

SECTION 15380 - FIRE PUMPS

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing [factory packaged] [or field assembled] fire pumps and their drivers, either electric motors or diesel engines, and electrically driven jockey pumps, and related controls.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
 - 1. Section 15310 Fire Protection Piping
 - 2. Section 15330 Wet-Pipe Sprinkler System
 - 3. Section 15375 Standpipe and Hose
 - 4. Section 16050 Basic Electrical Materials and Methods

1.3 CODES

- A. The WORK of this Section shall comply with the current editions of the following codes as adopted by the City of San Diego Municipal Code:
 - 1. Uniform Fire Code
 - 2. National Electrical Code

1.4 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:
 - 1. FM Factory Mutual System - Approval Guide
 - 2. NEMA MG-1 Motors and Generators
 - 3. NEMA 250 Enclosures for Electrical Equipment (1000 Volt Maximum).
 - 4. NFPA 20 Installation of Centrifugal Fire Pumps
 - 5. NFPA 24 Private Fire Service Mains and Their Appurtenances
 - 6. NFPA 37 Installation and Use of Stationary Combustion Engines and Gas Turbines
 - 7. UL Fire Protection Equipment Directory

- 8. UL 448 Pumps for Fire Protection Service
- 9. UL 778 Motor Operated Water Pumps
- 10. UL 1247 Diesel Engines for Driving Centrifugal Fire Pumps
- 11. UL 1478 Fire Pump Relief Valves

1.5 SHOP DRAWINGS AND SAMPLES

- A. The following shall be submitted in compliance with Section 01300:
 - 1. Shop drawings indicating general assembly, components, dimensions, weights, clearances, and methods of assembly.
 - 2. Product data including general assembly, details, pump curves showing performance characteristics with pump and system operating points indicated, NPSH curve, controls, wiring diagrams, and service connections.

1.6 OWNER'S MANUAL

- A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:
 - 1. Operation data including manufacturers instructions, start-up data, and trouble-shooting check lists for pumps, drivers and controllers.
 - 2. Maintenance data including manufacturers literature, cleaning procedures, replacement parts lists, and repair data for pumps, drivers and controllers.
 - 3. Manufacturer's certification that fire pumps meet or exceed specified requirements at specified operating conditions.

1.7 FIELD TESTING

- A. The WORK of this Section includes the following:
 - 1. Field testing and reports with summary of hydrostatic test and field acceptance tests performed [in accordance with NFPA 20].

1.8 REGULATORY REQUIREMENTS

- A. The WORK of this Section shall comply with the following:
 - 1. Equipment and components shall bear [UL] [FM] [] label or marking.
 - 2. Installation and testing of fire pumps, drivers and controllers shall conform to NFPA 20.
 - 3. Certificate shall be obtained from authority having jurisdiction indicating approval of field acceptance tests.

Submission of report with summary and results of tests performed in accordance with NFPA 20.

1.9 MAINTENANCE SERVICE

A. The WORK of this Section includes the following:

1. Service and maintenance of fire pump, driver and controller for [one] [] year from Date of Substantial Completion.

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. **Delivery of Materials:** Products shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.
- B. **Storage:** Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from weather, water and construction debris.

PART 2 -- PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Fire pumps shall include [electric motor] [diesel engine] driven [vertical in-line] [horizontal] [vertical turbine] fire pump with [jockey pump] [electric controllers] [diesel engine controller].

2.2 VERTICAL IN-LINE PUMPS

- A. Vertical in-line pumps shall comply with the following:
1. Type: UL 448 [and UL 778], vertical, single stage, close coupled, radially [or horizontally] split casing, for in-line mounting, rated for 250 psig.
 2. Casting: Cast or ductile iron, with suction and discharge gauge port, casing wear ring, seal flush connection, drain plug, flanged suction and discharge.
 3. Impeller: Bronze, fully enclosed, keyed directly to motor shaft.
 4. Shaft: Solid alloy steel with bronze sleeve.
 5. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 230 degrees F maximum continuous operating temperature.
 6. Seal: Carbon rotating against a stationary ceramic seat, [viton fitted,] [225 degrees F] [275 degrees F] maximum continuous operating temperature.

2.3 HORIZONTAL BASE MOUNTED PUMPS

- A. Horizontal base mounted pumps shall comply with the following:
1. Type: UL 448 [and UL 778], horizontal shaft, single stage, double suction, direct connected, horizontally split casing, rated for 250 psig maximum working pressure.
 2. Casing: Cast iron, with suction and discharge gauge ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.

3. Impeller: Bronze, double suction, fully enclosed, balanced and keyed to shaft.
4. Bearings: Grease lubricated ball bearings, replaceable without opening casing.
5. Shaft: Alloy steel with replaceable bronze shaft sleeve.
6. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 230 degrees F maximum continuous operating temperature.
7. Drive: Flexible coupling with coupling guard.
8. Baseplate: Cast iron [or fabricated steel] with integral drain rim.

2.4 VERTICAL TURBINE PUMPS

A. Vertical turbine pumps shall comply with the following:

1. Type: UL 448 [and 778], vertical, centrifugal, turbine.
2. Casing: Cast iron, rated for 250 psig or 1.20 times actual discharge working pressure discharge gauge, air vent, wear rings, seal flush connection, drain plug, and flanged discharge.
3. Impellers: Bronze, fully enclosed, keyed to shaft or secured with locknut.
4. Shaft: Stainless steel or carbon steel with bronze or stainless steel sleeve through seal chamber.
5. Seals: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings.

2.5 FIRE PUMP ACCESSORIES

A. The WORK of this Section includes the following accessories:

1. Eccentric suction reducer and outside stem and yoke (OS&Y) gate or butterfly valve on suction side of pump.
2. Concentric increaser and check valve in pump discharge and OS&Y gate or butterfly valve on system side of check valve.
3. Fire pump bypass fitted with OS&Y gate or butterfly valves and check valve.
4. Main relief valve, UL 1478, [and [enclosed] [open] type waste cone.]
5. Suction pressure gauge, 4-1/2-inch diameter dial with snubber, valve cock and lever handle.
6. Discharge pressure gauge mounted on board attached to pump, with snubber, valve cock and lever handle.
7. Casing 3/4-inch relief valve.

- 8 [3/4-inch] [one-inch] automatic air release valve.
- 9 Hose valve manifold with 2-1/2-inch hose gate valves with caps and chains.
- [10. Flow metering system for closed loop testing.]

2.6 ELECTRIC MOTOR DRIVES

A. Electric motor drives shall comply with the following:

1. Motor: Squirrel cage induction type; in open drip proof NEMA MG1 enclosure, [3500] [1750] rpm.
2. Controller: Limited service type with [auto-transformer] [primary resistor] [reduced voltage] [part winding] [across-the-line] starter, in NEMA 250 enclosure, including the following:

Disconnect Switch: Externally operable, quick break type.

Circuit Breaker: Trips in each phase calibrated at least to 300 percent of the motor full-load current, [10,000] [] amperes interrupting capacity.

Motor Starter: Energized automatically through pressure switch or manually by externally operable handle.

Pressure Switch: Set to cut in at [] psig.

Running Period Timer: Keeps motor in operation when started automatically, for a minimum of seven minutes.

Pilot Lamp: Indicates circuit breaker closed and power available.

Ammeter test link and voltmeter test studs.

Alarm Relay: Energizes alarm to indicate circuit breaker open or power failure.

Remote start switch relay.

Manual Selector Station: On enclosure marked "Automatic" and "Non-Automatic".

2.7 DIESEL ENGINE DRIVE

A. Diesel engine drives shall comply with the following:

1. Diesel Engine: Conforming to NFPA 1247, arranged for automatic operation and including overspeed/overcrank switch and drive, two contactor switches, low oil pressure and high water temperature warning detectors, and fuel shut-off solenoid, with wiring terminating in junction box.
2. Drives shall include the following engine accessories:

Stub shaft.

Oil bath air cleaner.

Water cooled exhaust manifold.

Heat exchanger.

Mechanical speed governor.

Fuel filter.

Lube oil filter and by-pass valve.

Lube oil cooler and relief valve.

Fuel pump.

Instrument panel with tachometer, hourmeter, oil pressure gauge, water temperature gauge, ammeter, hand speed control and start switch.

Starting system including generator/alternator, starting motor and voltage regulator.

Exhaust silencer, residential type.

Flexible exhaust tubing, 24 inches long.

3. Cooling Water System: Closed system with cooling water supply to heat exchanger from fire pump discharge. Include four manual shut-off valves (including by-pass line), two strainers, pressure regulating valve, automatic solenoid valve and pressure gauge.
4. Storage Batteries: Dual lead acid batteries with cables and battery racks.
5. Fuel System: [250 gallon] [] above ground storage tank, fill pipe and cap, manual shut-off valve, flame arrestor, oil level gauge, braided bronze flexible connectors, seamless Type L copper tubing with flared joints.
6. Automatic Diesel Engine Controller: Enclosed in floor mounted 14 gauge (1.8 mm) steel housing, UL listed and labelled.

Controller shall function to automatically start fire pump from water pressure control switch or test switch.

Stopping push button shall manually stop engine.

Under automatic conditions, controller shall alternate batteries automatically on each 15 second cranking cycle. Alarm shall sound if engine not started after six attempts.

Dual built-in battery charger shall recharge both batteries within 24 hour period. Chargers shall have automatic overload protection (current limiting).

Including individual voltmeters and ammeters for each battery.

Including individual pilot lights and common alarm bell for:

Low engine oil pressure
High engine jacket water temperature
Failure to start automatically
Charger failure
Battery 1 failure
Battery 2 failure
Overspeed shutdown

7. Remote Alarm and Signal Panel: Including wall mounted panel in NEMA 250 Type 1 enclosure with:

Engine running light.

Common engine failure light for:

Low engine oil pressure
High engine jacket water temperature
Failure to start automatically
Charger failure
Battery 1 failure
Battery 2 failure
Overspeed shutdown

Power on light

Switch off light indicating position of main control

Switch (off or manual).

2.8 PRESSURE BOOSTER (JOCKEY) PUMP

- A. Pressure booster (jockey) pumps shall comply with the following:

1. Electrically operated, horizontal [turbine] [close-coupled] type with standard open drip-proof horizontal motor.
2. 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.

2.9 SPARE PARTS

- A. The WORK of this Section includes the following spare parts:

1. [1 set] [2 sets] of [gaskets] [screens] [seals] [] for each pump type and model supplied.

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. Products and equipment shall be installed in accordance with the manufacturer's written installation instructions.
- B. Diesel engine drive shall be installed in accordance with NFPA 37.
- C. Pumps shall be installed with the indicated access space maintained around pumps for service and in no case less than minimum recommended by manufacturer.
- D. Line size shall comply with the indicated requirements and, where not otherwise indicated, line size shall be decreased with long radius reducing elbows or reducers. Piping shall be supported adjacent to pump such that no weight is carried on pump casings. For base mounted pumps, supports shall be installed under elbows on pump suction and discharge.
- E. Drains for bases and seals shall be piped to floor drains.
- F. Pumps shall be mounted on vibration isolators.
- G. Piping associated with pump, pump casing and exhaust silencer shall be insulated.
- H. Pumps shall be lubricated before start-up.
- I. Base mounted pumps shall be aligned prior to start-up.

3.2 FIELD TESTING

- A. System shall be hydrostatically flow tested in accordance with NFPA 20.
- B. Test shall be witnessed by [Fire Marshal] [authority having jurisdiction] [OWNER] [CONSTRUCTION MANAGER]

** END OF SECTION **

PUMP SCHEDULE

[P-1]

[P-2]

Location

Drawing Reference

Flow Capacity, GPM

Head, Feet

Motor, HP