METROLINX

Capital Projects Group

Fire Pump Specification

Specification 21 31 00

Revision 1
Date: September 2018

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Publication Date: September, 2018

Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Various	Sept. 20, 2018	Revised to coordinate with corresponding specifications.

LIST OF CONTENT

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Provide fire pumps as required, scheduled and specified herein.

1.2. DESIGN REQUIREMENTS

1.2.1. Fire pump is to be selected by mechanical professional engineer that designs the fire protection system.

1.2.2. Include for a qualified mechanical professional engineer registered and licensed in the jurisdiction of the work to design the fire pump work. Refer to Section entitled Mechanical Work General Instructions for requirements regarding Contractor retained engineers.

1.3. RELATED WORKS

1.3.1. Section 20 05 05 - Mechanical Work General Instructions.

1.3.2. Section 20 05 10 - Basic Mechanical Materials and Methods.

1.3.3. Section 20 05 40 – Mechanical Work Commissioning.

1.3.4. Section 21 12 00 – Fire Protection Sprinkler Standpipe System.

1.3.5. Section 21 13 00 – Fire Protection Sprinkler System.

1.4. REFERENCE STANDARDS

1.4.1. Standards and codes to be latest editions adopted by and enforced by local governing authorities.

1.4.2. NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection.

1.5. TRAINING

1.5.1. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

1.5.2. Include for 3 training sessions of maximum 7 hours duration per session for 6 Metrolinx people per session.

1.5.3. Refer to Section 20 05 05 for additional general requirements.

1.6. WARRANTY

1.6.1. Products to be guaranteed by manufacturer, for a minimum of 2 years after acceptance by Metrolinx.

1.7. DELIVERY, STORAGE AND HANDLING

1.7.1. Handle and store products in accordance with manufacturer's instructions, in locations approved by Metrolinx. Include one copy of these instructions with product at time of shipment.

1.8. SUBMITTALS

1.8.1. Refer to submittal requirements in Section 20 05 05.

1.8.2. Submit weekly inspection reports from fire protection system manufacturer's design engineer as specified below.

1.8.3. Submit a fire pump installation certification letter from fire pump supplier as specified in Part 3 of this Section.

1.8.4. Submit a copy of completed NFPA 20 pump performance test certificate as specified in Part 3 of this Section.

1.8.5. Submit shop drawings/product data sheets as follows:

a) to regulatory authority for review and approval prior to submitting to Consultant;

b) for all products specified in this Section;

c) copies of all calculations, stamped and signed by same engineer who signs layout drawings, and a listing of all design data used in preparing the calculations, system layout and sizing requirements;

d) copies of pump sizing calculations and a listing of design data used in preparing calculations, as well as performance curves and product data for pump motor.

1.8.6. Product Data

a) Submit product data sheets indicating:

1) technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;

2) performance criteria, compliance with appropriate reference standards, characteristics, limitations, and troubleshooting protocol;

3) product transportation, storage, handling, and installation requirements;

4) product identification in accordance with Metrolinx requirements.

1.8.7. Shop Drawings

a) Submit shop drawings indicating:

1) capacity and ratings;

2) mounting details to suit locations shown, indicating methods and hardware to be used;

3) control components and control wiring schematic.

1.8.8. Commissioning Package

a) Submit the following in accordance with Sections 20 05 05 and 20 05 40:

1) Commissioning Plan;

2) Commissioning Procedures;

3) Certificate of Readiness;

4) complete test sheets specified in Section 20 05 40 and attach them to the Certificate of Readiness;

5) Source Quality Control inspection and test results and attach to the Certificate of Readiness.

1.8.9. Commissioning Closeout Package

a) Submit the following in accordance with Section 20 05 05:

1) Deficiency Report;

2) Commissioning Closeout Report;

i) submit the following for each Product for incorporation into the Operation and Maintenance Manuals in accordance with Section 20 05 05:

ii) Identification: manufacturer's name, type, year, serial number, number of units, capacity, and identification to related systems;

iii) functional description detailing operation and control of components;

iv) performance criteria and maintenance data;

v) safety precautions;

vi) operating instructions and precautions;

vii) component parts availability, including names and addresses of spare part suppliers;

viii) maintenance and troubleshooting guidelines/protocol;

ix) product storage, preparation, handling, and installation requirements;

x) Commissioning Report.

1.9. QUALITY ASSURANCE

1.9.1. Site personnel are to be licensed in jurisdiction of the work and under continuous supervision of a foreman who is an experienced system installer.

1.9.2. Fire pump system work is to be in accordance with above Codes and Standards.

1.9.3. Fire protection system manufacturer's design engineer is to conduct weekly inspections during the course of the work, and submit an inspection report after each site visit. Design engineer is also to perform final inspection/start-up and submit certification as specified in Part 3 of this Section.

1.9.4. Manufacturers Qualifications

a) Manufacturer shall be ISO 9000, 9001 or 9002 certified. Manufacturer of product shall have produced similar product for a minimum period of five years. When requested by Consultant, an acceptable list of installations with similar product shall be provided demonstrating compliance with this requirement.

b) Where manufacturers provide after installation onsite inspection of product installations, include for manufacturer’s authorized representative to perform onsite inspection and certificate of approvals.

1.9.5. Installers Qualifications

a) Installers for work to be performed by or work under licensed Mechanical Contractor.

b) Installers of systems are to be fully qualified and experienced installers of respective products and work in which they are installing.

c) Where manufacturers provide training sessions to installers and certificates upon successful completion, installers to have obtained such certificates and submit copies with shop drawings.

1.9.6. Regulatory Requirements

a) Products and work to comply with applicable local governing authority regulations, bylaws and directives.

b) Include for required inspections and certificate of approvals of installation work from local governing authorities.

2. PRODUCTS

2.1. FIRE PUMP SET

2.1.1. Factory assembled, pre-piped and pre-wired pump set, generally as per drawing schedule, factory mounted and secured on a common primed and enamelled structural steel base, constructed and factory tested to NFPA 20, complete with a controller assembly, jockey pump, and jockey pump controller, and supplied ready for site piping and electrical connections.

2.1.2. Should pressure drop in the system, jockey pump will start automatically and pressurize system to a set pressure and then stop. If pressure in system continues to decrease beyond range of the jockey pump, fire pump will start automatically and jockey pump will shut-off. Fire pump will continue to operate until shut down manually.

2.1.3. Fire Pump

a) Vertical in-line pump capable of supplying not less than 150% of rated capacity at a pressure not less than 65% of rated head, with a total shut-off head not to exceed 140% of rated total head, and complete with:

1) maximum 1725 kPa (250 psi) working pressure rated cast or ductile iron casing;

2) hydraulically and dynamically balanced closed cast bronze impeller with stainless steel hardware, keyed to shaft of a motor conforming to requirements specified in Section 20 05 10;

3) type 304 stainless steel shaft sleeve and mechanical seal;

4) suction and discharge flange mounted 90 mm (3-½") diameter pressure gauges, each equipped with a gauge cock;

5) pump suction eccentric reducer fitting bolted (with gasket) to discharge flange and equipped with an automatic, float operated, 20 mm (¾") diameter air relief valve, and a 20 mm (¾") diameter circulation relief valve with setting approximately 10% above the operating discharge pressure;

6) pump suction shut-off valve, and pump discharge silent type check valve and shut-off valve;

7) capped tee in discharge piping between shut-off valve and check valve for site connection of hose valve header flow test piping.

2.1.4. Jockey Pump

a) Horizontal, 3500 rpm base mounted pump with a cast iron motor bracket and discharge body, a motor conforming to requirements of Section 20 05 10, stainless steel pump case and pump shaft, glass filled delrin impeller, polycarbonate diffuser, brass bearing sleeves, and suction and discharge connections to pump set suction and discharge piping, complete with suction and discharge shut-off valves and discharge check valve.

2.1.5. Fire Pump Controller

a) CSA certified full service controller in accordance with requirements of NFPA 20, complete with an NEMA 2 enamelled steel enclosure, and following:

1) door interlock main disconnect switch;

2) externally operated magnetic type moulded case circuit breaker with locked rotor protection with a trip time of between 8 and 20 seconds at locked rotor current, calibrated up to and set at 300% of full motor current;

3) full voltage, non-reversing, across-the-line magnetic start contactor capable of being energized automatically by a pressure switch or manually by a pushbutton, with contacts capable of being closed manually by an externally operable emergency start handle;

4) individual, 125 volt, SPDT dry alarm contacts for:

i) power failure, or circuit breaker in "off" position, and/or loss of one phase (10 ampere contact rating);

ii) wrong phase rotation (5 ampere contact rating);

iii) pump motor running (10 ampere contact rating).

5) LED pilot lights for:

i) wrong phase rotation;

ii) loss of power, phase failure, or open circuit breaker (red);

iii) power "on" (white).

6) adjustable water pressure switch to automatically operate pump, connected with tubing to pump set piping with globe valves, plugged tee, and check valves as per NFPA 20;

7) start and stop pushbuttons for manual pump operation;

8) emergency start handle to manually close motor starter contacts and start pump;

9) minimum run timer to maintain pump in operation for a minimum of 10 minutes when pump starts automatically by means of the pressure switch.

2.1.6. Automatic Transfer Switch

a) Mechanically held, electrically operated automatic transfer switch in accordance with NFPA 20, complete with NEMA 2 enamelled steel enclosure, mechanically attached to pump control panel enclosure to facilitate one enclosure, and arranged to automatically start emergency power generator set and transfer electrical loads from normal power to emergency power upon failure, voltage drop or phase reversal in any phase of normal power supply. Transfer switch is to be complete with:

1) externally operated main isolating switch connected ahead of emergency power input terminals;

2) operating handle for manual operation of transfer switch;

3) test switch to momentarily stimulate failure of normal power supply;

4) door mounted indicating lights for:

i) transfer switch connected to normal power supply (green);

ii) transfer switch connected to emergency power supply (red);

iii) emergency power isolating switch in off position (red).

5) audible alarm activated when emergency power isolating switch is in the "OFF" position;

6) auxiliary 10 ampere, 125 volt contacts for remote monitoring and alarms for:

i) transfer switch connected to normal power supply;

ii) transfer switch connected to emergency power supply;

iii) emergency power isolating switch in "OFF" position;

iv) emergency power engine start;

v) emergency power engine start when normal power supply fails.

7) time delay relays with circuitry for:

i) overriding momentary outages of normal power supply, factory set at three seconds;

ii) retransfer from emergency power supply to normal power supply after normal power supply is back in service, factory set at five minutes;

iii) unloaded operation of the engine-generator set after retransfer from emergency power supply to normal power supply to permit the engine-generator set to cool down, factory set at five minutes;

iv) prevention of electric motor start after retransfer from emergency power supply to normal power supply, factory set at two seconds.

8) memory circuit to restart fire pump after retransfer from emergency power supply to normal power supply, if pump had been manually or remotely started.

2.1.7. Jockey Pump Controller

a) In accordance with requirements of NFPA 20, complete with NEMA 2 enamelled steel enclosure, door interlock disconnect switch, overload protected motor starter, H O-A selector switch, adjustable water pressure switch with tubing connected to pump set piping as per NFPA 20, control transformer with secondary circuit breaker, white "power on" LED pilot light, and a SPDT "loss of power" alarm contact and relay.

2.1.8. Standard of quality assurance manufacturers for fire pump set are:

a) S.A. Armstrong Ltd.;

b) ITT Fluid Products Canada Bell & Gossett;

c) or approved equivalent.

2.2. FIRE PUMP TEST CONNECTION ASSEMBLY

2.2.1. Potter-Roemer Inc. model 586 Series or approved equivalent, flush wall mounting fire pump test connection assembly in accordance with NFPA 20, sized and arranged to suit capacity of fire pump and complete with:

a) cast brass header body with inlet located to suit site conditions, and 75 mm (3") diameter threaded outlet connections;

b) 75 mm (3") diameter threaded pipe nipple for each outlet, with length of nipples to suit wall construction;

c) polished brass NRS hose gate valve for each outlet, each valve complete with loose bonnet, 75 mm (3") female NPT inlet, and 65 mm (2-½") male hose thread outlet with screw-on cap and chain;

d) polished faceplate with "PUMP TEST CONNECTION" cast in raised lettering.

2.2.2. Exposed parts of assembly are to be chrome plated.

2.3. FIRE PUMP TEST METER

2.3.1. Victaulic Style 735, Model "L" or approved equivalent, fire pump test meter with steel housing and cone.

3. EXECUTION

3.1. INSTALLATION OF FIRE PUMP

3.1.1. Provide a fire pump set. Secure assembly in place, level and plumb, on a concrete housekeeping pad.

3.1.2. Install piping from pump set outwards with as few elbows as possible, and with long sweep pattern elbows where elbows are required. Arrange piping so as not to restrict access to power and control panels, and so as not to impede walking access in the room.

3.1.3. Support piping connecting pump set so that strain or pressure is not exerted on pump.

3.1.4. Pipe pump casing relief valve to drain. Set relief valve in accordance with pump set supplier's instructions to suit site pressure conditions.

3.1.5. Ensure supervisory switches are provided on handles of pump set shut-off valves, where required.

3.1.6. Adjust fire pump and jockey pump pressure switches in accordance with pump set supplier's instructions to suit the site water pressure conditions.

3.1.7. When installation is complete but prior to application for Substantial Performance of the Work, review installation on site with pump set supplier, and under supervision of pump set supplier, start pump set, (including requirements of Part II-2 of NFPA 20), check and adjust as required, and have pump set supplier certify in writing that pump set has been properly installed, started, checked and adjusted, and is ready for performance and acceptance testing. Submit a copy of pump set supplier's certification.

3.1.8. After pump set start-up has been performed and certified as specified above, perform field acceptance tests in accordance with Part II-2 of NFPA 20. Testing is to be performed in presence of Metrolinx, local Fire Chief, and Consultant, and testing is to include any additional tests required by Fire Chief. Supply required testing equipment. Document tests performed, results of tests, and names of those present during tests, and prepare and submit a complete test report.

3.2. INSTALLATION OF FIRE PUMP TEST CONNECTION

3.2.1. Provide an exterior wall mounted test connection assembly for fire pump set. Confirm exact location prior to roughing-in.

3.2.2. Provide a shut-off valve in test connection piping in an accessible location, adjacent to pump set, and provide a check valve with ball drip between shut-off valve and test connection assembly. Extend drainage piping from outlet of ball drip to nearest suitable floor drain.

3.2.3. Attach a 150 mm (6") square laminated red-white plastic plate to valve handle. Engrave plate to read: "FIRE PUMP TEST HEADER SHUT-OFF-VALVE - NORMALLY CLOSED".

3.3. INSTALLATION OF FIRE PUMP TEST METER

3.3.1. Provide a fire pump test meter in a valved bypass with air vent around the fire pump.

3.3.2. When installation if complete, purge the meter, test operation, then close bypass valves.

END OF SECTION