

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 28 31 00.02 - Multiplex Fire Alarm and Voice Communication Systems.

1.2 REFERENCES

- .1 National Building Code of Canada 2015.
- .2 National Fire Prevention Association (NFPA)
 - .1 NFPA 13-2016, Standard for the Installation of Sprinkler Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's Catalog Data, including specific model, type, and size for:
 - .1 Pipe and fittings.
 - .2 Sprinklers.
 - .3 Pipe hangers and supports (including seismic bracing).
 - .4 Mechanical couplings.
 - .3 Drawings:
 - .1 Sprinkler and piping system layout.
 - .1 Prepare detail working drawings of system layout in accordance with NFPA 13, "Working Drawings (Plans)".
 - .2 Show data essential for proper installation of each system.
 - .3 Show details and plan view of systems supply and piping.
 - .4 Design Data:
 - .1 Hydraulic calculations of sprinkler system design and seismic bracing.
 - .2 Calculations shall be sealed by a Professional Engineer licensed in the province of Québec.
- .3 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 Preliminary tests on piping system.
- .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 electronic drawings with title block similar to full size contract drawings.
- .4 Operation and Maintenance Manuals:
 - .1 Provide detailed Contractors Material and Test Certificate for aboveground piping, complete set of reviewed shop drawings, reviewed hydraulic and seismic calculations, warranty letter and other documentation for incorporation into manual in accordance with NFPA 13.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company or person specializing in wet sprinkler systems with documented experience.
- .2 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 Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

- .3 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.
- .4 Packaging Waste Management: perform in accordance with Section 01 74 21 - Construction/Demolition Waste Management.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- .1 Sprinkler system is existing; modify to suit new layout and ceiling elevations. Control components of system to remain as is.
- .2 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, for light hazard occupancy by hydraulic calculations for uniform distribution of water over design area.
- .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.
- .7 Design systems for earthquake protection. Power-actuated fasteners and drop-in anchors shall not be used for tension loads.
- .8 Location of sprinklers:
 - .1 Locate sprinklers in relation to ceiling and spacing of sprinklers not to exceed that permitted by NFPA 13 for light hazard occupancy, 20.1 m² per sprinkler.
 - .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 4.1 lpm per m².
- .11 Sprinkler Discharge Area:
 - .1 Area: hydraulically most remote 139 m² area as defined in NFPA 13.
- .12 Outside Hose Allowances:
 - .1 Include allowance in hydraulic calculations of 379 lpm for inside hose streams.
- .13 Friction Losses:
 - .1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping, and 140 for cement-lined ductile-iron piping.
- .14 Water Supply:
 - .1 Base hydraulic calculations on most recent fire pump test report. Calculate system back to pump discharge.

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.
- .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 Piping shall be either Schedule 10 or 40.
- .2 Fittings and joints to NFPA 13:
 - .1 Ferrous: threaded (Schedule 40 only), 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 Provide 25 mm threaded fittings into which sprinkler riser nipples, or drop nipples are threaded.
 - .3 Threaded hard pipe drops and arm-overs are permitted to be substituted with listed flexible sprinkler fittings.
 - .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.
- .3 Pipe hangers and seismic braces:
 - .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, brass.
 - .2 Type B: semi-recessed chrome, glass bulb type with ring and cup.
- .3 Provide nominal 1.2 cm orifice sprinklers.
 - .1 Release element of each sprinkler to be of ordinary temperature rating or higher as suitable for specific application.
 - .2 All sprinklers shall be standard response.
 - .3 Provide corrosion-resistant sprinklers and sprinkler guards in accordance with NFPA 13.
 - .4 Deflector: not more than 50 mm below suspended ceilings.

2.5 SIGNS

- .1 Permanently fix hydraulic design data nameplates at control valve of each system.

2.6 SPARE SPRINKLERS

- .1 Provide extra sprinklers and sprinkler wrench to stock of spare sprinklers. Number and types of extra sprinklers as specified in NFPA 13.

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 straight and true 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 FIELD PAINTING

- .1 All new piping to remain unpainted.
- .2 Apply coatings to clean, dry surfaces, using clean brushes.

3.5 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 normal operating pressure for a 2 hour period with no leakage or reduction in pressure.
 - .2 Flush piping with potable water in accordance with NFPA 13.
 - .3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.
 - .4 Test alarms and other devices.
 - .5 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 contract requirements.
 - .5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.

3.6 CLEANING

- .1 Clean in accordance with Section 01 74 11 - 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/Demolition Waste Management.

