

**SECTION 5.21.30 - FIRE PUMPS**  
**DESIGN AND CONSTRUCTION STANDARD**

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**PART 1 GENERAL**

1.01 Scope of Standard

- A. This standard provides general requirements of The University of Texas at Austin for fire pumps. This document is not intended to serve as a guide specification.
- B. The design guidelines contained herein include the requirements for fire pump systems at The University of Texas at Austin. It is the intention of this document to provide a minimum standard for the installation of fire pump systems at the University so as to provide the highest level of fire safety possible.

1.02 Scope of Work

- A. Provide a complete fire pump system as defined by the latest edition of NFPA 20. Portions of the campus have been provided with a dedicated Fire Water Distribution System (FWDS) supplied by existing fire pumps to supply standpipe and sprinkler systems. If the building may be connected to the FWDS, a water flow pump test shall be performed by the contractor with FSSS providing labor to run the test (FSSS will NOT be responsible for the test readings and the contractor shall supply all equipment necessary to obtain the readings including pressure gauges, pitot tubes, etc.) calculations must be provided to the University utilizing the existing FWDS fire pumps to provide the highest pressure and flow demand required for the sprinkler or standpipe system planned for the building, prior to the design and installation of a new building fire pump system. Upon University approval of the calculations and fire pump product data, If the FWDS fails to meet the highest calculated demand, design and procurement of the fire pump system components may be initiated. If the calculations indicate the FWDS fire pumps can provide the required flow and pressure for the building standpipe and/or sprinkler systems, a new fire pump is not required and the system may be connected to the campus FWDS. See standard 5.21.40 Fire Water Distribution System Connection for details concerning connection to the FWDS.

SEE JOCKEY PUMP DETAIL IN APPENDICES SECTION.

- B. The work addressed in this section consists of a fire pump system which will be coordinated with all of the following:
  - 1. Fire Alarm Systems
  - 2. Emergency power systems
  - 3. Central control and monitoring system.
  - 4. Water based fire suppression systems.
- C. Reference Standards (Utilize latest editions available):

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1. NFPA 13-Installation of Sprinkler Systems.
2. NFPA 14-Installation of Standpipe and Hose Systems.
3. NFPA 20-Standard for the Installation of Stationary Fire Pumps for Fire Protection.
4. NFPA 24-Installation of Private Fire Service Mains and their Appurtenances.
5. NFPA 25-Standard for the Inspection, Testing, and Maintenance of Water Based Fire Protection Systems.

1.03 Related Work: References/Quality Assurance

- A. The University of Texas, State Fire Marshal adopted codes, International Building Code, National Fire Codes as published by the National Fire Protection Association (NFPA) contain fire protection criteria and requirements for the design of all fire suppression systems. The project shall conform to the following:
  1. Conform to a minimum of the latest edition of NFPA 20 for fire pumps. FM may require design in excess of NFPA 20 and State Fire Marshal adopted codes.
  2. All design shall conform to requirements of NFPA and State Fire Marshal.

1.04 Submittals

- A. The University of Texas Project Manager shall review and distribute all submittals including design, calculations, and material data sheets for approval by the University insurer, the UT Fire Marshal, the Owner representative, and others as appropriate.
- B. Refer to provisions established in the Project Specifications and in related section of Division 01 – General Requirements. All product data shall be submitted under provisions of Division 01.
- C. Manufacturer’s data sheets shall be provided for all materials and equipment for approval before purchase or installation. Data sheets shall describe the type of material, capacities, manufacturer, and part numbers of equipment and give information necessary for verifying equipment approval.
- D. The Contractor shall submit detailed and accurate shop drawings prepared in accordance with NFPA 20, and NFPA 24 for approval of all equipment to be constructed and installed. Shop drawings shall identify all materials and list all equipment to be used. Shop drawings shall include ceiling grid or reflected ceiling layout and shall be coordinated with other trades prior to submittal.

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- E. No work shall be performed until the University has approved the shop drawings, calculations, and data sheets for the new fire pump. The contractor is solely liable for any work performed prior to this approval.

**PART 2 PRODUCTS**

2.01 Fire Pump, Motor, and Controller

- A. The pump furnished for fire protection service shall be supplied with a driver, controller and pump accessory items specified by the pump manufacturer.
- B. The pump and controller shall be UL listed or FM approved for fire service, per NFPA 20.
- C. The fire pump shall be a single stage, centrifugal horizontal split-case pump specifically labeled for fire service.
- D. The pump and motor shall be mounted on a common baseplate of formed steel.
- E. The pump casing shall be cast iron with 125 pound rated suction, unless the maximum pressure at the suction side of the pump exceeds 125 psi, and 250 pound rated discharge flanges machined to American National Standards Institute (ANSI) dimensions.
- F. The pump shall be hydrostatically tested and run tested prior to shipment. The pump shall be hydrostatically tested at a pressure of not less than one and one-half times the no flow (shut off) head of the pump's maximum diameter impeller plus the maximum allowable suction head, but in no case not less than 250 psi.
- G. Fittings
  - 1. The pump manufacturer shall furnish piping accessory items for the pump installation which will adapt the pump connections to the fire protection system and test connection as follows: Fittings subjected to pump discharge pressure shall be ANSI 250 psi rated. Fittings subjected to suction pressure shall be 125 psi rated, unless the maximum pressure at the suction side of the pump exceeds 125 psi.
- H. Fire Pump Test Header:
  - 1. Fire Pump Test Header:
    - a. Provide a fire pump test header with a 2-1/2" hose valve for every 250 gpm of the rated flow of the fire pump per NFPA 20.
    - b. Size the fire pump test header based on the fire pump rating per NFPA 20.

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- I. Fire Pump, Motor, and Controller:
1. The main fire pump controller shall be a factory assembled, wired, and tested unit.
  2. The controller shall be of the combined manual and automatic type designed for across-the-line type starting. Variable Frequency Drive controllers are not acceptable.
  3. The minimum withstand rating of the controller shall not be less than 30,000 Amps RMS Symmetrical at 480 volts.
  4. The controller shall include a motor rated combination disconnect switch/circuit breaker, mechanically interlocked and operated with a single externally mounted handle. When moving the handle from "OFF" to "ON" the interlocking mechanism shall sequence the isolating disconnect switch "ON" first and then the circuit breaker. When the handle is moved from "ON" to "OFF" the interlocking mechanism shall sequence the circuit breaker open first, and then the isolating disconnect switch.
  5. The controller shall have externally mounted, individual, visible indicators for "Power Available", "Phase Failure", "Phase Reversal", "Pump Running", and "Run Time On."
  6. The controller shall be wired so that the fire pump can only be shut down manually, per FM requirements.
  7. Individual "Phase Failure", "Phase Reversal" and "Pump Operating" alarm contacts shall be wired for connection to the Main Fire Alarm Control Panel, and the FCMS.
  8. Where required by NFPA 20, the controller shall be equipped with an automatic transfer switch. Power to the transfer switch shall be supplied by one of the NFPA 20 required power sources.
  9. The manufacturer shall test the entire controller assembly prior to shipment. This test shall include each function the controller may be required to perform. The manufacturer shall test the circuit breaker at 300% full load, 600% load, and short circuit current settings. The manufacturer shall perform a high potential test on the controller power circuits at not less than two times the rated voltage plus 1000 Volts. Documentation of the above listed tests shall be submitted before the fire pump acceptance test.
- J. Field Acceptance

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1. Upon completion of the pump and sprinkler piping installation, a field acceptance test shall be conducted at minimum, rated, and peak loads of the fire pump by controlling the quantity of water discharged through approved test devices. All acceptance testing outlined in NFPA 20 shall be conducted by installing contractor in the presence of a representative of The University of Texas Fire Prevention Services & Safety Storm Water Management. Documentation of all factory and field tests shall be submitted at the conclusion of the field acceptance test. A&E will not approve any equipment prior to receipt and review of these test results.
2. All tests shall be performed utilizing the fire pump test header.
3. Erosion Control Requirements - Fire pump discharges must be filtered to slow flow velocity and prevent erosion. Utilize a diffuser and follow one of the filtering methods pertinent to the site:
  - a. Pervious cover – direct flow to a vegetated area capable of absorbing as much water as possible without causing erosion or damage to existing landscape. To minimize erosion and reduce sediment deposition, controls such as a series of triangular dikes or other sediment erosion controls must be in place between flow and storm drain inlet.
  - b. Impervious cover – direct flow to a cleaned area where the discharged water enters a storm drain inlet protected by filtration (e.g. 3 or 4 triangular dikes or hay bales set in series or other sediment erosion controls). All water discharge to the outside of buildings to be approved by EH&S with Storm Water Discharge request filled out by the contractor and approved by EH&S.
  - c. If the total water volume is to exceed 10,000 gallons, the discharged water must be de-chlorinated before it enters the storm sewer system either by directing water into a small area where an approved chemical to dechlorinate water (e.g. sodium metabisulfite at 1 cup or 250 mgs per 5 gallons of chlorinated water) can be sprayed into flow to remove chlorine to acceptable levels.
  - d. If the total water volume is to exceed 1,000 gallons, the discharge must be directed through an obstacle course that is designed to remove the chlorine through aeration of the water. The obstacle course shall be constructed as referenced in section 3.a. above to minimize erosion, settle out sediment, and allow chlorine to dissipate in the atmosphere.

2.02 Jockey Pump and Motor Controller

- A. The contractor shall furnish and install a jockey pump coupled to a motor rated for the required pump, not to exceed 5 HP (Maximum), 480 volts, 60 HZ, 3 phase. Jockey pump to be a Grundfos Model CR5-11 or equal.

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SEE JOCKEY PUMP DETAIL IN APPENDICES SECTION.

- B. The jockey pump shall be installed in accordance with NFPA 20. All jockey pump valves to be located as required per NFPA 20.
- C. The control valves to and from the jockey pump shall be supervised butterfly valves installed in accordance with this standard.
- D. Jockey Pump Controller:
  - 1. The jockey pump controller shall be factory assembled, wired and tested, and specifically designed for this type of service.
  - 2. The jockey pump controller shall be UL listed or FM approved.
  - 3. The pressure switch shall have a range of 0-300 psi and have independent high and low pressure settings. The pressure switch shall be mounted inside the controller. The piping connection for the pressure switch shall be installed as shown in NFPA 20 Appendix A. The pressure switch set points shall be set as shown in NFPA 20 Appendix A.
  - 4. The controller manufacturer, prior to shipment, shall hook up and test the jockey pump controller as a completed assembly. This test shall include each function the controller may be required to perform. The manufacturer shall perform a high potential test of the controller power circuits are not less than two times the rated voltage plus 1000 volts. Documentation of the above listed tests shall be submitted prior to the pump acceptance test.
- E. Field Acceptance Test:
  - 1. A field acceptance test of the jockey pump and controller shall be performed by the contractor at the same time as the main fire pump acceptance test. The acceptance test shall include each function the controller may be required to perform including manual start-stop, automatic start-stop, and minimum run timing.

**PART 3 EXECUTION**

3.01 Guarantee

- A. The Contractor shall guarantee and service all workmanship and materials to be as represented by him, and shall repair or replace, at no additional cost to the Owner, any part thereof, which may become defective within the period of one (1) year after the date of final acceptance by the Engineer, and UT. Contractor shall be responsible for, and pay for, any damages caused by, or resulting from defects in his work.

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3.02 Qualifications

- A. System design and installation shall be supervised by a licensed NICET Level III sprinkler system technician or fire protection engineer with not less than five (5) years experience with fire pump systems. Shop drawings shall be prepared and engineered. Accurate As-Built drawings shall be required in the form of three hard copies and two copies on CD in the specified format. The signature of the RME or engineer constitutes an affidavit that the statements, representations, and information presented in the submittal constitute a complete operational system conforming to applicable state laws and recognized good engineering practices. All field installation work shall be continuously supervised by a NICET Level II or III sprinkler system technician.

END OF STANDARD