contractor shall provide DPS and the DPS fire suppression technician with copies of all shop drawings and in progress changes to those drawings.
4. DPS shall be notified of all AHJ(s) plan review comments within one working day after receiving comments. Responses to AHJ(s) plan review comments from the contractor shall be within 10 working days after receiving AHJ comments and DPS shall be notified with the contractor response comments.
5. Equipment submittals shall contain annotated descriptive data to show the specific model, type and size of each item the contractor proposes to furnish. Catalog product sheets shall be submitted in a suitable folder or binder and indexed referencing the applicable specification sections. Unclear or partial reproductions of manufacturer’s original catalog cuts or descriptive data shall not be accepted. Each item supplied shall be clearly identified on each sheet. Where the submittal material describes items, in addition to the items being submitted, the additional items shall be crossed out and the submittal item shall be identified.
6. Submit proof of compatibility for equipment components required to be approved as a system.
7. The System Design Engineer and/or Contractor shall acquire all necessary drawings from DPS Space Management Office to develop compete submittals.
8. The Systems Design Engineer and/or Contractor shall provide full submittals, including hydraulic calculations, product data, riser diagrams, designer certification, installer qualifications, employee certifications, test certifications, and shop drawings. Partial and incomplete submittals shall not be acceptable.
9. Review by DPS shall not relieve the System Design Engineer and/or Contractor from full compliance with requirements of the contract documents, codes, and standards.
10. The System Design Engineer and/or Contractor shall field verify all existing conditions:
  - a. Note: Electronic documents provided by DPS are obtained from reliable sources. Although it is deemed to be valid, neither the Facility Management Department nor any other school department or official can warrant the accuracy of the material. System Design Engineer and/or Contractor are required to field verify all existing conditions and information.
  - b. Should any discrepancies arise, DPP shall be notified in writing before or during the bid period.

### B. Shop Drawing:

1. Submit detailed shop drawings including a fire pump room, riser diagram, hydraulic calculations, equipment data sheet submittals, and employee certification in accordance with NFPA.
2. Submit anchoring details and calculations in accordance with DPS Design & Construction Standards.
3. Drawings shall be a minimum size of 24”x36” and a maximum size of 30”x42”, with a minimum scale of 1/8”=1’10”. Shop drawings, hydraulic calculations, and equipment data sheets shall be submitted for review.

C. Prior to submitting shop drawings to the Engineer for approval, shop drawings shall be submitted to the local building department and the local fire prevention bureau authorities for their review and approval of the fire pump size, capacity, pressure, and system interface. Only approved drawings shall be reviewed by the Engineer.

D. Product Data: Submit manufacturer’s data on all fire protection fire pump system piping material, accessories and products. Include all data on fire protection pumps including but not limited to pump characteristics, performance curves certified where indicated.

- E. Shop Drawings:
- F. Submit shop drawings for the fire protection fire pump systems showing the sizes, location, accessories, valves, gauges, equipment connections, wiring diagrams and typical details for unit installation.
- G. Certification of Installation; Fire Sprinkler Fire Pump: Submit certificate upon completion of fire pump installation which indicates that the work has been tested in accordance with NFPA 13, and also that system is operational, complete, and has no defects.
- H. Fire Pump test and procedures and certificate format are contained in NFPA No. 13.

## PART 2 - PRODUCTS

### 2.01 APPROVED MANUFACTURERS

- A. Provide products produced by one of the following (for each type of accessories or system).
- B. Fire Pumps Equipment
  - 1. Allis-Chalmers Corp.
  - 2. Aurora Pump Div., General Signal Corp.
  - 3. Fairbanks Morse Pump Div., Colt Ind.
  - 4. Patterson Pump Company
  - 5. Peerless Pump

### 2.02 ELECTRIC DRIVEN FIRE PROTECTION PUMPS

- A. **FIRE PUMP:** The pumps shall be an approved manufacture from section 2.01. The pump shall be rated for the required flow and hydraulic head as calculated by the delegated-design fire protection contractor. The pump shall be listed by UL and be approved by FM. The pump shall deliver not less than 65% of rated pressure at 150% of rated flow. The shut off pressure shall not exceed 140% of rated pressure.

**Electric Drivers:** The motors shall be listed by Underwriters' Laboratories. It shall be open drip proof with a 1.15 service factor and shall comply with the provisions of NFPA 70, National Electric Code as described in NFPA 20. The motor shall be mounted on a bent steel frame.

- B. **Controller:** The motor controller shall be listed by UL and approved by FM for fire pump service. It shall be compatible with the motor horsepower and voltage. It shall be of the ACROSS-THE-LINE type with a withstand rating of 100Ka short circuit symmetrical amperes. The controller enclosure shall be of NEMA 2 type. The controller shall have pre-piped ½" brass pipe pressure sensing line run from the discharge piping to the pressure switch.
- C. **Pressure Maintenance (Jockey or Make-Up) Pump:** The jockey pump shall be listed by UL and approved by FM for fire pump service. The pump shall be rated for 2 GPM @ 117 PSI. The jockey pump will be close coupled to a 1.5 hp @ 3600 rpm ODP motor. The motor will operate on 3 phase, 60 hertz, and 208 volts.

**Jockey Pump Controller:** A METRON model MB15B jockey pump controller shall be supplied. The jockey pump controller shall come complete with a fusible disconnect, front mounted hand-off-auto selector switch, and overload relays. The controller enclosure shall be of NEMA 2 type. The controller shall have ½" brass pressure sensing line run from the discharge piping to the pressure switch. Provide jockey controller with disconnect, pressure switch and casing relief valve.

- D. All equipment shall be factory tested in accordance with the requirements of NFPA, UL, and FM. The entire package system shall be hydrostatically tested by the pump manufacturer at 100 psi.

- E. **Provide a Remote panel and no start switch.**

### **2.03 FIRE PROTECTION AUXILIARY EQUIPMENT**

- A. Provide for the fire pump, a motor controller, which shall be listed by Underwriters Laboratories and/or approved by Factory Mutual for fire pump service. The controller shall be h the listed motor horsepower and voltage. The controller shall be across the line type. The controller shall be completely assembled and tested by the manufacturer. Unit installation shall conform to NFPA 20 and Division 16 of these specifications.
- B. The Jockey Pump controller shall be furnished with a fusible disconnect, pre-piped Mercoid pressure switch, front mounted HAND-OFF-AUTO selector switch, and overload relays, all mounted in a NEMA rated enclosure. Controls shall be compatible with jockey pump and main pump.
- C. Fire Protection Pump Fittings: Provide fire protection pump fittings, including UL listed, automatic release valve, suction and discharge gauges to be liquid filled (0 to 300 psig) 3-1/2" dial faces, isolating gate suction valve, an isolating butterfly discharge valve, a water check valve, and a main relief valve with and enclosed waste cone properly sized for rated flow. Provide concentric discharge increasers, hose valve caps, and eccentric suction reducers, as recommended by pump manufacturer for applications and working pressures, indicated.
- D. Provide a power distribution system to accept the incoming feeder and distribute power to the electric motor controller and the jockey pump in accordance with manufacturers' requirements.

## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

- A. Installer must examine the subs trades and conditions under which the fire protection fire pump system and accessories are to be installed, and notify the Contractor in writing of conditions, detrimental to the proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

### **3.02 PREPARATION**

- A. The Contractor shall verify dimensions and conditions governing his work at the building. No extra compensation shall be claimed or allowed, due to failure to report unfavorable conditions affecting his work.

### **3.03 INSTALLATION OF FIRE PUMPS**

- A. Install fire protection pumps where shown, in accordance with manufacturer's written instructions, complying with FM and NFPA No. 20, and with recognized industry practices, to ensure that fire protection pumps comply with requirements and serve intended purposes. Comply with NEMA standards and installation requirements of NEC. Fire pump and jockey pump shall be mounted on 6 inch concrete equipment pad with minimum of 6 inch on side with chamfer top edges. Concrete strength shall be 4,000psi or greater.
- B. Coordinate with other work, including plumbing, standpipe, and fire sprinkler piping as necessary to interface installation of fire protection pumps properly with other components of fire water protection system.
- C. Check alignment and where necessary (and possible), realign shafts of motors and pumps within tolerances recommended by Manufacturer.
- D. Install pumps and pump drives on vibration mounts as shown; comply with manufacturer's indicated installation method, if any, and with other Division 15 Sections. Provide motor controllers and coordinate requirements with Division 16 regarding connections and installation.

- E. Ensure that fire protection pump units are wired properly, with rotation in direction indicated and intended for proper pump performance.
- F. Provide pumps and motors with electrical equipment grounding.
- G. Upon completion of installation of fire protection pumps, perform field acceptance tests of pumps, complying with operating instructions and procedures of NFPA 20 to demonstrate compliance with requirements. Where possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units, which cannot be satisfactorily corrected.

#### **3.04 ADJUST AND CLEAN**

- A. Prior to energizing fire pump, assure that unit is clean and adjusted to the proper requirements. Provide final checkout in accordance with NFPA 20.

#### **3.05 DEMONSTRATION**

- A. Start-Up Services: Provide the services of a factory-authorized service representative to start-up fire pump units, in accordance with manufacturer's written start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- B. Operating and Maintenance Training: Provide services of manufacturer's service representative to instruct Owner's personnel in operation and maintenance of fire pump units. Review operating and maintenance data contained in the Operating and Maintenance Manuals specified in Division One.

**END OF SECTION 23 31 13**