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BuildingName
The Description of the Project
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SPECIFICATION DIVISION 21

NUMBER SECTION DESCRIPTION

DIVISION 21 FIRE SUPPRESSION
SECTION 213113 - FIRE PUMPS

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DIVISION 21 FIRE SUPPRESSION
SECTION 213113 - FIRE PUMPS

REVISIONS:
07-30-07: ELCTRICAL CHANGES PER KEN BIRRINGER.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

INCLUDE PARAGRAPH 1.1.A AND B IN EVERY SPECIFICATION SECTION. EDIT RELATED SECTIONS 1.1.B TO MAKE IT PROJECT SPECIFIC.

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

1.2 SCOPE OF WORK:

A. Provide a complete UL listed, FM approved, fire pump, jockey pump, and pump controllers as specified, detailed, and scheduled, meeting all of the applicable NFPA requirements.

1.3 QUALITY ASSURANCE:

A. Provide listing/approval stamp, label, or other marking on equipment made to specified standards.

B. Comply with local fire department/marshal standards pertaining to material, hose threads, and installation.

C. Comply with the requirements of NFPA 20 "Centrifugal Fire Pumps" for fire pumps, drivers, controllers, accessories, materials, and installation.

D. Comply with the requirements of NFPA 70-2005 "National Electrical Code" for electrical materials and installation.

E. Fire pumps and controllers shall be UL listed.

F. Comply with the requirements of FM "Approval Guide" as applicable to fire pumps, drivers, controllers, and accessories, and provide system capable of FM acceptance.

G. Manufacturer's Factory Tests: Perform factory test of each fire pump.

1.4 MANUFACTURERS:

A. The following fire pump manufacturers are acceptable:

1. Allis-Chalmers
2. Aurora
3. Peerless

B. The following controller manufacturers are acceptable:

1. Joslyn Clark

2. Metron
3. Hubbell
4. Firetrol

C. The drawings show the layout of equipment based on XXXXXXXX units. Equipment by other approved manufacturers is acceptable provided it fits within the space allocated with adequate maintenance access space and meets all other requirements in the specifications and plans.

PART 2 - PRODUCTS

2.1 FIRE PUMP SYSTEMS - GENERAL REQUIREMENTS

A. Horizontal fire pumps, except in line type, and drivers shall be factory assembled, mounted on same base, and connected with a flexible coupling having a guard.

B. Fire Pumps: UL 448, base-mounted, factory-assembled, and factory-tested, of types, capacities, and characteristics indicated.

C. Preparation for Shipping: After assembly and testing, clean flanges and exposed machined metal surfaces and treat with an anticorrosion compound. Protect flanges, pipe openings, and nozzles.

D. Nameplates

1. Fire Pump and Motor, Pressure Maintenance (Jockey) Pump and Motor: Provide nameplates, complete with motor horsepower, capacity, characteristics, and other pertinent data.
2. Fire Pump and Pressure Maintenance (Jockey) Pump Controllers: Provide nameplate complete with capacity, electrical characteristics, approvals and listings, and other pertinent data, on enclosure door

E. Factory Finish

1. Fire Pump, Motor and Controllers: Red, enamel paint applied to assembled, tested units prior to shipping.
2. Jockey Pump, Motor and Controllers: Manufacturer's standard color enamel paint applied to assembled, tested units prior to shipping.

2.2 AXIALLY-SPLIT-CASE FIRE PUMPS

A. Fire pumps shall furnish not less than 150 percent of rated capacity at not less than 65 percent of total rated head. The shutoff head shall not exceed 120 percent of total rated head.

B. Fire pumps shall be base-mounted, centrifugal, separately coupled, bronze-fitted, axially-split-case design, specifically labeled for fire service.

1. Type: Horizontally mounted, single stage - double suction.

SPEC EDITOR: THE TYPE ABOVE COVERS MOST STIUATIONS. IF NECESSARY, CHOOSE ON OF THE OTHER TYPES LISTED BELOW. DELETE OPTIONS NOT REQUIRED.

2. Type: Horizontally mounted, multistage - single suction.

3. Type: Vertically mounted, single stage - double suction.

C. Casing: Axially-split-case centrifugal design; cast-iron pump casing with suction and discharge flanges machined to ANSI B16.1 dimensions, and 125-psi pressure rating, except where 250-psi rated flanges are indicated.

D. Impeller: Statically and dynamically balanced, of construction to match type fire pump, fabricated from cast bronze, keyed to shaft.

E. Wear Rings: Replaceable, bronze.

F. Pump Shaft and Sleeve: Steel shaft, with bronze sleeve.

G. Pump Shaft Bearings: Grease-lubricated double row ball thrust bearings contained in a cast-iron housing.

H. Seals: Stuffing box consisting of a minimum of 4 rings of graphite-impregnated braided yarn with a bronze lantern ring between center 2 graphite rings, and a bronze packing gland.

I. Pump Couplings: Flexible, capable of absorbing torsional vibration; complete with metal coupling guard.

J. Fire Pump Electric Motor: NEMA MG 1, open drip proof, squirrel cage, induction motor, complying with NFPA 20 and NFPA 70, and wiring compatible with type controller used. Motor shall meet requirements of Section 220513 - Motors.

2.3 FIRE PUMP CONTROLLERS AND ALARM PANELS

A. Combined automatic and non-automatic operation, UL listed and FM approved, factory-assembled and wired, and factory-tested, of types, capacities, electrical characteristics, and with features indicated.

B. Enclosure: NEMA Type 12 (IEC IP55), drip proof, indoor, except where special-purpose enclosure is indicated.

C. Provide controls, devices, alarms, functions, and operations listed in NFPA 20, as required for the type driver and controller used, and the specific items listed for each type controller.

D. Provide mounting for enclosures as indicated:

1. Full-Service Fire Pump Controller Mounting: Wall or floor stand type, as indicated, for field electrical connections.
2. Alarm Panel Mounting: Wall type.

E. Controller Sensing Pipes: Provide nonferrous metal sensing piping, 1/2-inch size, with 1/2-inch globe valves for testing mechanism of controller, from system to pump controller, as indicated. Provide bronze check valve with 3/32-inch orifice in clapper or ground-face union with non-corrosive diaphragm having 3/32-inch orifice.

1. Fabricate pipe and fittings in accordance with NFPA 20.

F. The controllers shall not require rear access for installation or maintenance. For ease of installation in tight corners and basement equipment rooms, the controllers shall be capable of being hand trucked through a standard three-foot door opening without being disassembled.

G. All controllers' components, including circuit breakers and contactors, shall be front mounted, front wired and front accessible for maintenance. The circuit breaker interrupting capacity shall in no case be less than 18,000 AIC SYM. at 480 volts.

H. The controller manufacturer, prior to shipment, shall hook up and test the entire controller as a complete assembly. This test shall include, but not be restricted to, each function the controller may be required to perform including remote alarms, remote start, auto start with manual shut down, remote deluge valve start, pressure drop, manual start-stop, etc. Additionally, the controller manufacturer shall set the instantaneous and longtime trips in the circuit breaker at these settings to see that the breaker trips within the current time requirements stated above. Advise Owner to enable witness of testing at Owner's option

2.4 ELECTRIC-MOTOR-DRIVE FIRE PUMP CONTROLLERS

A. Motor Controllers: Controller specifically listed for electric motor drive fire pump service and service entrance.

SPEC EDITOR: SELECT CONTROLLERS FROM 6 OPTIONS BELOW. SEE EVALUATIONS FOR INFORMATION ON TYPES, APPLICATIONS, AND COSTS OF CONTROLLERS. EDIT TO SUIT PROJECT REQUIREMENTS WHERE MORE THAN ONE TYPE OF CONTROLLER IS REQUIRED. DELETE OPTIONS NOT REQUIRED.

SPEC EDITOR: ITEMS BELOW USUALLY USED FOR SMALL HP MOTORS AND WHERE HIGH INRUSH CURRENT IS ACCEPTABLE.

1. Type: Across the line.
2. Type: Primary resistance.
3. Type: Part winding.
4. Type: Wye-delta (closed transition).
5. Type: Autotransformer.

B. Size controller for scheduled horsepower. Provide controller with short circuit withstand rating at least equal to short circuit current available at controller location, taking into account cable size and distance from substation or supply transformers.

1. Standard: UL218, Standard for Fire Pump Controllers.

C. Provide controller capable of performing or containing the following features:

1. Isolating means and circuit breaker.
2. "Power On" pilot lamp.
3. Fire alarm system connections for indicating motor running condition, loss of line power, and line power phase reversal.
4. Automatic and manual operation, and minimum run time relay to prevent short cycling.
5. Water pressure actuated switch having independent high and low calibrated adjustments responsive to water pressure in fire protection system.
6. Manual and automatic shutdown.

SPEC EDITOR: CHOOSE ONE FOR THE FOLLOWING PARAGRAPHS (POWER TRANSFER SWITCH FOR GENERATOR SET EMERGENCY POWER SOURCE OR

POWER TRANSFER SWITCH FOR SECOND UTILITY EMERGENCY POWER SOURCE) DEPENDING ON TYPE OF EMERGENCY POWER SOURCE.

2.5 POWER TRANSFER SWITCH FOR GENERATOR SET EMERGENCY POWER SOURCE:

A. The power transfer switch shall be housed within the fire pump controller enclosure or in a NEMA Type 12 (IEC IP55) drip-proof enclosure attached directly to the fire pump controller. Where the power transfer switch is provided in an attached enclosure, the enclosures shall be fitted so that the assembly constitutes a single unit. The fire pump controller/power transfer switch shall be factory assembled, wired and tested as a unit prior to shipment.

B. The power transfer switch shall include a motor rated disconnect/isolating switch capable of interrupting the motor locked rotor current. The disconnect/isolating switch shall be mechanically interlocked so that the enclosure door cannot be opened with the handle in the ON position except by a hidden tool operated defeater mechanism. The disconnect/isolating switch shall be capable of being padlocked in the OFF position with up to three padlocks for installation and maintenance safety, and shall also be capable of being locked in the ON position. The enclosure door shall have a locking type handle and three-point cam and roller type vault hardware.

C. Provide an auxiliary contact on the transfer switch to prevent starting of the emergency generator set when the transfer switch or the main fire pump controller are being serviced.

D. The transfer switch circuitry shall be capable of sensing both the normal power source and the emergency power source. The normal power source pickup shall be set at 95 nominal voltage. The emergency power source shall be set to pick up at 90 nominal voltage and 95 nominal frequency. All voltage sensing, frequency sensing, and time delays shall be field adjustable to accommodate individual installation requirements. The transfer signal shall be delayed for one second, delaying the transfer and engine start signals so as to compensate for momentary, normal power outages. An automatic delay of three seconds shall be provided upon transfer to or from the emergency power source to allow the motor to slow sufficiently, preventing line disturbances that could trip either the generator set or fire pump circuit breakers.

E. The transfer switch shall have TRANSFER SWITCH NORMAL, TRANSFER SWITCH EMERGENCY and EMERGENCY ISOLATING SWITCH OFF LED's, TEST and TRANSFER BYPASS switches, an audible alarm device and SILENCE ALARM pushbutton mounted on the flange of the enclosure. The power transfer switch shall be furnished with both normally open and normally closed auxiliary contacts for an engine start signal when normal power failure occurs. Auxiliary contacts shall also be provided and wired to terminals to indicate the transfer switch position. The transfer switch shall be electrically operated and mechanically held, and shall be capable of being operated by a manual transfer mechanism located on the switch.

2.6 POWER TRANSFER SWITCH FOR SECOND UTILITY EMERGENCY POWER SOURCE:

A. The power transfer switch shall be housed within the fire pump controller enclosure or in a NEMA Type 12 (IEC IP55) drip-proof enclosure attached directly to the fire pump controller. Where the power transfer switch is provided in an attached enclosure, the enclosures shall be fitted so that the assembly constitutes a single unit. The fire pump controller/power transfer switch shall be factory assembled, wired and tested as a unit prior to shipment.

B. The power transfer switch shall include a motor rated combination isolating 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 closed 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.

C. The isolating disconnect switch/circuit breaker shall be mechanically interlocked so that the enclosure door cannot be opened with the handle in the ON position except by a hidden tool operated defeater mechanism. The isolating disconnect switch/circuit breaker shall be capable of being padlocked in the OFF position for installation and maintenance safety, and shall also be capable of being locked in the ON position without affecting the tripping characteristics of the circuit breaker. The enclosure door shall have a locking type handle and three-point cam and roller type vault hardware.

D. The circuit breaker trip curve adjustment shall be factory set, tested and sealed for the connected full load amps of the motor.

E. The fire pump controller/power transfer switch shall have data logging capability for historical operation recording and to aid in annual test, service and trouble shooting. The data logging shall be accessible by front mounted interface panel and also by saving to file. The file shall be in text (.txt) format and easily readable by most common text editing or word processing software. The circuit breaker shall be capable of being field tested to verify actual pick up, locked rotor, and instantaneous trip points after field installation without disturbing incoming line and load conductors.

F. The transfer switch circuitry shall be capable of sensing both the normal power source and the emergency power source. The normal power source pickup shall be set at 95 nominal voltage. The emergency power source shall be set to pick up at 90 nominal voltage and 95 nominal frequency. All voltage sensing, frequency sensing, and time delays shall be field adjustable to accommodate individual installation requirements. The transfer signal shall be delayed for one second, delaying the transfer signal so as to compensate for momentary, normal power outages. An automatic delay of three seconds shall be provided upon transfer to or from the emergency power source to allow the motor to slow sufficiently, preventing line disturbances that could trip either the transfer switch or fire pump circuit breakers.

G. The transfer switch shall have TRANSFER SWITCH NORMAL, TRANSFER SWITCH EMERGENCY and EMERGENCY ISOLATING SWITCH OFF LED's, TEST and TRANSFER BYPASS switches, an audible alarm device and SILENCE ALARM pushbutton mounted on the flange of the enclosure. To aid servicing, no indicating lights or switch devices shall be mounted on the enclosure door. Auxiliary contacts shall be provided and wired to terminals to indicate the transfer switch position. The transfer switch shall be electrically operated and mechanically held, and shall be capable of being operated by a manual transfer mechanism located on the switch.

2.7 ALARM PANEL:

SPEC EDITOR: RETAIN THIS PARAGRAPH ONLY WHEN A REMOTE ALARM PANEL IS REQUIRED.

A. NEMA ICS 6, Type 1 wall-mounting-type panel (or integral with main controller) with audible and visible alarms matching type controller used. Provide following features and manufacturer's standard features:

1. Motor operating condition.
2. Loss of line power.
3. Phase reversal.
4. Low water pressure alarm.

2.8 HORIZONTAL FIRE PUMP ACCESSORY FITTINGS

A. Provide the following accessory fittings, matching fire pump suction and discharge ratings, as required for fire pump capacity rating:

1. Automatic air release valve.
2. Casing relief valve.
3. Suction and discharge pressure gages.
4. Eccentric tapered reducer at suction inlet.
5. Concentric tapered reducer (increaser) at discharge outlet.

2.9 PRESSURE MAINTENANCE (JOCKEY) PUMPS

A. Base-mounted, factory-assembled, and factory-tested, of pump types, capacities, and electrical characteristics indicated. Close-coupled pressure maintenance pumps are exempt from base-mounted requirement.

B. Pressure maintenance pumps shall furnish not less than rated capacity at not less than total rated head indicated.

C. Cast-iron pump casing with suction and discharge connections of size indicated, threaded, or flanged and machined to ANSI B16.1 dimensions, and 125-psi minimum pressure rating, except where 250-psi rated flanges are indicated.

1. Impeller: Bronze or stainless steel.
2. Shaft: Stainless steel.
3. Seals: Mechanical.

D. Multi-Stage Pressure Maintenance Pumps:

1. Multi-stage, centrifugal, vertical construction, base mounting.

E. Electric Motor: NEMA MG 1, open drip proof, squirrel cage, induction motor, complying with NFPA 20 fire pump motor requirements and NFPA 70, and wiring compatible with controller. Motor shall meet requirements of Section 220513 - Motors.

2.10 PRESSURE MAINTENANCE (JOCKEY) PUMP CONTROLLERS

A. Combined automatic and non-automatic operation, UL listed, factory-assembled and wired, and factory-tested, of types, capacities, electrical characteristics, and with features indicated, for electric motor drive pressure maintenance pump service.

1. Type: Across the line.

SPEC EDITOR: MODIFY PARAGRAPH BELOW AS REQUIRED. DELETE IF SYSTEM IS NOT UL.

2. Standard: UL 508.

SPEC EDITOR: MODIFY PARAGRAPH BELOW WHERE NEMA TYPE 1 ENCLOSURE TO BE ALLOWED.

B. Enclosure: NEMA ICS 6, Type 2, wall mounted, for field electrical wiring.

C. Provide controls, devices, alarms, functions, and operations listed in NFPA 20, and the specific items listed.

D. Size controller for scheduled horsepower and provide the following items:

SPEC EDITOR: DELETE FEATURES BELOW NOT WANTED AND ADD OTHER OPTIONS WANTED. SEE MANUFACTURERS' CATALOG LITERATURE FOR VARIOUS OPTIONS.

1. Fusible disconnect switch.
2. Pressure switch.
3. "HAND-OFF-AUTO" selector switch.
4. Pilot light.
5. Running period timer.

E. Mounting: Wall type for field electrical connections.

F. Controller Sensing Pipes: Provide nonferrous metal sensing piping, 1/2-inch size, with 1/2-inch globe valves for testing mechanism of controller, from system to pump controller, as indicated. Provide bronze check valve with 3/32-inch orifice in clapper or ground-face union with non-corrosive diaphragm having 3/32-inch orifice.

1. Fabricate pipe and fittings in accordance with NFPA 20.

2.11 PRESSURE MAINTENANCE PUMP ACCESSORIES

A. Provide following accessory fittings, matching pressure maintenance pump suction and discharge ratings, as required for pump capacity rating:

1. Casing relief valve.
2. Suction and discharge pressure gages.

SPEC EDITOR: COORDINATE CONCRETE WORK WITH DIVISION 3. DELETE ARTICLE BELOW IF EQUIPMENT PADS ARE INCLUDED IN DIVISION 3. COORDINATE SIZE AND LOCATION OF CONCRETE PADS ON THE DRAWINGS. VERIFY STRUCTURAL REQUIREMENTS WITH A STRUCTURAL ENGINEER. VERIFY STRENGTH REQUIREMENTS FOR CONCRETE AND REINFORCING MATERIALS, SPACING, AND PLACEMENT.

2.12 EQUIPMENT BASES

A. Construct concrete equipment pads of dimensions per manufacturers requirements, minimum 6" on all sides. Form concrete pads by using framing lumber with form release compounds. Chamfer top edge and corners of pad.

B. Concrete: Portland cement mix, 4,000 psi:

1. Cement: ASTM C 150, Type I.
2. Fine Aggregate: ASTM C 33, sand.
3. Course Aggregate: ASTM C 33, crushed gravel.
4. Allow concrete to cure before installation of equipment.

C. Reinforcement: Steel conforming to the following:

1. Fabric: ASTM A 185, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615, Grade 60, deformed.
3. Install reinforcing, tied to frame, and place anchor bolts and sleeves using manufacturer's installation template.

2.13 FLOW MEASURING SYSTEMS

SPEC EDITOR: DELETE BELOW WHERE FLOW MEASURING SYSTEMS ARE NOT ACCEPTABLE TO LOCAL AUTHORITIES FOR FLOW TESTS. U OF M PREFERENCE IS FOR 'ANNUAL' PITOT TESTS. USE IN APPROPRIATE AREAS.

A. Fire pump flow measuring systems shall be FM approved, indicate flow in gpm to not less than 175 percent of fire pump rated capacity, and consist of a sensing element of size to match pipe, tubing, flow meter, and fittings.

B. Pressure Rating: 175 psi minimum.

C. Sensing Element: Venturi, annular probe, or orifice plate flow sensor.

D. Flow Meter: Compatible with flow sensing element and direct reading in gpm; dial not less than 4-1/2 inches in diameter or equivalent.

SPEC EDITOR: SELECT FROM 2 OPTIONS BELOW.

1. Permanently Mounted: Flow meter suitable for wall mounting with copper tubing for connecting to flow sensing element.
2. Portable: Flow meter, with two 12-foot hoses, in carrying case with handle.

E. Provide flow-measuring systems complete with operating instructions.

2.14 SOURCE QUALITY CONTROL

A. Factory Shop Tests: Hydrostatically test and test run each pump prior to shipment. Test at 150 percent of shut-off head plus suction head, but not less than 250 psig. Produce certified test curves showing head capacity and brake horsepower of each pump. Advise Owner to enable witnessing of the shop tests at Owner's option.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment foundations, and conditions with Installer present, for compliance with requirements for installation and other conditions affecting performance of fire pumps. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine fire protection piping systems to verify actual locations of piping connections prior to installation.

3.2 INSTALLATION OF FIRE PUMPS

A. Comply with the manufacturer's written installation and alignment instructions and with NFPA 20 and FM standards.

B. Install pumps in locations indicated and arrange to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

C. Support pumps and piping independently so that the weight of the piping system does not rest on pumps.

D. Set base-mounted pumps on concrete foundations. Disconnect coupling halves before setting. Do not reconnect couplings until alignment operations have been completed.

1. Support pump base plate on rectangular metal blocks and shims, or on metal wedges having a small taper, at points near the foundation bolts to provide a gap of 3/4 to 1-1/2 inches between the pump base and the foundation for grouting.
2. Adjust the metal supports or wedges until the shafts of the pump and driver are level. Check the coupling faces and suction and discharge flanges of the pump to verify that they are level and plumb.

E. Provide piping accessories, hangers, supports and anchors, valves, meters and gages, and equipment supports as required for complete installation.

F. Provide housekeeping pad for all floor mounted controllers.

G. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division 26 sections. Do not proceed with equipment start-up until wiring installation is acceptable.

3.3 ALIGNMENT

A. Align pump and driver shafts after complete unit has been leveled on foundation and after grout has set and foundation bolts have been tightened.

B. After alignment is correct, tighten the foundation bolts evenly but not too firmly. Fill the base plate completely with non-shrink, nonmetallic grout, with metal blocks and shims or wedges in place. After grout has hardened, fully tighten foundation bolts. Check alignment and take corrective measures required.

C. Make piping connections, check alignment, and take corrective measures required.

1. Adjust alignment of pump and driver shafts for angular and parallel alignment by one of the two methods specified in the Hydraulic Institute "Centrifugal Pumps - Instructions for Installation, Operation and Maintenance."
2. Alignment tolerances shall meet manufacturer's recommendations.

3.4 CONNECTIONS

A. General: Install valves of types and at locations indicated, that are same size as the piping connecting the fire pump, bypass, test header, and other piping systems.

B. Install suction and discharge pipe sizes equal to or greater than the diameter of fire pump nozzles.

C. Install pressure gages on the suction and discharge of each pump at the integral pressure gage tappings provided.

SPEC EDITOR: OMIT PARAGRAPH BELOW IF FLOW MEASURING SYSTEMS ARE NOT USED.

D. Install flow meters and sensing elements where indicated. Install connections, tubing, and fittings between flow sensing elements and meters as prescribed by manufacturer's installation instructions.

E. Electrical wiring and connections are specified in Division 26 sections.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide the services of a factory-authorized service representative to supervise field assembly of components, installation of fire pump units and pressure maintenance pump units, including piping and electrical connections, field acceptance tests, and to report test results in writing.

B. Check suction lines connections for tightness to avoid drawing air into the pump.

SPEC EDITOR: MODIFY PARAGRAPH BELOW TO SUIT PROJECT REQUIREMENTS. HOWEVER; RETAIN COMPLIANCE WITH NFPA 20. NORMALLY FIELD ACCPTANCE TESTS ARE PERFORMED FOR OWNER, INSURANCE UNDERWRITER, LOCAL FIRE OFFICALS, AND REPRESENTATIVES OF THE AUTHORITY HAVING JURISDICTION, AND PUMP AND CONTROLLER REPRESENTATIVES.

C. Perform field acceptance tests of each fire pump unit (fire pump, driver, and controller) and system piping, when installation of fire pump units is complete. Comply with operating instructions and procedures of NFPA 20 to demonstrate compliance with requirements. Where possible, field correct malfunctioning equipment, then retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or that does not perform as specified and as indicated, then retest to demonstrate compliance. Verify that each fire pump unit performs as specified and as indicated.

3.6 COMMISSIONING

A. Start-Up Services, General: Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below. Training will not occur at time of start-up.

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
2. Train Owner's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventative maintenance.
3. Review data in Operating and Maintenance Manuals. Refer to Division 01 Section "Project Closeout."
4. Schedule training with at least 7 days' advance notice after factory-authorized service representative has performed start-up and forwarded a copy of the start-up report to the Owner.

SPEC EDITOR: WHERE FIRE PUMPS MUST BE TESTED AND WATER WASTED, A PLACE FOR DISPOSAL OF LARGE QUANTITIES OF TEST WATER MUST BE ARRANGED. IF SPECIFIED FLOW MEASURING SYSTEM WILL BE ADEQUATE FOR TESTS, THEN DELETE PARAGRAPH BELOW. DELETE TEST HEADER, MANIFOLD, AND FIRE HOSE VALVES IN PART 2 OF THIS SECTION, ONLY IF APPROVED BY LOCAL FIRE AUTHORITY. MODIFY BELOW TO SUIT PROJECT CONDITIONS. OWNER MAY WANT TO RETAIN FIRE HOSES. THEN FIRE HOSES SHOULD BE NEW, PARAGRAPH BELOW MUST BE EDITED, AND FIRE HOSES ADDED TO PART 2 OF THIS SECTION.

5. Provide fire hoses in number, size, and of length as required to reach a storm drain or other acceptable locations for the disposal of fire pump test water. These fire hoses are for use during field acceptance tests only and are not to become property of the Owner.

B. Final Checks Before Start-Up: Perform the following preventative maintenance operations and checks before start-up:

1. Lubricate oil-lubricated bearings.

2. Remove grease-lubricated bearing covers and flush the bearings with kerosene and thoroughly clean. Fill with new lubricant in accordance with the manufacturer's recommendations.
3. Disconnect coupling and check electric motor for proper rotation. Rotation shall match direction of rotation marked on pump casing.
4. Check that pump is free to rotate by hand. If the pump is bound or even drags slightly, do not operate the pump until the cause of the trouble is determined and corrected.

C. Starting procedure for pumps:

1. Prime the pump, opening the suction valve, closing the drains, and prepare the pump for operation.
2. Open the sealing liquid supply valve if the pump is so fitted.
3. Start motor.
4. Open the discharge valve slowly.
5. Observe the leakage from the stuffing boxes and adjust the sealing liquid valve for proper flow to ensure the lubrication of the packing. Do not tighten the gland immediately, but let the packing run in before reducing the leakage through the stuffing boxes.
6. Check the general mechanical operation of the pump and motor.

END OF SECTION 213113