

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results for Electrical.
- .2 Section 28 31 00.01 – Multiplex Fire Alarm System.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations, Includes Update No. 1 (2012).
- .2 National Fire Prevention Association (NFPA):
 - .1 NFPA 13-2013, Standard for the Installation of Sprinkler Systems.
- .3 National Building Code, 2010.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data:
 - .1 Provide manufacturer's product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Shop Drawings:
 - .1 Manufacturer's Catalog Data, including specific model, type, and size for:
 - .1 Pipe.
 - .2 Threaded fittings.
 - .3 Valves, including gate, check, and globe.
 - .4 Sprinklers.
 - .5 Pipe hangers, supports and seismic bracing.
 - .6 Pressure or flow switch.
 - .7 Fire department connections.
 - .8 Mechanical fittings and couplings.
 - .2 Drawings:
 - .1 Sprinkler and piping system layout.
 - .2 Prepare detail working drawings of system layout in accordance with NFPA 13, "Working Drawings (Plans)".
 - .3 Show data essential for proper installation of each system.
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- .4 Show details, plan view, elevations, and sections of systems supply and piping.
- .5 Show piping schematic of systems supply, devices, valves, pipe, and fittings.
- .3 Design Data:
 - .1 Calculations for sprinkler system design including:
 - .1 Hydraulic calculations.
 - .2 Seismic calculations.
 - .2 Calculations to be sealed by Engineer licensed in the Province of Ontario.
- .4 Manufacturers' Instructions:
 - .1 Provide manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with NFPA 13.
- .2 Field Test Reports:
 - .1 Pressure tests on piping system.
 - .2 Backflow preventer full forward flow test.
 - .3 Standard backflow preventer test.
- .3 Records:
 - .1 As-built drawings of each system.
 - .1 After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes.
 - .2 Submit drawings with title block similar to full size technical drawings.
- .4 Operation and Maintenance Manuals:
 - .1 Provide detailed hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for aboveground piping and other documentation for incorporation into manual in accordance with NFPA 13.

1.5 QUALITY ASSURANCE

- .1 Supply grooved joint couplings, fittings, valves, grooving tools and specialties from a single manufacturer. Use date stamped castings for coupling housings, fittings, valve bodies, for quality assurance and traceability.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Provide spare sprinklers and tools in accordance with NFPA 13.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Protection:
 - .1 Store materials indoors in dry location.
 - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

Part 2 Products

2.1 DESIGN REQUIREMENTS

- .1 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, for light and ordinary hazard occupancy using hydraulic design for uniform distribution of water over design area in the Birks and Bates Buildings.
 - .2 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, for light and ordinary hazard occupancy using pipe schedule design for uniform distribution of water over design area within the Brouse Building.
 - .3 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.
 - .4 Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed shop drawings.
 - .5 Locate sprinklers in consistent pattern with ceiling grid, lights, and air supply diffusers.
 - .6 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.
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- .7 Design systems for earthquake protection as per NFPA 13 and the National Building Code.
- .8 Location of Sprinklers:
 - .1 Locate sprinklers in relation to ceiling. Spacing of sprinklers not to exceed that permitted by NFPA 13 for light or ordinary hazard occupancy. (as indicated on drawings)
 - .2 Uniformly space sprinklers on branch.
- .9 Water Distribution:
 - .1 Make distribution uniform throughout the area in which sprinklers will open.
 - .2 Discharge from individual sprinklers in hydraulically most remote area to be 100% of specified density.
- .10 Density of Application of Water:
 - .1 Size pipe to provide specified density when system is discharging specified total maximum required flow.
 - .2 Application to horizontal surfaces below sprinklers shall be:
 - .1 4.1 lpm per m² for light hazard.
 - .2 6.1 lpm per m² for ordinary hazard group 1.
 - .3 8.1 lpm per m² for ordinary hazard group 2.
- .11 Sprinkler Discharge Area:
 - .1 Area: hydraulically most remote 139 m² area as defined in NFPA 13. Use area reduction method as per NFPA 13 as applicable.
- .12 Hose Allowances:
 - .1 Include allowance in hydraulic calculations of 379 lpm for light hazard and 946 lpm for ordinary hazard for inside and outside hose streams.
- .13 Friction Losses:
 - .1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping.

2.2 ABOVE GROUND PIPING SYSTEMS

- .1 Provide fittings for changes in direction of piping and for connections.
 - .1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.
- .2 Perform welding in shop; field welding will only be permitted on a case-by-case basis.
- .3 Conceal piping in areas with suspended ceiling.

2.3 PIPE, FITTINGS AND VALVES

- .1 Pipe:
 - .1 Ferrous: to NFPA 13.
 - .2 All piping to be Schedule 10 or Schedule 40. Schedule 10 piping is not permitted to be threaded.
- .2 Fittings and joints to NFPA 13:
 - .1 Ferrous: threaded, welded, flanged or roll grooved.
 - .1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.
 - .2 Grooved fittings to have minimum pressure rating of 20.7 bar for the material on which they are used.
 - .3 Provide 25 mm welded or threaded fittings into which sprinklers, sprinkler riser nipples, or drop nipples are threaded.
 - .4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.
 - .5 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
 - .6 Fittings: ULC approved for use in wet pipe sprinkler systems.
 - .7 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
 - .8 Sprinkler pipe and fittings: metal.
- .3 Valves:
 - .1 ULC listed for fire protection service.
 - .2 Gate valves: open by counterclockwise rotation.
 - .3 Butterfly valves open by counterclockwise rotation.
 - .4 Check valves: clear opening swing or spring actuated check type with flanged inspection and access cover plate for sizes 10 cm and larger.
- .4 Pipe hangers and seismic bracing:
 - .1 ULC listed for fire protection services in accordance with NFPA.

2.4 SPRINKLERS

- .1 General: to NFPA 13 and ULC listed for fire services.
 - .2 Sprinkler Type:
 - .1 Type A: upright bronze, glass bulb type.
 - .2 Type B: pendant bronze, glass bulb type.
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- .3 Type C: semi-recessed, chrome, glass bulb type with ring and cup.
- .4 Type D: brass concealed.
- .3 Provide nominal 1.2 and 1.9 orifice sprinklers; refer to drawings.
 - .1 Release element of each sprinkler to be of ordinary temperature rating or higher as suitable for specific application.
 - .2 Provide polished semi-recessed sprinklers below suspended ceilings.
 - .3 Provide corrosion-resistant sprinklers and sprinkler guards in accordance with NFPA 13.
 - .4 Deflector: not more than 25 mm below suspended ceilings.
 - .5 Ceiling cups: not permitted.
 - .6 Concealed cover plates shall be paint matched to the existing ceiling paint colour.

2.5 SUPERVISORY SWITCHES

- .1 General: to NFPA 13 and ULC listed for fire service.
- .2 Valves:
 - .1 Mechanically attached to valve body, with normally open and normally closed contacts and supervisory capability.
 - .2 Backflow preventer test header shall be equipped with a control valve ULC listed to be monitored normally closed.
- .3 Flow switch type:
 - .1 With normally open and normally closed contacts and supervisory capability.
 - .2 Provide switch with circuit opener or closer for automatic transmittal of alarm over facility fire alarm system.
 - .3 Connect into building fire alarm system.
 - .4 Connection of switch: Section 28 31 00.01 - Multiplex Fire Alarm System.
 - .5 Alarm actuating device: mechanical diaphragm controlled retard device adjustable from 10 to 60 seconds and instantly recycle. Set to operate at 45 seconds.

2.6 FIRE DEPARTMENT CONNECTION AND TEST HEADER

- .1 Provide connections approximately 300 mm to 900 mm above finish grade, location as indicated.
- .2 To NFPA 13 and ULC listed.
- .3 Polished brass plated flush mounted fire department connection of approved two-way type with 63 mm National Standard female hose threads with plug, chain, and identifying fire department connection escutcheon plate.
 - .1 Flush mounted fire department connection plate to indicate "Auto-Sprk / Standpipe".

- .2 Test header plate to indicate: "Test Header".
- .4 Thread specifications: compatible with local fire department.
- .5 Install a 90-degree elbow with drain connection at the low-point near each fire department connection to allow for system drainage to prevent freezing; drain to building exterior.

2.7 PRESSURE GAUGES

- .1 ULC listed 100 mm diameter, liquid filled.
- .2 Maximum limit of not less than twice normal working pressure at point where installed.

2.8 ESCUTCHEON PLATES

- .1 Provide one piece type metal plates for piping passing through walls, in exposed spaces.
- .2 Provide polished chromium-plated finish on copper alloy plates.

2.9 INSPECTOR'S TEST CONNECTION

- .1 Locate inspector's test connection 900 mm downstream of flow switch. Provide test connections approximately 2.5 m above floor for each sprinkler system or portion of each sprinkler system equipped with flow switch.
- .2 Provide test connection piping to location where discharge will be readily visible and where water may be discharged without property damage, preferable to building exterior.
- .3 Provide discharge orifice of same size as corresponding sprinkler orifice.
- .4 Inspector's test connection to be single unit with incorporated sight glass capable of performing test and drain functions.

2.10 SIGNS

- .1 Attach properly lettered bilingual and approved metal signs to each valve and alarm device to NFPA 13. Provide a valve chart and permanently fix to wall in the sprinkler room.
- .2 Permanently fix hydraulic design data nameplates to riser of each system where systems are hydraulically calculated.

2.11 SPARE PARTS CABINET

- .1 Provide metal cabinet with extra sprinklers and sprinkler wrenches within sprinkler room. Number and types of extra sprinklers as specified in NFPA 13.
 - .2 Provide a minimum of two sprinklers of each type, finish, and temperature rating.
 - .3 Provide list of sprinklers installed at cabinet. List to include:
 - .1 Sprinkler identification number.
 - .2 Manufacturer model, orifice, deflector type, thermal sensitivity, and pressure pressure rating.
 - .3 General description.
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- .4 Quantity or spare sprinklers in cabinet.
- .5 Date of issue.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Install, inspect and test to acceptance in accordance with NFPA 13.

3.3 PIPE INSTALLATION

- .1 Install piping to slope back to valve/drain and to bear evenly on hangers and supports.
- .2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.
- .3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.
- .4 Inspect piping before placing into position.

3.4 ELECTRICAL CONNECTIONS

- .1 Provide electrical work associated with this section under Section 26 05 00 - Common Work Results for Electrical.
- .2 Provide fire alarm system under Section 28 31 00.01 - Multiplex Fire Alarm System.
- .3 Provide wiring in rigid metal conduit or intermediate metal conduit.

3.5 FIELD PAINTING

- .1 All piping to remain unpainted, except as indicated on drawings. Only Schedule 40 piping is permitted to be painted.

3.6 PIPE MARKINGS

- .1 Provide markings on pipe indicating use of pipe. Markings to be white writing on red background and shall be visible and clearly legible from ground level.
 - .2 Install markings on each side of walls through which piping is installed and at each change of direction.
 - .3 Provide arrows at each pipe marker indicating water flow direction. Arrows to be white on red background.
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3.7 FIELD QUALITY CONTROL

- .1 Site Test, Inspection:
 - .1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.
 - .2 Test, inspect, and approve piping before covering or concealing.
 - .3 Preliminary Tests:
 - .1 Hydrostatically test each system at 13.8 bar for a 2 hour period with no leakage or reduction in pressure.
 - .2 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.
 - .3 Test alarms and other devices.
 - .4 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.
 - .4 Formal Tests and Inspections:
 - .1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.
 - .2 Submit written request for formal inspection at least 5 days prior to inspection date.
 - .3 Repeat required tests as directed.
 - .4 Correct defects and make additional tests until systems comply with technical requirements.
 - .5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.
 - .6 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.
- .5 Provide test records within 48 hours of success full test.

3.8 CLEANING

- .1 Clean in accordance with Section 01 00 10 - General Instructions, Part 1.7 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

END OF SECTION
