

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 – Testing and Quality Control.
- .3 Section 01 77 00 - Closeout Procedures.
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 21 13 13 – Wet Pipe Sprinkler Systems.
- .6 Section 21 13 15 – Preaction Sprinkler System.
- .7 Section 21 24 16 – Fire Extinguishers.
- .8 Section 23 05 19 – Thermometers and Pressure Gauges – Piping Systems.
- .9 Section 23 05 53 – Mechanical Identification.

1.2 REFERENCE STANDARDS

- .1 National Fire Prevention Association (NFPA):
 - .1 NFPA 10 - Portable Fire Extinguishers, 2013 Edition.
 - .2 NFPA 13 - Installation of Sprinkler Systems, 2013 Edition.
 - .3 NFPA 25 - Inspection, Testing, and Maintenance of Water Based Fire Protection Systems, 2014 Edition.
- .2 National Building Code of Canada- 2015, including latest errata.
- .3 National Fire Code of Canada - 2015, including latest errata
- .4 Authorities Having Jurisdiction:
 - .1 Conform to the requirements of the Authority Having Jurisdiction.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and in accordance with NFPA 13.
- .2 Provide one (1) digital copy in PDF of shop drawings for all equipment specified and/or indicated including but not limited to the following items:
 - .1 Fire stopping Materials (by this Contractor).
 - .2 Access Doors (all types).
 - .3 Portable Fire Extinguishers (all types).
 - .4 Sprinkler Heads (all types).
 - .5 Supervisory switches.
 - .6 Water Flow Switches.
 - .7 Sprinkler Head Guards.
 - .8 Pipe Hangers.
 - .9 Pressure switches.
 - .10 Pre-Action Cabinets.

- .3 Layout Drawings: Submit drawings stamped and signed by a Professional Engineer licensed to practice in the Province of Nova Scotia.
 - .1 Piping layout drawings shall be done using latest version of AutoCAD® and shall be drawn to the latest edition of the PSPC CAD standards. Contractor to include QA checker files in submission to Departmental Representative
 - .2 Drawings to be done to the requirements of NFPA 13.
 - .3 In addition to these requirements, provide cross sections in different areas such as bulk heads, skylights, special ceilings, Mechanical Penthouse, etc.
- .4 Hydraulic Calculations: Provide hydraulic calculations on form sheets, including summary sheet, all in accordance with NFPA 13.
 - .1 Provide a graphic representation of the complete hydraulic calculation plotted on semi-logarithmic graph paper in accordance with NFPA 13.
- .5 Provide full information on the water supply as called for in NFPA 13.
- .6 Contractor is to maintain record drawings on site showing significant deviation from the contract documents and shop drawings.

1.4 CLOSEOUT SUBMITTALS

- .1 Operation and Maintenance Manuals: Provide operation and maintenance data for incorporation into the maintenance manual specified in Section 01 78 00 – Closeout Submittals.
 - .1 Operation and maintenance manual to be approved by, and final copies deposited with, Departmental Representative before final inspection.
 - .2 Operation data to include:
 - .1 Description of actions to be taken in event of equipment failure.
 - .2 Valves schedule and flow diagram.
 - .3 Colour coding chart.
 - .4 Legend of above ceiling identifiers.
 - .3 Maintenance data shall include:
 - .1 Servicing, maintenance, operation and troubleshooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .4 Performance data to include:
 - .1 Equipment performance verification test results.
 - .2 Special performance data as specified elsewhere.
 - .3 Cross connection and backflow device inspection report for each installed backflow preventer.
 - .5 Additional data:
 - .1 MSDS for all hazardous material installed and left stored on site or with the Departmental Representative.
 - .2 Analysis of hydronic systems water after cleaning and treatment of piping.
 - .6 Provide identification of all valves as required by NFPA 13.
 - .7 Provide updated, approved shop drawings for inclusion in the maintenance manuals.
 - .8 Provide certificate indicating that the installation satisfies:
 - .1 Local Authority Having Jurisdictions requirements

- .9 Provide a framed, glass covered set of instructions which clearly explain the complete operation of the system, together with the name, address and day and night telephone numbers of the Sprinkler Installation Contractor, permanently mounted near the sprinkler equipment in a location approved by the Departmental Representative.
- .10 Co-ordinate all valve identification with Fire Alarm System, provided by Division 26.
- .11 Approvals:
 - .1 Submit one (1) digital copy of the draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless so directed by Departmental Representative.
 - .2 Make changes as required and resubmit as directed by Departmental Representative.
- .2 As-Built/Record Drawings:
 - .1 Site records:
 - .1 The Departmental Representative will provide one set of reproducible fire protection drawings. Provide one set of white prints as required for each phase of the work. The contractor shall mark thereon all changes as work progresses and as changes occur.
 - .2 On a (weekly) basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
 - .3 Make available for reference purposes and inspection at all times.
 - .2 As built/record drawings:
 - .1 Identify each drawing in lower right hand corner in letters at least ½" high as follows: "AS BUILT/RECORD DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW FIRE PROTECTION SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
 - .2 Submit to Departmental Representative for approval and make corrections as directed.
 - .3 Submit completed reproducible as built/record drawings with each of the Operating and Maintenance Manuals.
 - .4 The Departmental Representative shall use the Contractor's marked up drawings to produce electronic copies of the As-Built/Record Drawings, refer also to Section 01 78 00 - Closeout Submittals.
- .3 Warranty: Submit warranties in maintenance manuals as specified in Section 01 78 00 – Closeout Submittals.
- .4 Guarantee:
 - .1 Submit manufacturers' written guarantees to the Departmental Representative for review.
 - .2 Bind guarantees in hard cover report binder suitable for 8½" x 11" sheets. Label cover "Guarantees" and show project name. Provide title sheet and table of contents.
 - .3 Each guarantee shall include:
 - .1 Project name and address.
 - .1 Guarantee time period (commencement date shall be as date shown on Project Final Certificate of Completion unless otherwise indicated).

- .2 Clear and concise definition of what is guaranteed and remedial action provided.
- .3 Signatures of Fire Protection Trade Contractor and a company officer of the manufacturing firm.
- .4 Include all extended guarantees (and service contracts) as specified in individual sections.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 – Testing and Quality Control.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.6 EQUIPMENT LIST

- .1 Compile a complete list of equipment and materials to be used on this project and forming part of contract documents by adding manufacturer's name, model number and details of materials, and submit for approval.
- .2 Submit for approval within ten (10) days after award of contract.

1.7 TRIAL USAGE

- .1 The Contractor may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.8 PROTECTION OF OPENINGS

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.9 CLEANING

- .1 Clean the job site daily. If the site is not cleaned to the Departmental Representative's satisfaction, then the Department Representative shall make arrangements for cleaning and charge the cost against the Contract.

1.10 PAINTING

- .1 To Section 09 91 00 - Painting.
- .2 Prime and touch up marred finished paintwork to match original. Touch-up to match original paint. Do not paint over nameplates.
- .3 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

- .4 Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated equipment.

1.11 DEMONSTRATION, OPERATING AND MAINTENANCE INSTRUCTIONS

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Where specified elsewhere in the specifications, the contractor is to provide demonstrations and instructions.
- .3 Use operation and maintenance manual, as built drawings, audio visual aids, etc. as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.
- .5 Where deemed necessary, the Department Representative may record these demonstrations on video tape for future reference.

1.12 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 33 00 - Submittal Procedures.
- .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.

1.13 AS INDICATED

- .1 Means that the item or items specified are shown on the drawings.
- .2 The word "provide" shall mean "Supply and Install".

1.14 ACCEPTABLE MANUFACTURER

- .1 Means that item named and specified by manufacturer and/or catalogue number, forms part of specifications and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.
- .2 Provide materials, equipment, and plant of specified design quality and of current models with published ratings for which replacement parts are readily available.

- .3 The codes and standards referred to in the specifications establish the minimum requirements only. The most stringent requirements of the specifications, drawings, codes and standards shall govern. Refer to the latest editions of all applicable codes and standards.

1.15 EQUIPMENT REQUIREMENTS AND INSTALLATION

- .1 Provide unions and flanges to permit equipment maintenance and disassembly and to minimize disturbance to connecting piping and duct systems and without interference from building structure or other equipment.
- .2 Pipe all drain lines to floor drains.
- .3 Equipment shall be installed on the axis of the building.

1.16 ANCHOR BOLTS AND TEMPLATES

- .1 Supply anchor bolts.
- .2 Drill and grout anchor bolts using templates.
- .3 Installed anchors shall perform to criteria required.

1.17 SLEEVES

- .1 Provide pipe sleeves at all points where pipes pass through masonry or concrete walls or slabs.
- .2 Also refer to Item 1.25 Cutting and Patching in this Section.
- .3 Sleeves to be primed coated prior to installation.
- .4 Sizes:
 - .1 Provide ½" (13mm) clearance all around between sleeve and pipes or between sleeve and insulation. Clearance around pipes penetrating fire rated walls and floors to be as required for fire stopping.
 - .2 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and all finished areas; and 2" (50mm) above floors in mechanical rooms, service spaces and wet areas such as kitchens, etc.
- .5 Fill voids around pipes.
- .6 Also refer to Item 1.21 Penetration of Walls and Floor Slabs.
- .7 All fire stopping to be done in accordance with Section 07 84 00 – Fire Stopping and Smoke Seals.
- .8 Temporarily plug all openings during construction.

- .9 Provide sleeves in all openings in mechanical room and wet area floors.
- .10 Sleeves to be Schedule 40 steel pipe complete with continuous welded fin.
- .11 Sleeves to be installed when concrete is poured.

1.18 ESCUTCHEONS AND PLATES

- .1 Provide on all pipes passing through finished walls, partitions, floors and ceilings.
- .2 Use chrome or nickel plated brass, split type with set screws for ceiling or wall mounting.
- .3 Inside diameter shall fit around finished pipe. Outside diameter shall cover opening or sleeve.
- .4 Secure to pipe or finished surface but not to insulation.
- .5 Where sleeves extend above finished floor, escutcheons or plates shall cover sleeve extension.

1.19 ACCESS DOORS

- .1 Supply access doors for furred ceilings and duct shafts or spaces for servicing equipment and accessories or for inspection of safety, operating or fire devices for installation under section erecting the walls or ceilings. Also supply and arrange for installation of access pits and covers for servicing and inspection of valves, devices which are to be installed below grade or below floor in floor slabs.
- .2 General: Prime coated steel.
- .3 Special areas such as tiled or marble surfaces: stainless steel.
- .4 In visible areas, access door locations to be approved by the Departmental Representative prior to installation.

1.20 DIELECTRIC COUPLINGS

- .1 Provide wherever pipes of dissimilar metals are joined.
- .2 Provide insulating unions for pipe sizes 2" (50mm) and under and flanges for pipe sizes over 2" (50mm).
- .3 Provide felt or rubber gaskets to prevent dissimilar metals contact.

1.21 PENETRATION OF WALLS AND FLOOR SLABS

- .1 Wherever pipes and ducts penetrate non-fire rated walls and floor slabs, tightly pack the space between construction and ducts/pipes the full depth with acoustic filler material and

seal both sides with acoustic sealant. Where pipes pass through fire rated walls and floor slabs, pack space between the pipe and sleeve with approved fire rated and ULC approved sealant.

.2 Acoustic Filler:

- .1 Filler material shall be glass fibre or inorganic mineral.
- .2 Filler material shall not have higher combustion rating than the following:
- .3 Flame Spread Rating = 25
- .4 Smoke Development Rating = 0
- .5 Fuel Contribution Rating = 0

.3 Acoustic Sealant:

- .1 Concealed Application: Non-shrinking, non-straining, non-drying and permanently elastic type.
- .2 Exposed Application: Permanently elastic, paintable acoustic sealant, latex acrylic or acrylic latex type.

1.22 PREPARATION FOR FIRE STOPPING

- .1 Fire stopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation to be ULC listed and acceptable to the Authority Having Jurisdiction. Installation to be as per manufacturer's recommendations and ULC's testing procedure.
- .2 Uninsulated unheated pipes NOT subject to movement: No special preparation.
- .3 Uninsulated heated pipes subject to movement: Wrap with non-combustible smooth material to permit pipe to move without damaging fire stopping material.
- .4 Insulated pipes and ducts: Ensure integrity of insulation and vapour barrier at fire separation.
- .5 Each Trade contractor shall be responsible for their own fire stopping.
- .6 Fire stopping shall be located at the penetration of the fire separation by a fire stopping System in accordance with ULC-S155 "Fire Tests of Fire Stop Systems" that has a rating of not less than the rating for the fire separation.
- .7 Fire stop systems shall be installed by qualified personnel.

1.23 DRAWINGS

- .1 Mechanical drawings are not intended to show structural details or architectural features.
- .2 The Mechanical drawings are not to be scaled.
- .3 Except where dimensioned, mechanical drawings indicate general Mechanical layouts only. Because of the small scale of Mechanical drawings, it is not possible to show all offsets, fittings and accessories which may be required. Investigate structural and finish

conditions affecting this work and arrange work accordingly, providing such fittings, valves and accessories which are required to meet the conditions.

- .4 These specifications are to be considered as an integral part of the drawings which accompany them; neither the drawings nor the specifications shall be used alone. Any item which is omitted in one but which is reasonably implied in the other, shall be considered properly and sufficiently specified and must, therefore, be provided under the Contract. The decision of the Departmental Representative shall be final, if interpretation is required.
- .5 Misinterpretation of drawings and specifications shall not relieve the Fire Protection Trade Contractor of responsibility.
- .6 The Fire Protection Trade Contractor shall make themselves familiar with the overall intended operation of the fire protection system prior to installation so that all necessary accessories can be installed during the normal progress of the work. Failure to do so will result in the Fire Protection Trade Contractor being responsible for providing such devices, at their expense when the need of such devices becomes apparent during start-up.

1.24 EXISTING SITE CONDITIONS

- .1 The Contractor shall visit the site of the building in order to examine firsthand the existing conditions which may affect his contract. No compensation shall be considered for additional expenditures incurred later through failure to do so.

1.25 CUTTING AND PATCHING

- .1 Any cutting, coring and patching required shall be done by the Contractor for as per Section 02 07 50 - Cutting and Patching.
- .2 Holes in slabs shall be by coring and ARE the responsibility of Contractor in locations to be approved by the Departmental Representative.
- .3 Where any masonry and concrete saw cutting and coring work is required the Contractor shall wet cut to reduce dust.
- .4 Approvals:
 - .1 Obtain approval from the Authority Having Jurisdiction beginning installation.
 - .2 Contractor to provide Engineer stamped shop drawings and piping layout drawings to the Authority Having Jurisdiction.
 - .3 Pay all costs associated with such approvals, including but not limited to checking of documents.

1.26 EXTRA MATERIALS

- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals and in accordance with NFPA 25.
- .2 Provide a metal cabinet containing six (6) spare sprinkler of each type and melting point temperature for each building of the project. Install cabinet as indicated on drawings and/or

in a location agreed upon by the Departmental Representative. Include sprinkler wrenches and keys.

1.27 PROVISION FOR FIRE WATCH

- .1 Provide a fire safety watch in accordance with the National Fire Code requirements during construction and demolition.

1.28 COMPLETION

- .1 This Trade shall be held responsible to provide and furnish all necessary labour and to bear all expenses incidental to the satisfactory completion of the work.

1.29 MANUFACTURERS REVIEW

- .1 It shall be the responsibility of the Contractor to have the equipment supplier or his representative review all proposed connections, clearances, sizes, valves, breakers, etc. including wire and pipe sizes to his equipment before installation commences. At that time, he shall inform the Departmental Representative of any changes required to make the equipment function satisfactorily.
- .2 Provide the Contractor with a letter accepting all connections as proposed and where required, recommend necessary changes.
- .3 If any changes or additional material and labour are required to make the equipment function properly to capacity and the manufacturer has not pointed out this work prior to commencement of work, the additional and/or corrective work shall then be done at the expense of the equipment supplier.

1.30 WARRANTIES

- .1 Make good all defects other than normal wear and tear during the life of the warranty period specified in the General Conditions of the contract. Warrant all work and installed equipment to work quietly and satisfactorily and to accomplish the work for which it was installed during the life of the warranty. At any time during this period, make any necessary changes and adjustments, or replacements, to accomplish this at no additional cost to the Departmental Representative.

1.31 COORDINATION

- .1 Co-ordinate work with other trades to avoid conflict.
- .2 Locate distribution systems, equipment and materials to provide minimum interference and maximum useable space.
- .3 Co-ordinate location of pipe drops and risers with trades erecting walls and ceilings to ensure that all pipes and ducts are concealed in walls or ceilings spaces. If space is not

available in walls or ceilings, locate pipes so that they can be easily boxed in by the relevant trades. Where pipes are shown rising in concrete block walls, placement of the pipe shall be done in conjunction with the erection of the wall.

1.32 GUARANTEE

- .1 This Fire Protection Trade Contractor shall guarantee all their work free from defects for a period of one year, unless specifically noted otherwise, after final acceptance of such work by the Departmental Representative and shall make good all defects other than normal wear and tear during the life of the guarantee. This Fire Protection Trade Contractor shall guarantee all work and equipment supplied by them to work quietly and satisfactorily and to accomplish the work for which it was installed during the life of the above guarantee. At any time during this period, they shall make any necessary changes and adjustments or replacements, to accomplish this at their own expense.

1.33 PERMITS AND REGULATIONS

- .1 The Fire Protection Trade Contractor shall comply with all regulations of authorities having jurisdiction, where applicable, including but not limited to the following:
 - .1 Provincial Department of Labour;
 - .2 Provincial Fire Marshal;
 - .3 Municipal Plumbing Inspector;
 - .4 Provincial Board of Insurance Underwriters; and
 - .5 Provincial Department of Health.
- .2 The Fire Protection Trade Contractor shall obtain and pay for any permits required by Local Codes and Regulations and arrange for inspections.
- .3 Any additional materials or labour required to conform to any of these rules and regulations will be furnished under the Contract with no additional cost to the Departmental Representative.

1.34 TESTS

- .1 Notice of Tests: Give written notice for a minimum of four (4) working days prior to date when tests will be made.
- .2 Prior Tests: Concealed work shall remain uncovered until completely tested and approved, but if construction schedule requires, arrange for prior tests on parts of system as approved.
- .3 Acceptance Tests: Conduct in presence of the Departmental Representative's or representative of the Authorities Having Jurisdiction.
- .4 Costs: Bear all costs in connection with tests conducted.
- .5 Certificates: Obtain acceptance certificates from the authorities having jurisdiction. Work is not considered complete until certificates have been delivered to the Departmental Representative.

1.35 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

1.36 COMMISSIONING

- .1 Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and will provide all systems commissioning in conjunction with all trade contractors. The Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used

END

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 – Testing and Quality Control.
- .3 Section 01 77 00 - Closeout Procedures.
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 21 05 00 – Common Work Results for Fire Suppression.
- .6 Section 21 13 15 – Pre-Action Sprinkler System.
- .7 Section 21 24 16 – Fire Extinguishers.
- .8 Section 23 05 19 – Thermometers and Pressure Gauges – Piping Systems.
- .9 Section 23 05 53 – Mechanical Identification.

1.2 REFERENCE STANDARDS

- .1 National Fire Prevention Association (NFPA):
 - .1 NFPA 10 - Portable Fire Extinguishers, 2013 Edition.
 - .2 NFPA 13 - Installation of Sprinkler Systems, 2013 Edition.
 - .3 NFPA 25 - Inspection, Testing, and Maintenance of Water Based Fire Protection Systems, 2014 Edition.
- .2 National Building Code of Canada - 2015, including latest errata.
- .3 National Fire Code of Canada - 2015, including latest errata.
- .4 Authorities Having Jurisdiction:
 - .1 Conform to the requirements of the Authority Having Jurisdiction.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures, Section 21 05 00 – Common Work Results for Fire Suppression and in accordance with NFPA 13.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for incorporation into the maintenance manual specified in Section 01 78 00 – Closeout Submittals, Section 21 05 00 – Common Work Results for Fire Suppression and in accordance with NFPA 13.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 – Testing and Quality Control.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

- .1 Steel Pipe:
 - .1 For Mains: Welded or Roll Grooved: Steel, Schedule 10.
 - .2 For Branches: Screwed or Cut Grooved: Steel, Schedule 40.
 - .3 Compressed Air Pipe: Steel, size as per drawings, screwed joints and fittings, to NFPA 13.
 - .4 Pre-Action systems: piping on discharge of cabinet shall be galvanized inside and outside.
- .2 Fittings: 1200 kPa (175 psi) minimum working pressure, to conform to the following:
 - .1 Cast Iron: screwed to ANSI B16.4, flanged to ANSI B16.1, Class 125 and 250.
 - .2 Malleable Iron: screwed to ANSI B16.3, Class 150 and 300.
 - .3 Grooved Products:
 - .1 All grooved products for systems to be ULC listed.
 - .2 All grooved couplings to be complete with angle bolt pads to provide a rigid joint.
 - .3 All grooved products provided for this work to be provided by only one manufacturer.
 - .4 Fittings to ASTM A47 99 and A536 84.
 - .4 Wrought light steel factory-made, butt weld fittings to ANSI B16.9.
 - .5 Butt welding ends for pipe, valves, flanges, and fittings to ANSI B16.25.
 - .6 Steel pipe flanges and flange fittings to ANSI B16.5.
 - .1 Flange Bolts: square or hex head bolts with heavy hex nuts to ASTM A307, Class B.
 - .2 Flange Gaskets: 1.6mm thick plain or cloth inserted red rubber to ASTM B16.20 or B16.21.
 - .7 Forged steel fittings: socket welded and threaded to ANSI B16.11.
 - .8 Wrought copper and bronze solder joint pressure fittings to ANSI B16.22.
 - .9 Cast bronze solder joint pressure fittings: to ANSI B16.18.
- .3 Reducers: One piece fittings, hex face bushings acceptable only where one piece standard reducing fittings of required size are not available.

2.2 VALVES

- .1 Valves shall be ULC listed and FM approved, designed for 1200 kPa (175 psi) minimum working pressure (water) and of one manufacturer.
- .2 Rising stems, to be repackable under pressure and with malleable iron wheel handles.
- .3 Sprinkler valves where required and indicated on drawings, to be equipped with contacts and devices necessary for operation of supervisory system specified under Division 26.
- .4 Gate Valves:
 - .1 50mm (2") and under: Screwed bronze body and trim to ASTM B61 solid wedge, rising stem.

- .2 65mm (2-1/2") and over: Iron body, bronze mounted, OS&Y solid wedge, flanged or roll grooved ends or butterfly gear operated up to 150mm (up to 6").
- .5 Globe Valves:
 - .1 50mm (2") and under: Bronze body and trim to ASTM B61 (screwed), replaceable composition disc.
- .6 Check Valves:
 - .1 50mm (2") and under: Bronze swing type to ASTM B61, composition disc (screwed).
 - .2 65mm (2-1/2") and over: ULC iron body, bronze mounted, regrind/renew bronze disc and seat ring, flanged or roll grooved.
- .7 Ball Valves:
 - .1 Up to 50 mm (2").
- .8 Butterfly Valves (Sprinkler Zone Valve).
- .9 Drain Valves:
 - .1 ULC straight or angle or globe for 1200 kPa (175 psi) for cold water or 860 kPa (125 psi) saturated steam.

2.3 SUPERVISORY AND ALARM SWITCHES

- .1 Supervisory Switches for valves:
 - .1 ULC listed or approved, cast aluminum housing, with red enamel finish, tamperproof.
 - .1 Gate Valves.
 - .2 Butterfly Valves.
 - .3 Valves 2" and Smaller.
 - .4 Supervisory Pressure Switches: ULC approval with open or closed circuit.
- .2 Alarm Switches:
 - .1 ULC listed or approved, cast aluminum housing with red enamel finish, tamper-proof. Built-in adjustable time delay 0-90 seconds.
 - .1 For Water Flow: 2 sets of contacts SPDT (Form C).
 - .2 For Pressure.
- .3 Electrical wiring from switches to the building fire alarm system panel by the Fire Alarm Contractor.

2.4 PIPE HANGERS

- .1 Pipe hangers to be ULC listed and in accordance with NFPA 13.

2.5 SPRINKLERS

- .1 General: to NFPA 13 and UL listed or approved for fire service.

- .2 Sprinklers shall be frangible bulb type as noted on the drawings.
- .3 Temperature ratings of sprinkler heads to be as per NFPA 13.
- .4 Pendant type heads shall have vertical adjustment. Unless noted otherwise pendant sprinklers in finished areas shall be the semi-recessed type.
- .5 Provide minimum 12.7 mm (1/2") nominal diameter discharge orifice.
- .6 All sprinklers in finished areas shall be chrome plated unless otherwise noted on drawings.
- .7 Sprinklers in light hazard occupancies shall be the quick response type.
- .8 Where sprinklers are located less than 2135mm (7'-0") AFF they shall be the recessed flat plate type.

2.6 SIGNS

- .1 Signs for control drain and test valves to NFPA 13.

2.7 FINISHES

- .1 Finished Areas: Chrome plated valves and fittings.

2.8 PRESSURE GAUGES

- .1 ULC listed and to Section 23 05 19 - Thermometers and Pressure Gauges – Piping Systems
- .2 Shall have maximum limit of not less than twice normal working pressure at point where installed.

PART 3 EXECUTION

3.1 INSPECTION

- .1 Piping, accessories, etc., not to be recessed, painted, or concealed before it has been inspected and approved by the Departmental Representative and other authorities having jurisdiction.

3.2 INSTALLATION

- .1 Install horizontal valves with stems in vertical upright position where spaces allow. Stems in other than upright position must be approved by the Departmental Representative.
- .2 Provide chrome plated valves, nozzles, fittings, except in unfinished areas where satin brass finish is acceptable.

- .3 Provide pressure gauges at each water supply connection and at highest point of sprinkler system, c/w 6mm (1/4") gauge connection and gauge cock.
- .4 Provide OS & Y gate or butterfly control valve at base of sprinkler/standpipe riser complete with supervisory switch.
- .5 Provide nominal 50mm (2") drain valve at base of sprinkler/standpipe riser, arranged to drain to safe location.
- .6 Co-ordinate locations of all holes for pipes and otherwise meet specified requirements of Section 21 05 00 – Common Work Results for Fire Protection for installation of sleeves.
- .7 Allow for the installation of a total of 40 additional sprinklers around exposed mechanical systems throughout the buildings.
- .8 All installation work to be in accordance with the rules and regulations of the Authority Having Jurisdiction and the Departmental Representative.
- .9 All piping to run concealed except where noted on drawings. All main lines to be kept as high and neat as possible. Pipe to run parallel to building lines unless noted otherwise.
- .10 All piping shall be securely hung from the building structure using approved hangers.
- .11 All valves controlling water supply to be complete with supervisory switch.
- .12 Provide extended escutcheons where necessary and where shown to clear obstructions located below sprinkler deflectors.
- .13 Co-ordinate locations of all holes required for pipes with the work of other trades. Provide fire stopping where pipes penetrate fire walls or floors.
- .14 Install system in accordance with approved shop drawings and manufacturers' recommendations.
- .15 For dry systems, install all pendent heads with return bends.
- .16 Arrange drains as indicated or as required so that all parts of the system can be drained.
- .17 This Contractor is to ensure flow switch and supervised valves are installed with supervisory components properly calibrated.
- .18 Identify system components as per specification Section 23 05 53 – Mechanical Identification.

3.3 PROTECTION OF COMPLETED WORK

- .1 Except for special finishes specified herein, sprinkler systems piping not to be painted.
- .2 Exposed piping in to be painted under Section 09 91 00 – Painting.

- .3 Provide red plastic coated wire baskets at sprinkler heads in Mechanical, Electrical, Storage, Elevator Machine and Telephone Room, around ventilation equipment, service areas and other areas that may be requested by the Authority Having Jurisdiction or the Departmental Representative to protect against possible mechanical injury.

3.4 IDENTIFICATION

- .1 Place enamelled steel signs in locations as per NFPA 13.
- .2 For outdoor signs secure with stainless steel bolts.

3.5 TESTING

- .1 Systems and equipment to be subjected to operational test.
- .2 Test and certify in accordance with NFPA 13. Test is to be witnessed by the Departmental Representative and, if required, by representatives of Authorities Having Jurisdiction.
- .3 All inspections, examinations, and tests required shall be arranged and paid for by this Section, deliver Inspection Certificates to the Departmental Representative. Finally, adjust equipment for to the satisfaction of approving authorities and Departmental Representative.

3.6 PRESSURE GAUGES

- .1 Install to permit removal.
- .2 Locate so as not subjected to freezing.

3.7 COMMISSIONING

- .1 Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and will provide all systems commissioning in conjunction with all trade contractors. The Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.

END

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 – Testing and Quality Control.
- .3 Section 01 77 00 - Closeout Procedures.
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 21 05 00 – Common Work Results for Fire Suppression.
- .6 Section 21 13 13 – Wet Pipe Sprinkler Systems.
- .7 Section 21 13 16 – Dry Type Sprinkler System.
- .8 Section 21 23 00 – Wet Chemical Fire Extinguishing Systems.
- .9 Section 21 24 16 – Fire Extinguishers.
- .10 Section 23 05 19 – Thermometers and Pressure Gauges – Piping Systems.
- .11 Section 23 05 53 – Mechanical Identification.

1.2 REFERENCE STANDARDS

- .1 CAN/ULC Standards:
 - .1 CAN/ULC-S524 Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S537 Standard for the Verification of Fire Alarm Systems.
- .2 National Fire Prevention Association (NFPA):
 - .1 NFPA 10 - Portable Fire Extinguishers, 2013 Edition.
 - .2 NFPA 13 - Installation of Sprinkler Systems, 2013 Edition.
 - .3 NFPA 25 - Inspection, Testing, and Maintenance of Water Based Fire Protection Systems, 2014 Edition.
 - .4 NFPA 72 National Fire Alarm Code.
- .3 National Building Code of Canada- 2015, including latest errata.
- .4 National Fire Code of Canada - 2015, including latest errata.
- .5 Authorities Having Jurisdiction:
 - .1 Conform to the requirements of the Authority Having Jurisdiction.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures, Section 21 05 00 – Common Work Results for Fire Suppression and in accordance with NFPA 13.
- .2 The fire protection contractor must prepare and submit for approval all installation drawings and hydraulic calculations as required by NFPA.
- .3 Submit for approval a set of equipment data sheets which will include all technical data for the Pre-Action System Cabinets.

- .4 Supply a standardized Maintenance & Operation Manual for Pre-Action System Cabinets and associated fire extinguishing system.
- .5 Maintenance and Operation Manual must include all necessary instructions to operate and maintain the system. Emergency procedures must be part of the manual.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for incorporation into the maintenance manual specified in Section 01 78 00 – Closeout Submittals, Section 21 05 00 – Common Work Results for Fire Suppression and in accordance with NFPA 13.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 – Testing and Quality Control.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.6 SYSTEM DESCRIPTION

- .1 The cabinet assembly shall contain preaction double interlock, Electric/Pneu-Lectric release, pre-assembled, pre-wired and factory tested under tight ISO-9001 manufacturing and quality control procedures.
- .2 All system components shall be UL/ULC listed or FM approved.
- .3 Cabinet shall conform to UL50 & UL50E.
- .4 Cabinet shall be certified to CSA Std. C33 No94.1-07 & C22.2 No94.2-07.
- .5 Cabinet shall be NEMA-4 listed.
- .6 Cabinet with integrated air compressor shall be NEMA-3 listed.
- .7 System shall have unique serial number for easy traceability.

PART 2 PRODUCTS

2.1 PRE-ENGINEERED PREACTION SYSTEM

- .1 Cabinet:
 - .1 Cabinet shall be self-contained and integrate a pre-action double interlock system, Electric/Pneu-Lectric release, and shall contain all hydraulic, pneumatic and electrical components required for the control of a self-contained pre-action system. System shall include the following:
 - .1 Sturdy free-standing 14 gauge steel cabinet measuring:
 - .2 58.4 x 63.5 x 195.5 cm (23" x 25" x 77") for 38mm (1-1/2") and 50mm (2") systems

- .3 91.4 x 63.5 x 195.5 cm (36" x 25" x 77") for 75mm (3") and 100mm (4") systems
 - .4 Textured rust proof coating, inside and outside, fire red, oven baked polyester powder on phosphate base (powder coated).
 - .5 One or two locked access door(s), depending on cabinet size, to reduce frontal clearance required for opening.
 - .6 Individual access doors for the hydraulic section and the emergency release.
- .2 Integrated Preaction System:
- .1 Deluge valves for 38mm (1-1/2") through 100mm (4") diameter c/w supervised butterfly control valve, releasing trim rated at 1724kPa (250ps) and all the necessary accessories. Trim shall include a mechanical latching device to prevent system from resetting in case of loss of power to the release solenoid. Systems provided with solenoid only, without this mechanical latching device, shall not be accepted. Every valve shall be clearly identified as to its operation with arrows indicating all positions to facilitate system operation.
 - .2 Pressure gauges to indicate water supply, priming water and air pressures of the system. Each pressure gauge must be provided with its own three-way valve.
 - .3 Release trim with solenoid valve, pneumatic actuator and every supervisory and alarm device required shall be Schedule 40 galvanized steel. Black pipe will not be accepted.
 - .4 Schedule 40 steel pipe header painted fire red, with grooved ends to be connected to supply water from either side.
 - .5 Schedule 40 steel pipe drain manifold of 50mm (2") diameter painted fire red, with grooved ends for drain connections from either side.
 - .6 Trim shall include properly identified contractor test ports factory mounted into the trim piping to facilitate system testing and commissioning.
 - .7 Integrated control panel with emergency batteries factory-assembled inside the cabinet.
 - .8 The system shall have an Integrated Releasing Circuit Disconnect Switch to allow the system to be tested without actuating the fire suppression system as required per NFPA 72, latest Edition. Operation of the Disconnect Switch shall cause a supervisory signal at the releasing service fire alarm control unit.
 - .9 Field wiring terminal strips and junction box integrated with the cabinet for connection of field wiring. Standard factory-wired terminal strips to accept field installation of ARM-44 Relay Module, CA2Z Class initiating circuit module, RA-4410RC remote annunciator.
- .3 The system shall be complete in all ways.
- .4 The system shall incorporate all components required for complete system operation.
- .5 The pre-action system shall be complete with the following options:
- .1 Provide a Listed and Approved supervised butterfly valve installed on the system riser inside the cabinet for full flow test purposes. An integrated sight glass shall be part of this arrangement for visually confirming water flow through the main drain upon system actuation.
 - .2 Provide the system with a flanged inlet and riser connections and a threaded drain.

- .3 Provide an integrated Listed and Approved Anti-Column Device to prevent possibility of water column downstream of the easy riser check valve on pre-action system.
- .4 Water supply inlet manifold and riser outlet with galvanized pipe, cap and couplings.

2.2 INTEGRATED RELEASING CONTROL PANEL

- .1 The release control panel shall be fully integrated to the cabinet enclosure. It shall be pre-assembled, pre-wired, programmed and tested at the factory. It shall be FM Approved and cULus listed to UL 864-9 standard. The panel shall include four programmable Class B, Style B initiating zones, two class B supervisory zones, and four programmable output circuits. Onboard, menu-driven programming with pre-installed programs for ease of set-up must also be provided. Batteries shall be sized to provide emergency power as per UL (24 hours) requirements. The control panel shall include both an LCD Annunciator and a set of YELLOW & RED LED lamps identifying alarm, trouble, supervisory and flow conditions. Easy to operate control buttons shall also be included for the operation of the panel functions.
- .2 5 minutes of alarm after 24 hours stand-by (UL).
- .3 Class A, Style D initiating device module: Provide a CA2Z module to allow the installation of Class A, Style D wiring on the initiating circuit.
- .4 Class A, Style Z indicating appliance module: Provide a CAM module to allow the installation of Class A, Style Z wiring on the indicating appliance circuit.
- .5 Relay module: Provide a relay module in the release control panel to allow for four inputs and four outputs. The relays shall connect via RS-485 and 24 VDC power and shall be rated for 3 amps at 24 VDC resistive load. There shall also be a disable switch to allow for maintenance and testing.
- .6 Remote Annunciator: Provide a remote annunciator module and install it on-site following the instructions provided by the manufacturer. The remote annunciator shall be mounted on a standard four gang wallbox provided by the contractor.

2.3 AUTOMATIC AND MANUAL DETECTION DEVICES

- .1 Supply and install a complete electrical detection system including conduit, wiring, heat and/or smoke detectors, manual pull stations, and connections to auxiliary functions.

2.4 NOTIFICATION DEVICES AND SIGNS

- .1 Supply and install a complete notification system including conduit, wiring, and notification devices.
- .2 The NAC devices (24 Vdc bell, horn or strobe) must be compatible with the release control panel.

2.5 SYSTEM OPERATION

- .1 The integrated release control panel sequence of operation shall be factory-programmed to perform the following:
- .2 The activation of the detection condition AND the opening of an automatic sprinkler is necessary to cause the deluge valve actuation.
- .3 The activation of the detection condition alone will sound an alarm and activate the alarm contacts connected to the remote-control panel but water will not enter the system piping;
- .4 The opening of an automatic sprinkler OR damage to system piping without the detection condition satisfied will activate the low air supervisory switch and supervisory contacts connected to the remote-controlled panel then at lower pressure the very low air supervisory switch, sound an alarm and activate alarm contacts connected to the remote-control panel but will not cause the system piping to fill with water.
- .5 Activation of the detection condition AND the opening of an automatic sprinkler will activate the solenoid valve open causing the deluge valve to open and water to flow out of any open sprinklers. The alarm pressure switch will activate.
- .6 Operation of the hydraulic emergency manual release will depressurize the priming chamber, causing the deluge valve to open and allowing water to enter the system piping and water will discharge through any open sprinklers. The alarm pressure switch will activate.

2.6 COMPRESSED AIR SUPPLY

- .1 Air compressor and supervisory trim shall be provided inside the cabinet and its pressure factory adjusted for the selected configuration. The air supply must be regulated and of the proper size to restore normal system air pressure within 30 minutes as per NFPA 13.
- .2 An accelerator device shall be factory installed in the air trim with its own pressure gauge and bypass valve, designed to increase the operating speed of the system.

2.7 AUTOMATIC SPRINKLERS

- .1 Supply and install all required automatic sprinklers. They shall be glass bulb type, UL/ULC listed and FM approved.
- .2 Applicable specifications of automatic sprinklers shall be determined as per the manufacturer recommendations, based on the project conditions.

2.8 PIPING

- .1 System piping and fittings shall in accordance with NFPA 13.

2.9 SYSTEM DRAIN

- .1 The single drain collector of the pre-action system shall be connected to an open drain consisting of a vertical pipe with an air gap around the drain collector pipe.
- .2 The drain piping shall not be restricted or reduced and shall be of the same diameter as the drain collector.
- .3 Multiple drain collectors and open drain cups inside the cabinet will not be accepted.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 The installation must meet all established standards and be according to all applicable laws, regulations and codes.
- .2 The proper operation and coordination for the system's installation, including the automatic sprinkler system, detection system, signaling system and initial start-up are all under the responsibility of the fire protection contractor.
- .3 Water supply for the cabinet shall allow a grooved connection to supply manifold from the left or right-hand side of the unit.
- .4 Drain output for the cabinet shall allow connection to the drain manifold from the left or right-hand side of the unit.

3.2 TRAINING

- .1 The contractor must plan and organize a training session of at least two hours for the building maintenance staff, in the presence of Department Representative.
- .2 The training session must include normal operation, emergency procedures and system maintenance.

3.3 TESTS AND VERIFICATION

- .1 Hydrostatic tests must be performed on the entire sprinkler piping system, as required by NFPA 13.
- .2 A drain test using the auxiliary drain valve fully open (drain located on water supply side, deluge valve inlet) must be performed to make sure that no back pressure in drain piping exists, which could affect the proper operation of the pre-action system.
- .3 An air supply test must be performed, to confirm that normal air pressure can be restored within 30 minutes.

- .4 The verification of the fire alarm system must be done in accordance with the CAN/ULC-S537.

3.4 REPORT AND CERTIFICATE

- .1 An inspection report and a certificate must be supplied to the Departmental Representative at the completion of the project. All test results shall be registered in a booklet to be included with the inspection report.

3.5 COMMISSIONING

- .1 Building Commissioning is a requirement of this project in order to comply with sections of Division 01 – General Requirements. A Commissioning Agent has been engaged and will provide all systems commissioning in conjunction with all trade contractors. The Commission Agent will provide a Commissioning Plan with commissioning start-up and test procedure sheets to be performed and completed by the various trade contractors.

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