SECTION 21 30 00

FIRE PUMPS

PART 1 – GENERAL

1.1 PURPOSE

A. This guideline is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. PSP is to apply the principles of this section such that the University of Texas at Arlington (UTA) may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be approved by UTA and may require justification through Life Cycle Cost (LCC) analysis and submitted to UTA for approval.

1.2 **LESSONS LEARNED AND DESIGN CONSIDERATIONS**

A.

1.3 THE FOLLOWING SECTIONS ARE TO BE INCLUDED AS IF WRITTEN HEREIN:

A. Section 21 00 00 – Basic Fire Protection Requirements
B. Section 21 05 29 – Fire Protection Supports and Sleeves
C. Section 21 05 13 – Fire Protection Motors
D. Section 21 05 53 – Fire protection Piping and Equipment Identification

1.4 SECTION INCLUDES

A. Fire pump package
B. Fire pump [motor] [engine]
C. Electric jockey pump
D. Controllers
E. Fire Pump Test Header
F. Flow metering device

1.5 RELATED SECTIONS

A. Section 21 05 13 – Fire Protection Motors
B. Section 21 13 13 – Fire Protection Systems
C. Section 26 27 26 – Equipment Wiring Systems

1.6 REFERENCES

A. Factory Mutual System (FM) – Approval Guide
B. NEMA MG-1 – Motors and Generators
C. NEMA 250 – Enclosures for Electrical Equipment (1000 Volt Maximum)
D. NFPA 20 – Installation of Centrifugal Fire Pumps, 2019
E. NFPA 24 – Private Fire Service Mains and their Appurtenances, 2019
F. UL – Fire Protection Equipment Directory
G. UL 448 – Pumps for Fire Protection Service
H. UL 778 – Motor Operated Water Pumps
I. UL 1478 – Fire Pump Relief Valves

1.7 SYSTEM DESCRIPTION

A. [Electric motor] driven horizontal, double inlet, split case fire pump with jockey pump [electric controllers].

1.8 SUBMITTALS

A. Submit under provisions of Section 21 00 00.
B. Shop Drawings: Indicate layout, general assembly, components, dimensions, weights, clearances, and methods of assembly.
C. Product Data: Provide manufacturers literature including general assembly, pump curves showing performance characteristics with pump and system with operating point indicated, NPSH curve, controls, wiring diagrams, and service connections.

D. Manufacturer's Installation Instruction: Indicate support details, connection requirements, and include start-up instructions for fire pump system.
E. Manufacturer's Certificate: Certify that fire pump(s) meet or exceed specified requirements at specified operating conditions. Submit summary and results of shop tests performed in accordance with NFPA 20.
F. Field Reports: Indicate summary of hydrostatic test and field acceptance tests performed in accordance with NFPA 20.

1.9 OPERATION AND MAINTENANCE DATA
A. Submit under provisions of Section 21 00 00.
B. Operation Data: Include manufacturer's instructions, start-up data, trouble-shooting checklists, for pumps, drivers, and controllers.
C. Maintenance Data: Include manufacturer's literature, cleaning procedures, replacement parts lists, and repair data for pumps, drivers and controllers.

1.10 QUALITY ASSURANCE
A. Perform work in accordance with NFPA 20.
B. Equipment and Components: Bear UL and FM label or marking.
C. Maintain one copy of each document onsite.

1.11 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.
B. Installer: Company specializing in performing the work of this Section with minimum three years documented experience.

1.12 REGULATORY REQUIREMENTS
A. Conform to NFPA 20 for installation and testing of fire pumps, drivers, and controllers.
B. Provide certificate of compliance from authority have jurisdiction indicating approval of field acceptance tests.

1.13 DELIVERY, STORAGE, AND HANDLING
A. Delivery, store, protect and handle products to site under provisions of Section 21 00 00.
B. Accept fire pumps and components on site in factory packing. Inspect for damage. Comply with manufacturers rigging and installation instructions.
C. Protect fire pumps and components from physical damage including effects of weather, water, and construction debris.
D. Provide temporary inlet and outlet caps and maintain in place until installation.

PART 2 – PRODUCTS

2.1 HORIZONTAL BASE MOUNTED PUMPS
E. Type: NFPA 20 compliant UL 448 and UL 778 listed, horizontal shaft, single stage, double suction, direct connected, horizontally split casing, pump suction flange shall be rated for 125 psi working pressure on inlet side and the discharge flanged shall be rated for 250 psi, manufactured by Aurora, Peerless, Patterson or AC.
F. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
G. Impeller: Bronze double suction fully enclosed, balanced and keyed to shaft.
H. Bearings: Grease lubricated ball bearings, replaceable without opening casing.
I. Shaft: Alloy steel with replaceable bronze shaft.
J. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 230 degrees F maximum continuous operating temperature.
K. Drive: Metal coupling with coupling guard.
L. Baseplate: Cast iron with integral drain rim.
M. Motor: Squirrel cage induction type in open drip proof NEMA MG-1 enclosure [1750] [3450] RPM

2.2 FIRE PUMP ACCESSORIES
A. Eccentric suction reducer and OS&Y gate or butterfly valve on suction side of pump.

B. Concentric increaser and check valve in pump discharge and OS&Y gate or butterfly valve on system side of check valve.
C. Fire pump bypass fitted with OS&Y gate or butterfly valves and check valve.
D. Main relief valve, UL 1478, and open type waste cone.
E. Suction pressure gage, 4 1/2-inch diameter dial with snubber, valve cock and lever handle.
F. Discharge pressure gage mounted on board attached to pump, with snubber, valve cock and lever handle.
G. Casing 3/4-inch relief valve.
H. Float operated 3/4-inch automatic air release valve.
I. Provide a wall mounted fire pump test header, consisting of a ductile iron body,(3) 2-1/2" swivel inlet hose gate valves with male hose threaded outlet, angle style 6" inlet, fire pump test connection, complete with polished chrome plated exposed surfaces, with plate lettered "Pump Test Connection", manufactured by Potter Roemer No. 5863-7-13-D, or approved equal.
J. Provide flow metering system for closed loop testing. The flow meter shall be FM approved for testing fire pumps, flanged venture type BV manufactured by Aeroequip, or approved equal.

2.3 ELECTRIC MOTOR DRIVE

A. Combination Fire Pump Controller/Automatic Transfer Switch: The fire pump controller/automatic transfer switch shall be of the combined manual and automatic type, solid state reduced voltage, minimum, 100,000 amp withstand rating, full service, and UL listed and FM approved per NFPA 20 currently enforced. The fire pump controller/automatic transfer switch shall be housed in a NEMA 2 floor-mounted, non-vented enclosure, mounted on a 4" thick concrete pad, and include the following:
   1. Isolation switch with a separate NEMA operating handle interlocked with circuit breaker.
   2. Time delay circuit breaker set at 300 percent motor full load current with external LED supervised locked rotor protector, instant and time delay trip test switch, and external NEMA operator handle.
   3. Differential adjustable pressure switch with energize to start relay.
   4. Minimum run timer, 10 minutes non-adjustable, with timed out LED indicator.
   5. POWER AVAILABLE and PHASE REVERSAL pilot lights wired to the line side of the motor starter. Indicating lights shall be long life LEDs.
   6. Digital ammeter and voltmeter with three phase selector switch, calibrated traceable to NBS standards.
   7. Built in alarm panel and supervisory power pilot light powered from separate reliable 120 VAC power source with lights, bell, silence button, and lamp test switch for indication of PUMP RUNNING, POWER FAILURE, PHASE REVERSAL, TRANSFER SWITCH IN EMERGENCY, ISOLATION SWITCH OPEN. A status panel for start and run demands shall also be included. All indicating lights shall be long life LEDs with lamp test feature.
   8. START and STOP pushbuttons for manual control.
   9. Two sets each of dry form "C" contacts for remote indication at main fire alarm panel for PUMP RUNNING, POWER FAILURE, PHASE REVERSAL, TRANSFER SWITCH IN EMERGENCY, ISOLATION SWITCH OPEN, and SUPERVISORY POWER FAILURE.
   10. Digital paperless alarm recorder.
   11. Three non-fused control power transformers, surge protector wired to the load side of the isolation switch with short circuit protection, magnetic contactors with externally operable mechanical start mechanism, and restart delay timer.
   12. Automatic transfer switch housed in a separate compartment of the fire pump controller. The transfer switch shall have normal power light and monitors, emergency power light and monitor, test switch, and time delays for generator start, transfer to emergency, and retransfer to normal. All control and monitoring components shall be individually serviceable. Unit shall have, as a minimum, a 5-year warranty on parts and a 2-year warranty on labor.
   13. The fire pump controller and transfer switch shall be for fire pump scheduled horsepower, UL 1008 listed, 460 volt, 3 phase motor. Manufactured by Firetrol No. FTA1900 or approved equal by Master or Metron.

B. The fire pump controller/ATS shall also have the following control functions:
   1. Provide an interlock between the fire pump controller and ATS that will when the fire pump is running, inhibit the automatic transfer switch from "TRANSFERRING-TO-NORMAL" power source as long as the fire pump is operating on the "EMERGENCY" source.
   2. Interlock control wiring from the Fire Pump Controller to the Fire Pump Automatic Transfer Switch shall be factory-installed.

2.4 PRESSURE BOOSTER (JOCKEY) PUMP

A. Electrically operated, vertical multi-stage centrifugal type with standard open drip-proof motor manufactured by Grundfos, Aurora, Armstrong or Gould.
B. Performance: As scheduled on drawings.
C. Control by automatic jockey pump controller with full voltage starter and minimum run timer to start pump on pressure drop in system and stay in operation for minimum period of time. Fire pump shall start automatically on further pressure drop or on jockey pump failure.
D. Relief Valve: Provide the fire jockey pump with a factory-mounted bypass relief valve complete with piping. Set relief valve to relieve at a pressure of 25 psig above design total dynamic head to prevent motor overload and system damage.
E. The electric jockey pump controller shall be UL listed and NEC compliant. Unit shall include a circuit breaker, magnetic starter with overloads, 0-300 psig pressure switch, H-O-A selector switch, minimum run timer, dual fused control transformer, two sets of remote form "C" contacts for pump running, and a NEMA 2 enclosure, Master control Model PMC series, or Firetrol Model FTA500, or Metron.

PART 3 – EXECUTION

3.1 INSTALLATION

A. All installation shall be in accordance with manufacturer's instructions.
B. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For base mounted pumps, provide supports under elbows on pump suction and discharge. Refer to Section 21 13 13.
D. Provide drains for bases and seals, piped to and discharging to interior sump or exterior of building but not interfering with pedestrian pathways or landscaping.
E. Mount unit on vibration isolators. Refer to Section 21 05 48.
F. Provide piping for fuel supply and return connected to motor. Provide piping to and from exhaust silencer with thimble at wall or roof penetrations. Refer to Section 22 13 16.
G. Provide for connection to electrical service. Refer to Section 26 27 26.
H. Lubricate pumps before start-up.
I. Check, align, and certify base mounted pumps by qualified millwright prior to start-up.
J. Installation shall meet or exceed all applicable, state requirements and referenced standards having jurisdiction.
K. Provide piping to, and route discharge from all relief valves and drains to exterior of building and terminate at a location and in a manner to prevent any damage to surrounding areas.

3.2 FIELD QUALITY CONTROL

A. Perform field inspection and hydrostatic field tests on entire system in accordance with NFPA 20.

END OF SECTION