

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC 2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.
- .2 National Fire Prevention Association (NFPA)
 - .1 NFPA 13-2016, Standard for the Installation of Sprinkler Systems.
 - .2 NFPA 20-2007, Standard for the Installation of Stationary Pumps for Fire Protection.
 - .3 NFPA 25-2008, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
- .3 Underwriter's Laboratories of Canada (ULC)

1.2 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.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Newfoundland and Labrador, Canada.
 - .2 Indicate:
 - .1 Materials.
 - .2 Finishes.
 - .3 Method of anchorage
 - .4 Number of anchors.
 - .5 Supports.
 - .6 Reinforcement.
 - .7 Assembly details.
 - .8 Accessories.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .4 Samples:
 - .1 Submit samples of following:
 - .1 Each type of sprinkler head.
 - .2 Signs.
- .5 Test reports:
 - .1 Submit certified test reports for wet pipe fire protection sprinkler systems from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
- .6 Certificates:
 - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .7 Manufacturers' Instructions:
 - .1 Provide manufacturer's installation instructions.
- .8 Field Quality Control Submittals:
 - .1 Manufacturer's Field Reports: manufacturer's field reports specified.
- .9 Sustainable Design Submittals:
 - .1 LEED Canada-NC 2009 Submittals: in accordance with Section 01 35 21 - LEED Requirements.

1.3 CLOSEOUT
SUBMITTALS

- .1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.
- .2 Manufacturer's Catalog Data, including specific model, type, and size for:
 - .1 Pipe and fittings.
 - .2 Alarm valves.
 - .3 Valves, including gate, check, and globe.
 - .4 Alarms.
 - .5 Sprinkler heads.
 - .6 Pipe hangers and supports.
 - .7 Pressure or flow switch.
 - .8 Fire department connections.

1.3 CLOSEOUT
SUBMITTALS
(Cont'd)

- .2 (Cont'd)
 - .9 Excess Pressure pump.
 - .10 Mechanical couplings.
- .3 Drawings:
 - .1 Sprinkler heads and piping system layout.
 - .1 Prepare 760 mm by 1050 mm 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, plan view, elevations, and sections of systems supply and piping.
 - .4 Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams.
 - .2 Electrical wiring diagrams.
- .4 Design Data:
 - .1 Calculations of sprinkler system design.
 - .2 Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.
- .5 Field Test Reports:
 - .1 Preliminary tests on piping system.
- .6 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 760 mm by 1050 mm drawings on reproducible Mylar film with title block similar to full size contract drawings.
- .7 Operation and Maintenance Manuals:
 - .1 Provide detailed hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for aboveground and underground piping and other documentation for incorporation into manual in accordance with NFPA 13.

1.4 QUALITY
ASSURANCE

- .1 Qualifications:
 - .1 Installer: company or person specializing in wet sprinkler systems with documented experience approved by manufacturer.
- .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.

1.5 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.

1.6 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: remove for reuse or return of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition 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, by hydraulic calculations for uniform distribution of water over design area.
- .2 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.
- .3 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.
- .4 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers. Sprinkler heads to be centred in ceiling tiles wherever possible.
- .5 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.
- .6 Location of Sprinkler Heads:
 - .1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13 for light hazard occupancy.
 - .2 Uniformly space sprinklers on branch.
- .7 Water Distribution:
 - .1 Make distribution uniform throughout the area in which sprinkler heads will open.
 - .2 Discharge from individual heads in hydraulically most remote area to be 100 % of specified density.
- .8 Density of Application of Water:
 - .1 Size pipe to provide specified density when system is discharging specified total maximum required flow.

2.1 DESIGN
REQUIREMENTS
(Cont'd)

- .8 Density of Application of Water: (Cont'd)
 - .2 Application to horizontal surfaces below sprinklers shall be 4.1 lpm per m² (0.1 gpm/ft²).
- .9 Sprinkler Discharge Area:
 - .1 Area: hydraulically most remote 139 m² area as defined in NFPA 13.
- .10 Combined Inside and Outside Hose Allowance:
 - .1 Include allowance in hydraulic calculations of 380 lpm for outside hose streams.
- .11 Friction Losses:
 - .1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping.
- .12 Hydraulic design calculations and sprinkler drawings must be stamped and signed by a Professional Engineer licensed to practice in the Province of Newfoundland and Labrador.
- .13 Water Supply:
 - .1 Sprinkler contractor to conduct flow and pressure test of water supply in vicinity of project to obtain criteria for basis of design in accordance with NFPA 13.
 - .2 Hydraulic flow tests were conducted on May 18, 2017 on a hydrant in close proximity to the building site. The results indicate a static pressure of 413 kPa (60 psi). The results of the two flow tests are included in APPENDIX A - FLOW TESTS.
 - .3 Contractor to verify flow test results.

2.2 SUSTAINABLE
REQUIREMENTS

- .1 Materials and products in accordance with Section 01 35 21 - LEED Requirements.
- .2 Grooved couplings and fittings made from minimum 90% recycled metal.

2.3 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 not be permitted.
- .3 Conceal piping in areas with suspended ceiling.

2.4 PIPE, FITTINGS
AND VALVES

- .1 Pipe:
 - .1 Ferrous: to NFPA 13.
 - .2 Fittings and joints to NFPA 13:
 - .1 Ferrous: screwed, 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 threaded or grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
 - .3 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.
 - .4 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
 - .5 Fittings: ULC approved for use in wet pipe sprinkler systems.
 - .6 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
 - .7 Side outlet tees using rubber gasketed fittings are not permitted.
 - .8 Sprinkler pipe and fittings: metal.
 - .3 Valves:
 - .1 ULC listed for fire protection service.
-

2.4 PIPE, FITTINGS .3
AND VALVES
(Cont'd)

- Valves: (Cont'd)
- .2 Gate valves: open by counterclockwise rotation.
 - .3 Provide rising stem valve beneath each alarm valve in each riser when more than one alarm valve is supplied from same water supply pipe.
 - .4 Check valves: flanged clear opening swing or spring actuated check type with flanged inspection and access cover plate for sizes 10 cm and larger.
 - .5 Provide gate valve in piping protecting elevator hoistways, machine rooms, and machinery spaces.
- .4 Pipe hangers:
- .1 ULC listed for fire protection services in accordance with NFPA.

2.5 SPRINKLER HEADS .1

- General: to NFPA 13 and ULC listed for fire services.
- .2 Sprinkler Head Type:
- .1 Type A: upright bronze.
 - .2 Type C: pendant chrome glass bulb type.
 - .3 Type D: recessed polished chrome glass bulb type with ring and cup.
- .3 Provide nominal 1.2 cm orifice sprinkler heads.
- .1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application.
 - .2 Provide polished chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings.
 - .3 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.
 - .4 Deflector: not more than 75 mm below suspended ceilings.
 - .5 Ceiling plates: not more than 25 mm deep.

2.6 ALARM CHECK
VALVE

- .1 Alarm check valve to NFPA 13 and ULC listed for fire service.
- .2 Provide variable pressure type alarm valve complete with retarding chamber, alarm test valve, alarm shutoff valve, drain valve, pressure gages, accessories, and appurtenances for proper operation of system.
- .3 Provide valve complete with internal components that are replaceable without removing the valve from the installed position.

2.7 EXTERIOR
ELECTRONIC FIRE
ALARM

- .1 Provide alarms approved weatherproof and guarded type, to sound locally on flow of water in each corresponding sprinkler system.
- .2 Mount alarms on outside of outer walls of each building at location as directed.

2.8 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.
- .3 Pressure or 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.
- .4 Pressure alarm switch:
 - .1 With normally open and normally closed contacts and supervisory capability.

2.9 FIRE
DEPARTMENT
CONNECTION

- .1 Provide connections approximately 1.5 m above finish grade, location as indicated.
- .2 To NFPA 13 and ULC S543 listed, Siamese type.
- .3 Polished bronze exposed of approved two-way type with 2.5 inch National Standard female hose threads with plug, chain, and identifying fire department connection escutcheon plate.
- .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.

2.10 EXCESS
PRESSURE PUMP

- .1 Provide pumps on each sprinkler piping riser.
- .2 Pump and motor unit:
 - .1 Approved for automatic wet pipe fire extinguishing sprinkler systems; complete with pilot light panel, differential motor control switch, high pressure switch, and low pressure switch.
 - .2 NEMA Class B squirrel cage induction 1725 rpm, continuous duty, drip proof, ball bearing, maximum temperature rise 50°C, 0.25kW, 120/1/60.
 - .3 Capacity: 7.6 L/min.
- .3 Provide electrical power supply connections for pump and pilot ;ogjt panel at supply side of building service panel.
- .4 Provide separate fused safety-type switch with locked lever for each occasion.
- .5 Pump operation switch: to operate excess pressure pump with pressure differential of 103kPa.
- .6 Shut-off valve and strainer on pump inlet. Relief vavle, check valve and shut-off valve on discharge connections.

2.11 PRESSURE
GAUGES

- .1 ULC listed and to Section 23 05 19.01 -
Thermometers and Pressure Gauges - Piping
Systems.
- .2 Maximum limit of not less than twice normal
working pressure at point where installed.

2.12 BURIED WATER
PIPING SYSTEM

- .1 Pipe and Fittings:
 - .1 All piping in accordance with Section 33
11 16 - Site Water Utility Distribution
Piping.
 - .2 Anchor joints in accordance with NFPA
24.
 - .3 Provide concrete thrust block at elbow
where pipe turns up toward the floor, and
restrain pipe riser with steel rods from elbow
to flange above floor.
 - .4 Flange adapter to join plain end PVC
piping to meet AWWA C-900. Constructed of
ductile iron to meet ASTM A536 Grade 65-45-12.
 - .5 Minimum depth of cover: 1.8 metre at
finish grade.
 - .6 Piping beyond 1.5 metre outside of
building walls: provided under Section 33 11 16
- Site Water Utility Distribution Piping.
- .2 Buried Utility Warning and Identification
Tape:
 - .1 Provide marker tape in accordance with
Section 33 11 16 - Site Water Utility
Distribution Piping.

2.13 PIPE SLEEVES

- .1 Provide pipe sleeves where piping passes
through walls, or floors.
- .2 Secure sleeves in position and location
during construction.
- .3 Provide sleeves of sufficient length to pass
through entire thickness of walls, and floors.
- .4 Provide 2.5 cm minimum clearance between
exterior of piping and interior of sleeve or
core-drilled hole.
 - .1 Firmly pack space with mineral wool
insulation.

2.13 PIPE SLEEVES .4
(Cont'd)

(Cont'd)

.2 Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to firm but pliable mass, provide mechanically adjustable segmented elastomeric seal.

.3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.

.5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide hot-dip galvanized steel.

.2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.

.6 Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide 0.61 mm thick galvanized steel sheet.

2.14 ESCUTCHEON
PLATES

.1 Provide one piece or split hinge type metal plates for piping passing through walls, floors, and ceilings in exposed spaces.

.2 Provide polished chromium-plated finish on copper alloy plates in finished spaces.

.3 Provide paint finish on metal plates in unfinished spaces.

2.15 INSPECTOR'S
TEST CONNECTION

.1 Locate inspector's test connection at hydraulically most remote part of each system, provide test connections approximately 3 m above floor for each sprinkler system or portion of each sprinkler system equipped with alarm device.

.2 Provide test connection piping to location where discharge will be readily visible and where water may be discharged without property damage.

<u>2.15 INSPECTOR'S TEST CONNECTION (Cont'd)</u>	.3	Provide discharge orifice of same size as corresponding sprinkler orifice.
<u>2.16 SIGNS</u>	.1	Attach properly lettered Bilingual and approved metal signs to each valve and alarm device to NFPA 13.
	.2	Permanently fix hydraulic design data nameplates to riser of each system.
<u>2.17 SPARE PARTS CABINET</u>	.1	Provide metal cabinet with extra sprinkler heads and sprinkler head wrench adjacent to each alarm valve. Number and types of extra sprinkler heads as specified in NFPA 13.
<u>PART 3 - EXECUTION</u>		
<u>3.1 MANUFACTURER'S INSTRUCTIONS</u>	.1	Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.
<u>3.2 INSTALLATION</u>	.1	Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.
<u>3.3 PIPE INSTALLATION</u>	.1	Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.
	.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

3.3 PIPE INSTALLATION (Cont'd) .3 (Cont'd)
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 control and fire alarm wiring, including connections to fire alarm systems, in accordance with National Electrical Code.

.4 Provide wiring in rigid metal conduit or intermediate metal conduit.

3.5 DISINFECTION .1 Disinfect new piping.

.2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.

.3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.

.4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.6 FIELD PAINTING .1 Clean, pretreat, prime, and paint new systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories.

.2 Apply coatings to clean, dry surfaces, using clean brushes.

- 3.6 FIELD PAINTING .3 Clean surfaces to remove dust, dirt, rust,
(Cont'd)
- .4 Immediately after cleaning, provide metal surfaces with 1 coat of pretreatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.
- .5 Shield sprinkler heads with protective covering while painting is in progress.
- .6 Upon completion of painting, remove protective covering from sprinkler heads.
- .7 Remove sprinkler heads which have been painted and replace with new sprinkler heads.
- .8 Provide primed surfaces with following:
- .1 Piping in Finished Areas:
- .1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.
- .2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.
- .3 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals throughout piping systems.
- .2 Piping in Unfinished Areas:
- .1 Provide primed surfaces with one coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.
- .2 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals.

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 200 psig 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 15 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.

.6 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and

- 3.7 FIELD QUALITY CONTROL
(Cont'd)
- .2 Manufacturer's Field Services:(Cont'd)
.2 (Cont'd)
periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.
- .3 Site Tests:
.1 Field test each fire pump, driver and controllers in accordance with NFPA 20.
Testing shall include:
.1 Verification of proper installation system initiation adjustment and fine tuning.
.2 Verification of the sequence of operations and alarm systems.
.2 Testing to be witnessed by Fire Commissioner of Canada and authority having jurisdiction.
.3 Develop, with Departmental Representative assistance, detailed instructions for O & M of this installation.
- .4 Materials and products in accordance with Section 01 35 21 - LEED Requirements include:
.1 Materials and resources.
.2 Storage and collection of recyclables.
.3 Construction waste management.
.4 Resource reuse.
.5 Recycled content.
.6 Local/regional materials.
.7 Low-emitting materials.
- 3.8 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 and Disposal and Section - 01 35 21 - LEED Requirements.