

Capital Projects Group

Fire Protection Sprinkler System Specification

Specification 21 13 00

Revision 1

Date: March 2021

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Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Section 3.18	Mar. 2021	Removal of anti-freeze piping reference

LIST OF CONTENT

1. GENERAL.....	3
1.1. SCOPE OF WORK.....	3
1.2. DESIGN REQUIREMENTS	3
1.3. RELATED WORKS	3
1.4. REFERENCE STANDARDS.....	3
1.5. SPARE PARTS	4
1.6. TRAINING	4
1.7. WARRANTY	4
1.8. DELIVERY, STORAGE AND HANDLING	4
1.9. SUBMITTALS.....	4
1.10. QUALITY ASSURANCE.....	6
2. PRODUCTS.....	8
2.1. PIPE, FITTINGS AND JOINTS	8
2.2. SERVICE MAIN DOUBLE CHECK VALVE ASSEMBLY	9
2.3. SHUT-OFF VALVES.....	9
2.4. CHECK VALVES.....	10
2.5. BALL DRIPS.....	10
2.6. SHUT-OFF VALVE SUPERVISORY SWITCHES.....	10
2.7. FIRE DEPARTMENT CONNECTION.....	10
2.8. SPRINKLER MAIN "LOSS OF PRESSURE" ALARM SENSOR.....	11
2.9. WATER FLOW ALARM SWITCH	11
2.10. ALARM CHECK VALVE.....	11
2.11. EXCESS PRESSURE PUMP	11
2.12. DRY PIPE VALVE.....	12
2.13. DRY PIPE ZONE AIR COMPRESSOR	13
2.14. PREACTION VALVE AND ACCESSORIES	13
2.15. ZONE CONTROL RISER MODULES	15
2.16. SPRINKLER HEADS.....	15
2.17. SPARE SPRINKLER HEAD CABINET	16
2.18. INDICATOR POST AND VALVE	16
3. EXECUTION	16
3.1. MONITORING OF SYSTEMS.....	16
3.2. DEMOLITION	17
3.3. PIPING INSTALLATION REQUIREMENTS.....	17
3.4. INSTALLATION OF DOUBLE CHECK VALVE ASSEMBLY	18
3.5. INSTALLATION OF SHUT-OFF VALVES AND CHECK VALVES.....	18
3.6. INSTALLATION OF SHUT-OFF VALVE SUPERVISORY SWITCHES.....	19
3.7. INSTALLATION OF FIRE DEPARTMENT CONNECTION	19
3.8. INSTALLATION OF LOSS OF PRESSURE SENSOR	19
3.9. INSTALLATION OF FLOW ALARM SWITCHES.....	19
3.10. INSTALLATION OF ALARM CHECK VALVES	19
3.11. INSTALLATION OF EXCESS PRESSURE PUMP AND CONTROL	20
3.12. INSTALLATION OF WATER MOTOR ALARM	20
3.13. INSTALLATION OF DRY PIPE VALVES.....	20

3.14. INSTALLATION OF DRY ZONE AIR COMPRESSOR 21
3.15. INSTALLATION OF PREACTION SPRINKLER SYSTEM..... 21
3.16. INSTALLATION OF ZONE CONTROL RISER MODULES..... 21
3.17. INSTALLATION OF ZONE CONTROL RISER MODULE CABINETS 22
3.18. INSTALLATION OF SPRINKLER HEADS 22
3.19. INSTALLATION OF SPARE SPRINKLER HEAD CABINET 23
3.20. INSTALLATION OF INDICATOR POST VALVE 23

TABLES

TABLE 3-1: SPRINKLER HEADS SCHEDULE (STANDARD OF QUALITY ASSURANCE
MANUFACTURERS)22

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Provide fire protection sprinkler system as required, scheduled and specified herein.

1.2. DESIGN REQUIREMENTS

1.2.1. Fire protection sprinkler work is to be designed in accordance with NFPA 13 and Provincial Standards, and, where required, local building and fire department requirements and standards of Metrolinx's Insurer. If water supply flow and pressure test data is not available, conduct Municipal main water flow and pressure tests at nearest fire hydrant to obtain criteria to be used in system design. Include hydrant location and flow and pressure test data with system design calculations.

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

1.2.3. Sprinkler /System Occupancy - Hazard Design requirements: In accordance with NFPA 13 occupancy-hazard density requirements, unless otherwise specified.

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.

1.4. REFERENCE STANDARDS

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

1.4.2. NFPA 13, Standard for the Installation of Sprinkler Systems.

1.4.3. CSA B137.2, Polyvinylchloride (PVC) Injection-Moulded Gasketed Fittings for Pressure Applications.

1.4.4. CSA B137.3, Rigid Polyvinylchloride (PVC) Pipe for Pressure Applications.

1.4.5. ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

1.4.6. ASTM A135, Standard Specification for Electric-Resistance-Welded Steel Pipe.

1.4.7. ASTM A234, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

- 1.4.8. ASTM A536, Standard Specification for Ductile Castings.
- 1.4.9. ASTM A795, Standard Specification for Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
- 1.4.10. ANSI/ASME B16.4, Grey Iron Threaded Fittings (Classes 125 and 250).
- 1.4.11. CAN/CSA B64.10, Backflow Preventers and Vacuum Breakers.

1.5. SPARE PARTS

- 1.5.1. Supply spare parts and tools as required by NFPA13 including minimum 4 spare sprinkler heads of each type installed.

1.6. TRAINING

- 1.6.1. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.
- 1.6.2. For sprinkler systems include for 7 training sessions of maximum 7 hours duration per session for 10 Metrolinx people per session.
- 1.6.3. Refer to Section 20 05 05 for additional general requirements.

1.7. WARRANTY

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

1.8. DELIVERY, STORAGE AND HANDLING

- 1.8.1. 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.

1.9. SUBMITTALS

- 1.9.1. Refer to submittal requirements in Section 20 05 05.
- 1.9.2. 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 except pipe and fittings;
 - c) complete CAD layout drawings indicating source of water supply with test flow and pressure, "head-end" equipment piping schematic, pipe routing and sizing, and zones, all signed and sealed by a qualified professional mechanical engineer registered in jurisdiction of the work as specified below;

- d) copies of all calculations, including hydraulic 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, including occupancy-hazard design requirements;
 - e) complete sprinkler system test certificate as specified in Part 3 of this Section.
- 1.9.3. Sprinklers are to be identified on drawings and product submittals, and be specifically identified by manufacturer's listed model or series designation. Trade names and other abbreviated listings are unacceptable.
- 1.9.4. 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.
- 1.9.5. 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.
- 1.9.6. 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.

1.9.7. Commissioning Closeout Package

- a) Submit the following in accordance with Section 20 05 05:
 - 1) Deficiency Report;
 - 2) Commissioning Closeout Report;
 - 3) submit the following for each Product for incorporation into the Operation and Maintenance Manuals in accordance with Section 20 05 05:
 - i) Identification: Manufacturer's name, type, year, serial number, number of units, capacity, and identification to related systems;
 - ii) functional description detailing operation and control of components;
 - iii) performance criteria and maintenance data;
 - iv) safety precautions;
 - v) operating instructions and precautions;
 - vi) component parts availability, including names and addresses of spare part suppliers;
 - vii) maintenance and troubleshooting guidelines/protocol;
 - viii) product storage, preparation, handling, and installation requirements;
 - ix) Commissioning report.

1.10. QUALITY ASSURANCE

- 1.10.1. Site personnel are to be licensed in jurisdiction of the work and under continuous supervision of a foreman who is an experienced fire protection system installer and a journeyman pipe fitter licensed in jurisdiction of the work.
- 1.10.2. Check and verify dimensions and conditions at site and ensure work can be performed as indicated. Coordinate work with trades at site and accept responsibility for and cost of making adjustments to piping and/or spacing to avoid interference with other building components.

- 1.10.3. Verify working condition of existing sprinkler system equipment which has direct interface with project work and is to remain. Replace with new equipment where necessary.
- 1.10.4. System components must be ULC listed and labelled.
- 1.10.5. Grooved couplings, and fittings, valves and specialties are to be products of a single manufacturer. Grooving tools are to be of same manufacturer as grooved components.
- 1.10.6. Castings used for coupling housings, fittings, valve bodies, etc., are to be date stamped for quality assurance and traceability.
- 1.10.7. 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.
- 1.10.8. Installers Qualifications
 - a) Installers for work to be performed by or work under licensed Mechanical / Sprinkler Contractor.
 - b) Installers of equipment, systems and associated work 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.
- 1.10.9. 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. PIPE, FITTINGS AND JOINTS

2.1.1. Pipe, fittings and joints are to be as follows, with exceptions as specified in Part 3 of this Section:

- a) PVC:
 - 1) Class 200, DR14, rigid, hub and spigot pattern PVC pipe and CSA certified fittings to CAN/CSA B137.2 and B137.3 and complete with gasketed joints.
- b) Schedule 40 Steel - Grooved Coupling Joints:
 - 1) Schedule 40 mild black carbon steel, ASTM A53, Grade B, complete with grooved ends and mechanical fittings and couplings - Victaulic "FireLock" fittings and Victaulic Style 009N, 107H, and 107N QuickVic and 005 rigid coupling joints, or approved equivalent. Strap type outlet fittings such as Victaulic "Snap-Let" or similar are not acceptable.
- c) Schedule 40 Steel - Screwed and Welded Joints:
 - 1) Schedule 40 mild black carbon steel, ASTM A53, Grade B. Screwed piping complete with Class 125 cast iron screwed fittings to ANSI/ASME B16.4. Welded piping complete with factory made seamless carbon steel butt welding fittings to ASTM A234, Grade WPB, long sweep pattern wherever possible.
- d) Schedule 10 Steel - Grooved Coupling Joints:
 - 1) Schedule 10 mild black carbon steel, ASTM A53, Grade B, complete with grooved ends and fittings and couplings - Victaulic "FireLock" fittings and Victaulic Style 009N, 107H, and 107N QuickVic and 005 rigid coupling joints, or approved equivalent.
- e) Schedule 10 Steel - Screwed Joints:
 - 1) Schedule 10 mild black carbon steel, ASTM A53, Grade B, complete with mill or site threaded ends, Class 125 cast iron screwed fittings to ANSI/ASME B16.4, and screwed joints.
- f) CPVC Pipe:
 - 1) IPEX BlazeMaster or approved equivalent, solvent weld, orange, SDR 13.5 pipe and Schedule 80 fittings, ULC listed for use in wet pipe automatic sprinkler systems, with a flame spread rating less than 25 and a smoke developed rating less than 50 when tested in accordance with CAN/ULC S102.2, and in accordance with NFPA 13 requirements.

- g) Standard Mechanical Couplings: Equal to Victaulic:
 - 1) Manufactured in two segments of cast ductile iron, conforming to ASTM A-536, Grade 65-45-12. Gaskets are to be pressure-responsive synthetic rubber, grade to suit intended service, conforming to ASTM D-2000. Mechanical coupling bolts are to be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to ASTM A-449 and ASTM A-183. Couplings are to comply with ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
 - 2) Rigid Type: Coupling housings with offsetting, angle-pattern bolt pads are to be used to provide system rigidity and support and hanging in accordance NFPA-13. Couplings are to be fully installed at visual pad-to-pad offset contact. Couplings that require exact gapping of bolt pads at specific torque ratings are not permitted.
 - 3) Flexible Type: Use in locations where vibration attenuation and stress relief are required; Victaulic Style 177 (Quick-Vic™) or approved equivalent, flexible coupling.

2.2. SERVICE MAIN DOUBLE CHECK VALVE ASSEMBLY

- 2.2.1. Minimum 1205 kPa (175 psi) rated dual check valve backflow preventer assembly to CAN/CSA B64, complete with tight-closing resilient seated shut-off valves, test cocks and strainer.
- 2.2.2. Standard of quality assurance manufacturers are:
 - a) Watts Industries Canada;
 - b) Zurn/Wilkins;
 - c) Apollo Valves (Conbraco Industries);
 - d) or approved equivalent.

2.3. SHUT-OFF VALVES

- 2.3.1. Minimum 2070 kPa (300 psi) rated full port brass or bronze body screwed ball valves and lug body or grooved end type butterfly valves.
 - a) Butterfly valves are to include a pressure responsive seat, and stem is to be offset from disc centerline to provide complete 360° circumferential seating.
 - b) Standard of Acceptance: Victaulic Style 705 or approved equivalent.
 - c) Supervised closed applications standard of acceptance Victaulic Series 707C or approved equivalent, supervised closed butterfly valve.

- 2.3.2. OS&Y or approved equivalent Gate Valves: 1725 kPa (250 psi), grooved ends with ductile iron body, yoke, and handwheel conforming to ASTM A-536, EPDM coated ASTM A-126-B cast iron disc, ASTM B16 brass rising stem, flanged and epoxy coated ductile iron bonnet, EPDM O-ring stem seals and body gasket. Victaulic Series 771H (Grooved ends) and Series 771F (Grooved x Flanged), or approved equivalent.

2.4. CHECK VALVES

- 2.4.1. Minimum 1725 kPa (250 psi) resilient seat check valves, suitable for vertical or horizontal installations. Standard of Acceptance: Victaulic Series 717 or approved equivalent.
- 2.4.2. Check valves associated with Fire Department connections and fire pump test connection are to be tapped for site installation of a 20 mm (¾") diameter ball drip.

2.5. BALL DRIPS

- 2.5.1. National Fire Equipment Ltd. or approved equivalent, Model #A58, 20 mm (¾") diameter automatic ball drip.

2.6. SHUT-OFF VALVE SUPERVISORY SWITCHES

- 2.6.1. Tamper-proof supervisory switches, each arranged to activate a fire alarm system trouble alarm condition if the valve is closed or tampered with, each suitable in all respects for the application, and each complete with all required mounting and connection hardware.
- 2.6.2. Actuator housings are to be weatherproof.

2.7. FIRE DEPARTMENT CONNECTION

- 2.7.1. Wall mounting polished brass clapper type dual inlet Fire Department connection with two, 65 mm (2-½") diameter inlets threaded to Fire Department hose requirements and equipped with caps and chains, an outlet sized as shown, and a faceplate.
- 2.7.2. Faceplate is to be polished brass and complete with "AUTO-SPKR" "STANDPIPE" cast-in raised lettering.
- 2.7.3. Exposed metal parts of Fire Department connection are to be chrome plated.
- 2.7.4. For low point near each fire department connection, a 90° elbow with drain connection to allow for system drainage to prevent freezing. Standard of Acceptance: Victaulic #10-DR or approved equivalent.

2.8. SPRINKLER MAIN "LOSS OF PRESSURE" ALARM SENSOR

- 2.8.1. Piping mounted adjustable pressure sensor designed to actuate an alarm upon sensing a loss of pressure in the fire protection main. Switch is to be low voltage or line voltage as required.

2.9. WATER FLOW ALARM SWITCH

- 2.9.1. Pipe mounting water flow alarm switch, minimum 1725 kPa (250 psi) rated, designed to actuate 2, 7 ampere rated (at 125/250 VAC) SPDT snap action switches when water flow exceeds 0.758 L/sec. (10 Imperial gpm), complete with a tamper-proof cover with conduit connection opening, a piping saddle and U-bolt, and an automatic reset pneumatic retard device with field adjustable (0 to 70 second) switch actuation delay to reduce false alarms caused by a single or series of transient water flow surges.

2.10. ALARM CHECK VALVE

- 2.10.1. Enamelled cast iron check valve assembly designed for either vertical or horizontal mounting and to actuate alarms when wet type sprinkler system is activated. Assembly is to be minimum 1205 kPa (175 psi) cold water rated with all moving parts constructed of brass, bronze, stainless steel or EPDM, and is to be complete with:
- a) pipe, fittings and accessories for site connection of an excess pressure pump;
 - b) basic trim including piping materials and check valve for an external by-pass, potable water supply and system water supply pressure gauges with gauge test ports and shut-off valves, an angle type main drain valve, and fittings for mounting an alarm test by-pass;
 - c) alarm test by-pass piping with ball valve to permit alarm testing without operation of alarm valve;
 - d) alarm trim with pipe and fittings for connection to a water motor alarm, and an adjustable pressure switch for electrical connection to an alarm system upon flow through valve.

2.11. EXCESS PRESSURE PUMP

- 2.11.1. Close coupled, 1750 RPM, all bronze gear pump sized to maintain sufficient pressure in fire protection main to prevent alarm check valve(s) from initiating flow alarms during fluctuations in pressure of Municipal water supply. Pump is to be complete with:
- a) stainless steel shaft with maintenance free seal;
 - b) lifetime lubricated carbon bearings;

- c) TEFC motor conforming to requirements specified in Section 20 05 10, and secured to a mounting base;
 - d) accessory package consisting of flexible suction and discharge connection hoses, a Monel inlet strainer, relief valve factory set at 862 kPa (120 psi), and a steel mounting plate designed to mount pump to alarm check valve flange;
 - e) power and control panel.
- 2.11.2. Factory pre-wired power and control panel, CSA certified, designed to automatically start and stop pump in response to water pressure variations in the main and consisting of a surface wall mounting NEMA 2 enamelled steel panel with hinged front door equipped with Corbin catch, and following:
- a) door interlock fused disconnect with HRC fuses;
 - b) protected type pump starter;
 - c) door mounted H-O-A rotary selector switch;
 - d) fused control transformer;
 - e) 115 volt adjustable pressure switch to suit the application;
 - f) set of NO/NC dry contacts for connection of lack of power availability alarm;
 - g) door mounted "POWER ON" LED.
- 2.12. DRY PIPE VALVE**
- 2.12.1. Victaulic Series 768-NXT or approved equivalent:
- a) Series 746-LPA accelerator quick opening device.
 - b) Series 757 regulated air maintenance trim assembly.
 - c) Required air pressure: 90 kPa (13 psig).
 - d) Externally resettable valve.
 - e) Series 757 regulated air maintenance trim assembly.
- 2.12.2. Valve to be complete with internal components that are replaceable without removing valve from installed position.
- 2.12.3. Systems requiring a quick opening device are to use a regulated, tank mounted air supply.

2.13. DRY PIPE ZONE AIR COMPRESSOR

- 2.13.1. Victaulic 7C7 or approved equivalent, CSA certified, oil-less, piston type direct driven compressor with a motor conforming to requirements specified in Section entitled Basic Mechanical Materials and Methods, and a mounting bracket.
- 2.13.2. General Air Products OLT Series, or approved equivalent, package type, oil-free, piston type, tank mounted air compressor set complete with horizontal, ASME rated and stamped steel tank with support feet, pressure gauge with gauge cock, tank drain, flexible compressor to tank and tank to piping flexible connections supplied loose for field installation, and a motor conforming to requirements specified in Section 20 05 10.
- 2.13.3. Compressor set capacity and performance must suit final dry pipe system design and reviewed piping and sprinkler head layout shop drawings. If a larger compressor set than that specified is required, provide larger set at no additional cost, and include any additional costs for a larger size motor starter and associated wiring.

2.14. PREACTION VALVE AND ACCESSORIES

- 2.14.1. Victaulic Series 745 FirePac or approved equivalent, pre-assembled dry, preaction or deluge fire protection valve mounted completely within a steel cabinet for sizes 40 mm (1-½") through 203 mm (8"). Unit is to be ULC listed with all materials and wiring conforming to NFPA requirements.
- 2.14.2. Cabinet is to be coated with red ASA-61 electrostatically applied polyester powder coating. Cabinet is to have field removable access panels on three sides to allow for ease of valve maintenance, servicing, and installation. Unit is to be provided with Series 728 ball valve or Series 705 butterfly shutoff valve with pre-wired supervisory switches, sprinkler system fire protection valve, alarm line pressure switches, air supervisory pressure switches, alarm pressure switch and pressure gauges for proper operation and is to be pre-wired to Model RP-2001 control panel. External electrical connections are to be able to be connected through a factory provided conduit connection to an enclosure inside of cabinet. Water inlet, system supply, and drain connections are to be grooved for ease of installation.
- 2.14.3. Victaulic FireLock NXT Series or approved equivalent, valve is to be low differential, latched clapper design with a black enamel coated ductile iron body conforming to ASTM A536, aluminum bronze clapper, stainless steel spring and shaft, EPDM diaphragm and seal, brass seat with nitrile seat o-rings. Valve internal parts are to be replaceable without removing valve from installed position and are to be externally resettable. 2070 kPa (300 psi) pressure rating in sizes 40 mm (1-½") through 203 mm (8") and are to be grooved ends for vertical installation only.
- 2.14.4. Trim configurations:
 - a) Dry Valve: Pneumatic operation.

- b) Preaction Valve:
 - 1) Non-interlock; [Pneumatic] [and] [or] [Electric].
 - 2) Single interlock; [Pneumatic] [or] [Electric].
 - 3) Double interlock; [Pneumatic] [and] [Electric].
 - c) Deluge Valve:
 - 1) Electric release.
 - 2) Wet pilot.
 - 3) Dry pilot.
- 2.14.5. Electric Release Panel: Notifier Model RP-2001 or approved equivalent, compact single enclosure unit containing power supply, two 12Amp-hr batteries and availability to have factory installed all accessory options.
- 2.14.6. Preassembled cabinet is to have pipe penetrations sealed to meet NEMA 4 protection of equipment inside of enclosure with respect to ingress of water, whether rain, sleet, snow, splashing water or hose directed water.
- 2.14.7. Preassembled cabinet is to have nitrogen fill options as well as a factory installed low nitrogen pressure alarm to augment low air alarms as needed in certain trim applications.
- 2.14.8. Standard of quality assurance manufacturers are:
- a) Victaulic Co.;
 - b) FireFlex System Inc.;
 - c) Reliable Automatic Sprinkler Co. Inc;
 - d) or approved equivalent.
- 2.14.9. Photoelectric type smoke detectors, each complete with a red LED that pulses during normal standby conditions and illuminates steadily during an alarm condition.
- 2.14.10. Surface wall mounting (to a recessed box) non-break glass pull station with test/reset key.

2.15. ZONE CONTROL RISER MODULES

- 2.15.1. Victaulic Co. "FireLock" Series 747M or approved equivalent, factory assembled zone control riser modules, each complete with a painted cast ductile iron grooved end body, a ball type shut-off valve, a test and drain combination with properly sized orifice, a flow alarm switch, a pressure gauge with cock, and a pressure relief valve kit.
- 2.15.2. Zone flow test and drain assembly cabinets: National Fire Equipment Ltd. Model CV-200 or approved equivalent, recessed cold rolled steel cabinets, sized to suit assemblies, with a baked enamel finish, #18 gauge with universal knockouts for tubs, #14 gauge for doors and trim, with all metal edges ground and rounded. Doors are to be complete with:
- a) hollow channel reinforcement;
 - b) full length semi-concealed piano hinge with paint stop feature and designed to permit 180° door opening;
 - c) flush stainless steel door latch.

2.16. SPRINKLER HEADS

- 2.16.1. Sprinkler heads, unless otherwise specified, are to be as scheduled in Part 3 of this Section.
- 2.16.2. Sprinkler body is to be die-cast, with a hex-shaped wrench boss integrally cast into sprinkler body to reduce risk of damage during installation. Wrenches are to be provided by sprinkler manufacturer that directly engages wrench boss.
- 2.16.3. For locations where corrosive resistant coatings are required, body is to be coated with ULC listed and FM approved anti-corrosion VC-250 coating (silver coloring).
- 2.16.4. Recessed sprinkler heads in finished areas are to be chrome plated unless otherwise specified. Concealed sprinkler head ceiling plates are to match ceiling color.
- 2.16.5. Where exposed pendent heads occurs in areas with suspended ceilings, they are to be complete with chrome plated escutcheon plates. Similarly, sidewall heads with concealed piping are to be complete with chrome plated escutcheon plates.
- 2.16.6. Sprinkler heads which are exposed in areas where they may be subject to damage are to be complete with wire guards, chrome plated where in finished areas.
- 2.16.7. Escutcheons and guards are to be listed, supplied, and approved for use with sprinkler by sprinkler manufacturer.
- 2.16.8. Sprinkler heads located in areas or over equipment where high ambient temperature is present are to be, unless otherwise specified, 74°C (165°F) heads. All other heads, unless otherwise specified or required, are to be 57°C (135°F) rated.

2.16.9. Standard of quality assurance manufacturers are:

- a) Victaulic Co.;
- b) Tyco Fire Suppression & Building Products;
- c) The Viking Corporation;
- d) The Reliable Automatic Sprinkler Co;
- e) or approved equivalent.

2.17. SPARE SPRINKLER HEAD CABINET

- 2.17.1. Surface wall mounting, red enamelled steel, identified cabinet with hinged door, shelves with holes for mounting sprinkler heads, a wrench or wrenches suitable for each type of sprinkler head, and a full complement of spare sprinkler heads.
- 2.17.2. Cabinet is to be sized to accommodate a minimum of four spare heads for each type of head used on the project, however, each cabinet is to be full of spare heads.

2.18. INDICATOR POST AND VALVE

- 2.18.1. Cast iron, bronze trim, resilient seat, OS&Y or approved equivalent, gate valve with non-rising stem in accordance with AWWA 200W, minimum 1380 kPa (200 psi) cold water rated and complete with a square operating nut and ends to suit connecting piping.
- 2.18.2. Adjustable indicator post assembly with a cast iron valve box of a length to suit valve depth and flange bolted to the valve, a cast iron lower barrel bolted to the valve box and of a length to suit valve location, and a cast iron upper housing bolted to the lower barrel and complete with wrench and operating mechanism with steel extension shaft and coupling nut sized to suit, operating handle, and valve "OPEN" and "CLOSED" identification visible through a clear polycarbonate window.

3. EXECUTION

3.1. MONITORING OF SYSTEMS

- 3.1.1. Daily monitor and supervise existing sprinkler system serving renovated areas to ensure that each respective system is left in proper operating condition at end of each working day. Include for but not be limited to performing following:
 - a) under presence of Metrolinx representative, check each morning and evening (start and end of work) of each day, sprinkler system to ensure that it is in proper working condition;

- b) if portions of sprinkler system are not in proper working order, provide temporary provisions subject to approval of local fire authority or local governing authority, to ensure that proper sprinkler coverage is provided and/or provide supervisory personnel to monitor areas where sprinkler system is not operational;
- c) document and sign off with Metrolinx representative signing off also, each respective daily check condition;
- d) ensure that work to sprinkler system does not affect portion of system serving areas outside of renovation areas.

3.2. DEMOLITION

3.2.1. Refer to demolition requirements specified in Section 20 05 35.

3.3. PIPING INSTALLATION REQUIREMENTS

3.3.1. Provide required sprinkler system piping.

3.3.2. Perform piping work in accordance with requirements of NFPA 13, governing regulations, and "Reviewed" shop drawings.

3.3.3. Piping, unless otherwise specified, is as follows:

- a) for underground piping inside or outside building - Class 200, DR14 rigid PVC, braced and secured at bends and tees with concrete blocks in accordance with Municipal standards and details;
- b) for piping inside building and above ground except as noted below - Schedule 40 grooved end black steel with Victaulic or equal fittings and coupling joints, or, for piping to and including 50 mm (2") diameter, screwed fittings and joints, or, for piping 65 mm (2-½") diameter and larger, welding fittings and welded joints;
- c) for piping downstream of "head end" alarm valve(s) and equipment - Schedule 10 black steel pipe with Victaulic or equal fittings and coupling joints or screwed fittings and joints;
- d) for branch piping to heads in suspended ceilings, etc., may be flexible piping installed in accordance with manufacturer's instructions.

3.3.4. Exceptions to piping requirements specified above are as follows:

- a) dry pipe zone steel piping, fittings, unions, couplings and flanges are to be galvanized;

- b) wet zone steel piping, fittings, unions, couplings and flanges for sprinkler work exposed to weather either inside or outside building (including parking garages), are to be galvanized;
 - c) PVC piping is not to be used above grade;
 - d) ferrous pipe hangers, supports, and similar hardware used for galvanized steel piping are to be electro-galvanized.
- 3.3.5. Pipe sizes, pipe routing, sprinkler head quantities and locations, and layout of work shown on drawings are to assist during tendering period. Ensure adequate head coverage, head quantities and pipe sizing as specified in Part 1 of this Section. Do not reduce size of sprinkler main or re-route main unless reviewed with Consultant and approved by Metrolinx.
- 3.3.6. Install grooved joints in accordance with manufacturer's latest installation instructions. Grooved ends are to be clean and free from indentations, projections and roll marks. Gaskets are to be moulded and produced by coupling manufacturer, and verified as suitable for intended service. Have factory-trained representative from mechanical joint manufacturer provide on-site training in proper use of grooving tools and installation of grooved piping products. Have factory-trained representative periodically review product installation and ensure best practices are being followed. Remove and replace any improperly installed products.
- 3.3.7. Clean pipe, fittings, couplings, flanges and similar components after erection is complete. Wire brush clean any ferrous pipe, fitting, coupling, flange, hanger, support and similar component which exhibit rust and carefully coat with suitably colored primer.
- 3.3.8. When sprinkler work is complete, test system components and overall system(s) and submit completed test certificate and other documentation in accordance with Chapter 8 of NFPA 13.

3.4. INSTALLATION OF DOUBLE CHECK VALVE ASSEMBLY

- 3.4.1. Provide a double check valve assembly in sprinkler main inside the building.
- 3.4.2. Equip assembly with inlet and outlet shut-off valves with supervisory switches as specified below.
- 3.4.3. Support each end of assembly from floor by means of flanged pipe supports with saddles.

3.5. INSTALLATION OF SHUT-OFF VALVES AND CHECK VALVES

- 3.5.1. Provide shut-off valves and check valves in piping where shown and wherever else required.
- 3.5.2. Locate valves for easy operation and maintenance.

3.5.3. Confirm exact locations prior to roughing-in.

3.6. INSTALLATION OF SHUT-OFF VALVE SUPERVISORY SWITCHES

3.6.1. Equip each shut-off valve with a supervisory switch.

3.6.2. Identify each supervised valve with a 150 mm (6") square, engraved, laminated red-white plastic tag to correspond with supervised valve numbering specified and/or shown as part of the electrical work fire alarm system.

3.6.3. At low point near each fire department connection, install a 90° elbow with drain connection to allow for system drainage to prevent freezing.

3.7. INSTALLATION OF FIRE DEPARTMENT CONNECTION

3.7.1. Provide an exterior Fire Department connection. Confirm exact location prior to roughing-in. Confirm finish prior to ordering.

3.7.2. Equip connection with a check valve. Equip check valve with a ball drip to drain piping between Fire Department connection and check valve, and extend drainage piping from outlet of ball drip to nearest suitable floor drain.

3.8. INSTALLATION OF LOSS OF PRESSURE SENSOR

3.8.1. Supply and mount a pressure sensor in the fire protection piping main to activate a "LOSS OF PRESSURE" trouble alarm should Municipal water service pressure fall below the acceptable level.

3.8.2. Locate sensor for easy access and maintenance, and set alarm pressure to suit site conditions. Confirm setting on site.

3.8.3. Identify pressure sensor and its normal setting with a 150 mm (6") square red-white laminated plastic tag engraved to read "LOSS OF WATER PRESSURE SENSOR - NORMAL SETTING 210 kPa". Confirm wording prior to engraving.

3.9. INSTALLATION OF FLOW ALARM SWITCHES

3.9.1. Provide water flow alarm switches in accessible locations in zone piping.

3.9.2. Adjust to suit site water pressure conditions. Check and test operation.

3.9.3. Identify each switch with a 150 mm (6") square red-white laminated engraved plastic tag. Confirm wording prior to engraving.

3.10. INSTALLATION OF ALARM CHECK VALVES

3.10.1. Provide alarm check valves, complete with trim, for wet zone fire protection sprinkler piping.

- 3.10.2. Check and test operation of each valve and adjust as required to suit site water pressure conditions.
- 3.10.3. Identify each valve with a 150 mm (6") square red-white laminated engraved plastic tag. Confirm wording prior to engraving.

3.11. INSTALLATION OF EXCESS PRESSURE PUMP AND CONTROL

- 3.11.1. Provide an excess pressure pump in wet fire protection sprinkler system piping, arranged to prevent activation of alarm check valve water flow alarms during normal water pressure fluctuations in the main. Locate pump on a steel mounting plate assembly at alarm check valve(s) and install accessories supplied with pump. Provide a pressure gauge in valved tubing across pump suction and discharge connections.
- 3.11.2. Supply a starter and control panel for pump and surface wall mount adjacent to pump. Connect panel pressure switch with copper tubing in accordance with pump manufacturer's instructions. Adjust pressure switch to suit site conditions.
- 3.11.3. Start-up the pump, test operation and adjust as required.

3.12. INSTALLATION OF WATER MOTOR ALARM

- 3.12.1. Provide a water motor alarm. Secure gong on the exterior wall, impeller and motor assembly on the interior wall, and connect with drive assembly in accordance with manufacturer's instructions. Install inlet strainer supplied loose with assembly.
- 3.12.2. Provide a galvanized steel drain pipe from impeller-motor assembly down the interior wall and terminate piping back out through the wall with a 45° piping elbow and wall plate located 600 mm (24") above finished grade.
- 3.12.3. Confirm exact location of alarm gong prior to roughing-in.
- 3.12.4. When installation is complete, check and test alarm operation and adjust as required.

3.13. INSTALLATION OF DRY PIPE VALVES

- 3.13.1. Provide dry pipe valves for zones.
- 3.13.2. Connect compressed air piping to each valve, as well as all compressed air piping trim.
- 3.13.3. When installation is complete, check and test valve operation and adjust as required.

3.13.4. Provide drum drips in dry type fire protection sprinkler zone piping where shown or required. Wherever possible locate drum drips in heated areas. Where drum drips are located in unheated areas ensure trades performing thermal insulation work and electric heating cable pipe tracing work are aware of the number of drum drips required, and the size and location. Identify each drum drip. Locate drum drips in heated areas wherever possible.

3.14. INSTALLATION OF DRY ZONE AIR COMPRESSOR

3.14.1. Provide an air compressor with air maintenance device and pressure control for the dry pipe zone and dry pipe valve. Secure compressor to a piping main by means of a mounting bracket supplied with compressor. Adjust to suit site conditions.

3.14.2. Provide an air compressor set with receiver and secure in place on rubber-steel-rubber vibration isolation pads on a concrete housekeeping pad.

3.14.3. Install flexible piping connections supplied loose with set.

3.14.4. Extend valved drain piping from receiver to a floor drain.

3.14.5. Connect receiver and control panel pressure switch with copper tubing.

3.14.6. When installation is complete, check and test air compressor set, including automatic operation, and adjust as required.

3.15. INSTALLATION OF PREACTION SPRINKLER SYSTEM

3.15.1. Provide a preaction sprinkler system.

3.15.2. Install preaction deluge valve cabinet assembly with control panel and air compressor as indicated but confirm exact location prior to roughing-in.

3.15.3. Provide required water supply, compressed air, sprinkler, and drain piping. Terminate drain piping over a funnel floor drain.

3.15.4. Provide detection devices and install in accordance with manufacturer's instructions. Connect to control panel with wiring in conduit.

3.15.5. Supply detection devices and hand to electrical trade on site for installation.

3.16. INSTALLATION OF ZONE CONTROL RISER MODULES

3.16.1. Provide zone control riser modules with drain piping where required. Terminate drainage piping over a funnel floor drain unless otherwise shown or specified. Identify each assembly.

3.17. INSTALLATION OF ZONE CONTROL RISER MODULE CABINETS

- 3.17.1. Provide flush wall mounting cabinets for zone control and inspector's test connection assemblies where required in finished areas. Confirm exact locations prior to roughing-in.
- 3.17.2. Identify each cabinet with a nameplate in accordance with requirements of Section 20 05 10.

3.18. INSTALLATION OF SPRINKLER HEADS

- 3.18.1. Provide required sprinkler heads in accordance with following schedule:

Table 3-1: Sprinkler Heads Schedule (Standard of Quality Assurance Manufacturers)

APPLICATION	SPRINKLER HEAD TYPE
Rooms/areas with a suspended ceiling	Victaulic V38/V39 or Tyco Series RFII "Royal Flush II" concealed pendent Victaulic V27 or Tyco Series TY-FRB recessed pendent Victaulic V27 or Tyco Series TY-FRB pendent with escutcheon plates
Rooms/areas without a suspended ceiling	Victaulic V27 or Tyco Series TY-FRB pendent
Elevator shafts	Victaulic V27 or Tyco Series TY-FRB horizontal sidewall
Unheated exterior stairwells	Victaulic V36 or Tyco Series DS-1 dry pipe horizontal sidewall Victaulic V36 or Tyco Series DS-3 wet pipe horizontal sidewall
Air handling system outdoor air and relief air plenums (unheated)	Tyco Series DS-3 ECOH dry horizontal sidewalls in wet piping Victaulic V27 or Tyco Series TY-FRB upright or horizontal sidewall in dry pipe
Unheated and unfinished areas	Victaulic V36 or Tyco Series DS-3 ECOH dry horizontal sidewall in wet piping Victaulic V27 or Tyco Series TY-FRB upright or horizontal sidewall in dry pipe
Heated areas with overhead doors	Victaulic V27 or Tyco Series TY-FRB horizontal sidewall
Unheated parking garage	Victaulic V34 or Tyco Series EC-11 or EC-14 ECOH upright or Victaulic V27 or Series TY-FRB upright for dry piping

APPLICATION	SPRINKLER HEAD TYPE
Heated parking garage	Victaulic V34 or Tyco Series EC-11 or EC-14 ECOH upright or Victaulic V27 or Series TY-FRB upright for wet piping
Parking garage ramp	Victaulic V34 or Tyco Series EC-11 or EC-14 ECOH upright or Series TY-FRB upright or Victaulic V27 or Series ELO SW-20 or SW-24 ECOH sidewall
At non-rated windows in rated walls	Tyco Model WS horizontal and pendent vertical sidewall

- 3.18.2. Sprinkler head manufacturers indicated on schedule are for type indication purposes. Standard of quality assurance manufacturers or approved equivalent, are listed in Part 2 of this Section.
- 3.18.3. Coordinate sprinkler head locations with all drawings, including architectural reflected ceiling plan drawings, and, where applicable, electrical drawings. Coordinate sprinkler head locations in areas with suspended ceilings with the location of lighting, grilles, diffusers, and similar items recessed in or surface mounted on the ceiling as per the reflected ceiling plans. In areas with lay-in tile, centre the sprinkler head both ways in the lay-in tile wherever possible. Confirm locations prior to roughing-in.
- 3.18.4. Maintain maximum headroom in areas with no ceilings.
- 3.18.5. Provide guards for heads where they are subject to damage.
- 3.18.6. Provide high temperature heads in equipment rooms and similar areas over heat producing or generating equipment.

3.19. INSTALLATION OF SPARE SPRINKLER HEAD CABINET

- 3.19.1. Supply spare sprinkler heads as noted in Part 1 and place in a wall mounting storage cabinet located adjacent to sprinkler system "head end" equipment where later directed by Metrolinx.

3.20. INSTALLATION OF INDICATOR POST VALVE

- 3.20.1. Provide a shut-off valve in underground sprinkler main piping outside building. Equip valve with a valve box and an indicator post assembly.
- 3.20.2. Confirm valve box length and steel shaft length prior to ordering and confirm exact location prior to roughing-in.
- 3.20.3. When installation is complete, check and test operation of assembly and adjust as required.

END OF SECTION