
Part 1 General

1.1 RELATED SECTIONS

- .1 Section 21 05 05 - Common Work Results for Fire Suppression.
- .2 Section 21 13 13 - Wet Pipe Sprinkler Systems.
- .1 Section 23 05 05 - Installation of Pipework.
- .2 Section 23 05 19 - Thermometers and Pressure Gauges - Piping Systems.
- .3 Section 23 05 29 - Hangers and Supports For HVAC Piping and Equipment.
- .4 Section 23 05 49.01 - Seismic Restraint Systems (SRS).
- .5 Section 23 05 53.01 - Mechanical Identification.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CSA C22.1-2011, Canadian Electrical Code.
- .2 National Electrical Manufacturing Association (NEMA).
 - .1 NEMA MG-1, Motors and Generators.
- .3 Underwriters Laboratories of Canada (ULC).
 - .1 CAN/ULC S543, Internal Lug Quick Connect Coupling for Fire Hose.
- .4 National Fire Protection Association (NFPA).
 - .1 NFPA 20-2013, Installation of Stationary Pumps for Fire Protection.
 - .2 NFPA 25-2014, Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
 - .3 NFPA 70-2014, National Electrical Code.
 - .4 NFPA 110-2013, Standard for Emergency and Standby Power Systems.
 - .5 NFPA 170-2012, Standard for Fire Safety and Emergency Symbols.

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Technical Sheets:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet for electrical fire pump and fire pump control. Technical sheets should include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Shop Drawings:
 - .1 Shop drawings must include the following:
 - .1 Method of anchorage;
 - .2 Number of anchors;
 - .3 Supports;
 - .4 Reinforcement;
 - .5 Assembly details;
 - .6 Accessories;
 - .7 Indicate hydraulic and electrical characteristics including Net Positive Suction Head (NPSH) required, make, and model number.
 - .2 Provide power and control diagrams.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Maintenance Sheets:
 - .1 Maintenance sheets must include the following:
 - .1 Technical data from manufacturer, including model, year, power, capacity, and dimensions for the following elements:
 - .1 Fire pump;
 - .2 Motor;
 - .3 Fire pump control panel;
 - .4 Fire pump accessories;
 - .5 Jockey pump;
 - .6 Jockey pump motor;
 - .7 Jockey pump control panel;
 - .8 Monitoring switches;
 - .9 Valves, including gate valves, check valves, and globe valves;
 - .10 Couplings;
 - .11 Test header for the fire pump.
 - .2 A copy of the fire pump test curves;
 - .3 Details regarding operation, housekeeping, and maintenance;
 - .4 A list of recommended spare parts.

- .3 Provide a copy of NFPA 25 "Inspection, Testing, and Maintenance of Water Based Fire Protection Systems" and incorporate it into the "Operation and maintenance Manual".

1.5 HEALTH AND SAFETY

- .1 Take necessary measures to ensure health and safety on construction site, in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
 - .1 Test reports:
 - .1 Submit certified test reports for packaged fire pumps from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Test each pump/driver package at factory to provide detailed performance data and to demonstrate compliance with NFPA 20 and specification. Submit certified test curves.
 - .3 Test hydrostatically to meet requirements of fire protection system to which it will be connected.
 - .2 Instructions:
 - .1 Submit manufacturer's installation instructions.
 - .3 Manufacturer's Field Reports:
 - .1 Manufacturer's field reports specified.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Sort waste in order to re-use and recycle in conformity with section 01 74 21 - Waste Management Plan.
- .2 Collect packaging materials and send to appropriate recycling facilities.
- .3 Collect and sort plastic, paper, and corrugated cardboard wrappings, and dispose them in appropriate designated bins in conformity with the Waste Management Plan.
- .4 Dispose in designated containers substances meeting the definition of toxic or hazardous waste.
- .5 Manipulate and eliminate hazardous materials in conformity with the Canadian Environmental Protection Act, Transportation of Dangerous Goods Act, and provincial and municipal regulations.
- .6 Sort metal banding, flatten, and place in designated area for recycling.

1.8 ACCEPTABLE PRODUCTS AND MATERIALS

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products.

Part 2 Products

2.1 GENERAL

- .1 All products used in fire safety installations must be "cUL" or "ULC" listed and must be labelled as such.
- .2 Provide accessories that can withstand the normal pressure exerted in the fire protection network.

2.2 PIPES AND FITTINGS

- .1 Refer to section 21 13 13 – Wet Pipe Sprinkler Systems.

2.3 VALVES

- .1 All valves to be listed for fire protection service.
- .2 Acceptable Products:
 - .1 Valves, NPS 2 and less, threaded ends:
 - .1 Bronze gate valves, with outside screw and yoke (OS&Y):
 - .1 Acceptable products:
 - .1 Nibco T-104-0;
 - .2 Replacement materials or products: approved by addendum according to Instructions to bidders.
 - .2 Bronze ball valves:
 - .1 Acceptable products:
 - .1 Victaulic S/728 Firelock with monitoring switches;
 - .2 Anvil F171N;
 - .3 Jenkins Fig. 202J;
 - .4 Nibco KT-505-W-8;
 - .5 Replacement materials or products: approved by addendum according to Instructions to bidders.
 - .2 Valves, NPS 2 and less, grooved ends:
 - .1 Bronze ball valves.
 - .1 Acceptable products:
 - .1 Victaulic S/728 Firelock with monitoring switches;
 - .2 Nibco KG-505-W-8;

- .3 Replacement materials or products: approved by addendum according to Instructions to bidders.
- .3 Gate valves, NPS 2½ and over, grooved ends:
 - .1 Ductile iron gate valve with outside screw and yoke (OS&Y), bronze trim, grooved ends.
 - .1 Victaulic 771H;
 - .2 Replacement materials or products: approved by addendum according to Instructions to bidders.
 - .4 Gate valves, NPS 2½ and over, flanged ends:
 - .1 Ductile iron gate valve with outside screw and yoke (OS&Y), bronze trim, flanged ends.
 - .1 Nibco F-607-RW;
 - .2 Replacement materials or products: approved by addendum according to Instructions to bidders.
 - .5 Butterfly valves, NPS 2½ and over, with monitoring switch:
 - .1 Ductile iron butterfly valves, with indicating yoke, grooved ends.
 - .1 Acceptable products:
 - .1 Tyco, model BFV-N, TFP1520;
 - .2 Nibco LD3510-8;
 - .3 Replacement materials or products: approved by addendum according to Instructions to bidders.
 - .6 Swing check valves with composite material disc:
 - .1 Flanged ends:
 - .1 Acceptable products:
 - .1 Nibco F908W;
 - .2 Viking D-1 and G-1 flanged;
 - .3 Replacement materials or products: approved by addendum according to Instructions to bidders.
 - .2 Quiet type, adapted for flanged ends:
 - .1 Acceptable products:
 - .1 Rite, model 212;
 - .2 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.4 FIRE PUMP UNIT

- .1 General:
 - .1 ULC listed vertical in line fire pump, including all required accessories and control devices for proper operation of the fire pump.

- .2 Accessories in accordance with NFPA 20 Standard, including the following:
 - .1 Fire pump bypass fitted with electrically supervised OS&Y shut off valves and quiet check valve.
 - .2 Audible and visual alarm on suction side as per NFPA 20.
 - .3 90 mm (3.54 in) pressure gauges on suction and discharge sides equipped with NPS ½ control valve.
 - .4 OS&Y valves on suction sides, electrically supervised.
 - .5 Butterfly valves on discharge sides, electrically supervised.
 - .6 Anchor bolts must be sized to withstand seismic zone acceleration and velocity forces.
- .2 Compact fire pump unit including:
 - .1 Fire pump (PI-01);
 - .2 Control panel;
 - .3 Electrical drive motor;
 - .4 Excess pressure pump with control panel (JP-01);
 - .5 All accessories installed at manufacturer's shop;
 - .6 Test header with discharge outlet for fire pump tests;
 - .7 Required isolation valves;
 - .8 All integrated controls.
- .3 Acceptable Products:
 - .1 Vertical in-line fire pump unit:
 - .1 Armstrong, FirePack Ultra Plus, 4516 Series;
 - .2 Plad;
 - .3 AC Fire Pump;
 - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.5 FIRE PUMP (PI-01)

- .1 General:
 - .1 Cast iron body with bronze impeller, steel driving shaft with bronze coupling and mechanical gasket with stainless steel parts.
 - .2 Pump rated for a 860 kPa suction pressure.
 - .3 Pump mounted on a steel pedestal.
 - .4 Nominal flow capacity to satisfy fire protection system requirement and NFPA 20. Pump capable to produce 150% of rated flow at 65% of rated pressure.
 - .5 Pump must be capable of producing 140% of rated pressure at no flow condition.

- .2 Pump Characteristics:
 - .1 Pump type: vertical in line.
 - .2 Rated flow: 78.86 L/s.
 - .3 Pump Rated Pressure: 586 kPa.
 - .4 Minimal suction pressure: 333 kPa.
 - .5 Maximal suction pressure: 400 kPa
 - .6 Power: 100 HP.
 - .7 Rotation speed: 1,800 rpm.
 - .8 Acceptable products:
 - .1 Armstrong, model 8x8x16FM;
 - .2 Plad;
 - .3 AC Fire Pump;
 - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.6 CONTROL PANEL

- .1 Control panel with integrated automatic transfer switch in accordance with NFPA 20 and ULC listed, with the following characteristics:
 - .1 Manual/automatic type with an automatic power transfer switch;
 - .2 Starting type: Electric soft starter;
 - .3 Equipped with terminals for regular and emergency electrical supply;
 - .4 Completely prewired and tested in shop, mounted in a NEMA 2 cabinet;
 - .5 Load shedding contacts, 10 A, 120 VAC;
 - .6 Disconnect switch- with external control;
 - .7 Circuit breakers with fuses of adequate capacity on each phase;
 - .8 Pressure switch;
 - .9 Starter controlled by pressure switch and external lever;
 - .10 Load control timer, for a period not exceeding 7 minutes;
 - .11 Pilot lamps indicating electrical supply and phase reversal;
 - .12 Contacts for proof of operation and low suction pressure;
 - .13 Two position operation selector (automatic and manual).
- .2 Acceptable Products:
 - .1 Tornatech, model GPS+GPU;
 - .2 Cutler-Hammer;
 - .3 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.7 DRIVER

- .1 General:
 - .1 Electric horizontal drip-proof motor UL and CSA listed for fire pump service, in accordance with NEMA MG-1 and NEMA B, with a service factor of 1.15, complete with storage batteries, starting equipment, and controls.
 - .2 Driver characteristics:
 - .1 Electric motor including all accessories required for proper operation:
 - .1 Power: 100 HP at 575/3/60.
 - .2 Rotation speed: 1,800 tpm.

2.8 PRESSURE MAINTENANCE (JOCKEY) PUMP (JP-01)

- .1 General: horizontal, multi-stage, close-coupled, electrically driven pump, and controller.
- .2 Characteristics:
 - .1 Flow rate: 0.31 L/s.
 - .2 Pressure: 655 kPa.
 - .3 Rotation speed: 3,450 rpm.
 - .4 Motor: 1.5 HP at 575/3/60.
 - .5 Acceptable products:
 - .1 Armstrong, 4700 Series, model VMS-0306;
 - .2 Plad;
 - .3 AC Fire Pump;
 - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.
- .3 Pressure maintenance pump controller:
 - .1 Automatic controller, full-voltage starter, pre-wired in manufacturer's shop.
 - .2 Pressure switch.
 - .3 Pilot lamps for pump running, electrical supply and overload.
 - .4 Disconnect switch with external control.
 - .5 Acceptable products:
 - .1 Tornatech, model JP3;
 - .2 Cutler-Hammer;
 - .3 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.9 FIRE PUMP TEST HEADER

- .1 Multiple type connection, installed as indicated, for built-in mounting with an antique bronze indicating plates, polished finish, with embedded inscription directly on the plates, threaded caps with metal chains in antique bronze.

- .2 Test valve: 63 mm angle valve for fire pump test header connection, cast or forged brass complete with hand wheel, thread corresponding to local Fire service.
- .3 Metallic storage cabinet, painted red, identified, big enough to store all fire pump test header valves.
- .4 Acceptable Products:
 - .1 Test header:
 - .1 Guardian, model 6066;
 - .2 CFH;
 - .3 Replacement materials or products: approved by addendum according to Instructions to bidders.
 - .2 Test angle valve:
 - .1 Wilson & Cousins, model 1E23;
 - .2 Guardian, model 5015;
 - .3 Giacomini, model A-56;
 - .4 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.10 OPERATION

- .1 Jockey pump must start upon a pressure drop in the system. It remains in operation until normal pressure is restored. If system pressure continues to drop, the fire pump starts.

2.11 HANGERS

- .1 Hangers for fire protection service, in conformity with NFPA 20 Standard, and to sections 23 05 29 - Hangers and Supports for HVAC Piping and Equipment and 23 05 49.01 - Seismic Restraint Systems (SRS).

2.12 MONITORING SWITCHES

- .1 General: Switches approved for fire protection service, complying with NFPA 13 Standard.
- .2 Valves:
 - .1 Mechanically attached to valve body, with normally open and normally closed contacts, with monitoring capability.
 - .2 Add monitoring contacts on non-supervised valves, as indicated on-site.
 - .3 Acceptable products:
 - .1 OS&Y valve:
 - .1 System Sensor, model OSY2A.
 - .2 Replacement materials or products: approved by addendum according to Instructions to bidders.

- .2 Pluggable valves:
 - .1 System Sensor, model PSP1A.
 - .2 Replacement materials or products: approved by addendum according to Instructions to bidders.

2.13 PRESSURE GAUGES

- .1 ULC approved pressure gauges in compliance with Section 23 05 19 - Thermometers and Pressure Gauges - Piping Systems.
- .2 Maximum limit of not less than twice normal working pressure at point where installed.
- .3 Provide an isolating bronze ball valve, with drainage fitting at every gauge.

2.14 IDENTIFICATION

- .1 Nameplate for the fire pump and pump motor: according to NFPA 20 and Section 23 05 53.01 - Mechanical Equipment and Network Identification.
- .2 Fire protection equipment identification according to NFPA 170.
- .3 Fire pump test valves cabinet identification.

Part 3 Execution

3.1 GENERAL

- .1 Install, verify, and submit to an acceptance test the fire pump unit in accordance with NFPA20 Standard.
- .2 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install in accordance with established Standards and the requirements of laws, regulations, Standards, codes in force and according to the manufacturer's instructions.
- .2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.
- .3 Proper operation and installation coordination of the system, including automatic sprinkler systems, system supervision, and starting-up, are all under the responsibility of the Fire Protection Contractor.
- .4 Clearly mark drain valves, bypass valves, main control valves, and auxiliary valves.

- .5 Install pump test piping.
- .6 Provide one valve per fire pump test header outlets. Store them inside a cabinet for this purpose and inside the pump room once commissioning is completed.

3.3 TRAINING

- .1 Organize a 4-hour training session for operational and maintenance (O&M) personnel.
- .2 Training will cover Standard operation, emergency operations and maintenance of system, as per NFPA 25 Standard.

3.4 TESTS AND VERIFICATIONS

- .1 Carry out the following tests on the fire pump installation, in accordance with NFPA 20 Standard:
 - .1 Execute tests in manufacturers shop (shop curves) in order to provide detailed data on pump performance.
 - .2 Execute flushing in accordance with NFPA 20.
 - .3 Execute complete hydrostatic testing on the automatic sprinkler systems piping and appurtenances at a pressure of 1,380 kPa for 2 hours.
 - .4 Execute a fire pump flow test at 0%, 100%, and 150% of rated flow. Make sure no components overheat.
 - .5 Execute a loads start test of the fire pump and bring up to rated speed without interruption under the conditions of a discharge equal to peak load.
 - .6 Execute a phase reversal test on normal power supply and on the alternate power supply.
 - .7 Execute a minimum of six manual and automatic tests of the fire pump control panel in accordance with manufacturer's instructions. Each test should last at least five minutes.
 - .8 Simulate loss of normal power supply. Check that the transfer to the emergency power supply is carried out when the pump operates at peak load.
 - .9 Simulate all fire pump alarms conditions and check that all alarms conditions are relayed to the fire panel.
 - .10 Operate fire pump for a minimum period of 1 hour.
 - .11 Execute opening and closing of all water supply control valves while under system pressure.
- .2 Conduct tests in presence of the Departmental Representative and supply test certificates, as required by NFPA 20 Standard.
- .3 Provide and perform all tests with calibrated equipment. Equipment calibrations must have been done inside within one year prior to the test period.

3.5 REPORT AND CERTIFICATE

- .1 Provide both inspection report and inspection attestation, as per NFPA 20, to the Departmental Representative at the end of the project in addition to the properly completed and signed Contractor materials and tests certificate. Record all tests results in a notebook appended to the report.

3.6 CLEANING

- .1 Proceed in accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

END OF SECTION