

PART 1 GENERAL

1.01 Scope of Standard

- A. This standard provides general requirements of The Sam Houston State University 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 SHSU. 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.
- C. Fire pump assemblies shall include a separate and dedicated jockey pump, apart from jockey pump required to be installed on system or building-side of PRV assembly, if utilized.

1.02 Scope of Work

- A. Provide a complete fire pump system as defined by the latest edition of NFPA 20
- 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):

1.03 Related Work: References/Quality Assurance

- A. SHSU, 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. SHSU Project Manager shall review and distribute all submittals for approval by the University insurer, the SHSU AHJ, the Owner's 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, 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 13, NFPA 14, 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. Shop drawings are to be submitted with a minimum 1/8" scale and all details at a minimum 1/4" scale.
- E. Hydraulic calculations for standpipe & sprinkler systems shall comply with NFPA 13 and shall include comprehensive hydraulic data sheets. Provide a 10 psi or 10% safety factor, whichever is greater, for all standpipe system hydraulic calculations.
- F. Provide hydraulic calculations for automatic standpipes, where required per NFPA 14, to provide 100 psi when flowing 500 gpm at the most remote standpipe outlet and 250 gpm at each additional standpipe. Provide hydraulic calculations for manual standpipes to demonstrate the pressure available at the top of each standpipe while flowing the demand required per NFPA 14.
- G. Prior to preparing shop drawings and hydraulic calculations, the design engineer is required to verify the adequacy of the water pressure and other pertinent water supply data from the City of Huntsville water distribution system. Hydrant flow tests performed on the University distribution system shall incorporate erosion control requirements identified in this standard. See 2.10L Field Acceptance. The design engineer shall immediately notify the SHSU FSSS & AHJ and Project Manager of the need for testing the appropriate water supply or fire pump, or the need for any special considerations required. The engineer shall provide the record data at the point of the new utility connection as follows:
- 1 Building Name and flange elevation (ft)
 - 2 Test hydrants (hydrant numbers and location) and hydrant elevations (ft)
 - 3 Flow rate (gpm), static pressure (psi), and residual pressure (psi)
 - 4 All turning of valves and operation of fire pump to be performed by FSSS. Actual test to be performed by Contractor or Engineer utilizing their own equipment.
 - 5 If flowing water on campus, the Project Manager shall submit a request for approval to FSSS & EH&S.
- H. No work shall be performed until the University has approved the shop drawings, calculations, and data sheets. 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 and/or FM approved for fire service, per NFPA 20.

Controller: SHSU specifies Metron controllers

- 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.

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 Reversal", "Pump Running", and "Run Time On."
- 6 The controller shall be wired so that the fire pump can be shut down automatically utilizing pump run-timer.
- 7 Individual "Power Failure", "Phase Reversal" and "Pump Running" alarm contacts shall be wired for connection to the Main Fire Alarm Control Panel, and the FCMS.
 - a. 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

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 SHSU FSSS. 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:

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.

- B. The jockey pump shall be installed in accordance with NFPA 20. All jockey pump valves and sensing lines to be located as required per SHSU Detail 5.21.40
- C. Not Used
- 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 and/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 per SHSU Detail 5.21.40. The pressure switch set points shall be determined by Professional Services Provider and in accordance with 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.
 5. All jockey pumps shall be served by emergency power circuits.
- E. Field Acceptance Test:
1. A field acceptance test of the jockey pump and controller shall be performed by the contractor, and witnessed by SHSU FSSS 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 SHSU. Contractor shall be responsible for, and pay for, any damages caused by, or resulting from defects in his work.

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 AutoCAD 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.

3.03 System Acceptance Testing and Commissioning

- A. Perform acceptance tests according to NFPA 20 & 25. Provide copies of test reports to the SHSU AHJ, SHSU FSSS, A&E Services, and other interested parties as tests are completed. Prior to acceptance, accurate red-lines must be submitted and required training for SHSU personnel completed. Provide a complete set including all test results to the Owner at the completion of the project and a copy in each O&M Manual. All Fire Sprinkler Systems to be tagged per State Fire Marshall's requirements.

3.04 Warranty

- A. Warranty shall be good for one year.
- B. Contractor to respond to all warranty calls within 24 hours. If equipment cannot be repaired at this time, FSSS shall be updated daily with the progress and/or status.
- C. See Fire Alarm Warranty

END OF STANDARD