Part 1 General

1.1 RELATED GENERAL PROVISION

.1 This section covers items common to all sections of Division 21 and is intended only to supplement the requirements of Division 1.

1.2 REFERENCES

.1 The installation of the fire suppression systems shall be in accordance with the drawings issued under this contract, these specifications, and:

.1 The National Building Code of Canada 2010.

.2 The National Fire Code of Canada 2010.

.3 The National Plumbing Code of Canada 2010.

.4 NFPA 10 – 2007 Standard for Portable Fire Extinguishers.

.5 NFPA 13 – 2013, Standard for the Installation of Sprinkler Systems.

.6 NFPA 25 – 2011, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

.7 NFPA 20 – 2013, Standard for the Installation of Stationary Pumps for Fire

.8 Underwriter's Laboratories of Canada (ULC).

.9 Material Safety Data Sheets (MSDS)

1.3 CONTRACT DRAWINGS

.1 The following drawings are considered as part of this contract:

.1 H1 - Mechanical – Demolition & Proposed Floor Plans

1.4 DESCRIPTION OF WORK

.1 Work under this division covers all labour, materials and equipment required for installing and placing in operation the mechanical systems as specified herein and as shown on the drawings.

1.5 RESPONSIBILITY FOR TRIAL USAGE

.1 Obtain written permission from Departmental Representative to start and test permanent equipment and equipment and systems prior to acceptance by Owner.

.2 Comply with the requirements of Departmental Representative in connection with the use of these systems and equipment.

.3 Such use of permanent equipment and systems shall in no way prejudice the period of guarantee of all equipment and systems which shall commence upon the acceptance of the building by the Owner as substantially complete.

.4 Owner may use equipment and systems for test purposes prior to acceptance. Supply labour, materials and instruments required for testing.

.5 Such tests shall not be construed as evidence of acceptance of any part of the contract and it is agreed and understood that no claim for damage will be made for any injury or breakage to any part or parts of the tested equipment due to the aforementioned tests.

1.6 EXAMINATION OF SITE AND DRAWINGS

.1 Examine the site and local conditions affecting the work of this contract prior to submitting tender.

.2 Examine the fire protection drawings and determine that the work under this contract can be carried out without changes to the building as it is shown on these drawings.

.3 Before commencing any work, examine the work of other trades and report at once any defects or interference affecting the work of this division.

.4 Notes on the drawings are intended to form a part of this specification.

.5 The fire suppression drawings do not show all structural details of the building. Any information involving accurate dimensions of the building shall be taken by measurements taken on site.

.6 The contractor shall make, without additional charge, any necessary changes to accommodate structural conditions as built or existing.

.7 As work progresses and before installing fixtures, fittings, or equipment which may interfere with the interior treatment or use of the building, consult with the Architect/ Departmental Representative on the exact location of such equipment.

.8 The drawings indicate the general location and route of pipes, ducts, etc. Where required piping, etc., are not shown, or shown diagrammatically, they shall be installed to conserve head room and space.

.9 The plans do not necessarily show all valves, unions, etc. The Contractor shall not avail himself to these obvious omissions but shall install the work complete in essential details that it will function properly and so that repairs or removal of equipment can easily be accomplished.

.10 The drawings are intended to serve as a guide to the Contractor.

.11 Bidders finding discrepancies in, or omissions from the drawings, specifications, or other documents, or having any doubts as to the intent or meaning of any part thereof, shall immediately notify the Departmental Representative who will send written instructions or explanations to all bidders. Neither the Consultant, the Departmental Representative nor the Owner will be responsible for oral instructions.

.12 The Departmental Representative will supply to the contractor a copy of all the sprinkler preliminary drawings in pdf format at no cost to help him in the production of the working drawings. For any other format such as Autocad format, the contractor should expect to be charged for the additional work. Additional cost would depend on the work involved and cost would be based on an hourly rate of 85.00 $ / hr.

1.7 COOPERATION OF CONTRACTORS

.1 Coordinate the fire-suppression work with the work of other trades to facilitate the progress of the work as a whole.

.2 Any change in the work or schedule caused by failure to coordinate trades shall not be considered as a claim for extra compensation.

1.8 CHANGES AND EXTRAS

.1 No change to the drawings and specifications will be accepted, if not authorized in writing by the Departmental Representative.

.2 All work carried out which does not conform to the plans and specifications shall be corrected at the Contractor's expense.

.3 The Owner reserves the right to change quantity, quality, or any kind of work or equipment described on the drawings or in the specifications without affecting the validity of the contract.

.4 Monetary adjustments required by such changes shall be accepted in writing by the Departmental Representative before alterations are proceeded with by the Contractor.

1.9 LAWS AND ORDINANCES

.1 All work performed under this division shall comply with the requirements of the authorities having jurisdiction, including, but not limited to, the following: Provincial Department of Labour, Provincial Department of Environment, Provincial Fire Marshall, Provincial Board of Insurance Underwriters, Provincial Department of Health, Plumbing Inspector, Building Inspector, National Building Code of Canada, Local and Municipal By-Laws and Canadian Standards Association.

1.10 GUARANTEE

.1 All fire suppression work and equipment shall be guaranteed to work satisfactorily for a period of one year from the date of acceptance of substantial completion of the contract, provided any failure is not due to neglect or improper use by the Owner.

.2 Any certificate given, payment made, partial or entire use of the equipment by the Owner, shall not be construed as acceptance of defective work or improper materials.

.3 This general guarantee shall not act as a waiver of any specified guarantee for any greater length of time.

1.11 DESIGN APPROACH – SPRINKLER SYSTEM

.1 The Departmental Representative has laid out in a general way the sprinkler systems, located risers, cross mains, branch lines, and specified the system types and zones. The Departmental Representative drawings are only <<Preliminary Plans>> and the Contractor is responsible to produce <<Working Plans>> as per NFPA 13 Edition 2013 Section 22.1 - Working Drawings.

.2 The Contractor shall complete the hydraulic calculations, to size the sprinkler piping.

.3 Pipe location and final pipe layout is the responsibility of the Contractor. All pipe changes shall be approved by Departmental Representative.

.4 The Trade Contractor shall install the system as shown on drawings by is responsible for confirming pipe routes, pipe sizing and sprinkler head locations. Any necessary changes shall be the responsibility of the Trade Contractor and must be approved by the Departmental Representative and incorporated in the <<Working Plans >>.

.5 Any deviation from approved << Working Plans >> shall be submitted to the Departmental Representative and the authority having jurisdiction.

.6 Water supply for the sprinkler system shall be based on the municipal water supply. Calculation shall be based on 85% of the water supply indicated. Contractor to conduct flow tests to confirm supply.

1.12 SYSTEM DESCRIPTION

.1 The contract includes work identified below, in Division 21 of the specification and as shown on the contract drawings:

.1 The upgrade of the existing wet pipe sprinkler system to provide protection for the new storage space that formerly housed the firing range.

.2 Fire alarm system shall be by Division 28.

1.13 DESIGN CRITERIA – SPRINKLER SYSTEM

.1 Water supply for the sprinkler system shall be based on the results of the water flow test.

1.14 COMMISSIONING AND TRAINING

.1 Contractor shall provide two (2) eight (8) hour sessions with Owner for commissioning and training.

.2 Coordinate with fire alarm system commissioning.

1.15 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 78 00 – Closeout Submittals.

.2 Shop Drawings:

.1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

.1 Shop drawings: submit drawings with contractor revision stamp and signed.

.2 Submit complete plans to Authority of Jurisdiction for review and approval before commencement of work.

.3 Shop drawings and product data shall show:

.1 Materials

.2 Finishes

.3 Method of anchorage

.4 Number of anchors

.5 Supports

.6 Reinforcement

.7 Assembly details

.8 Accessories

.9 Indicate hydraulic and electrical characteristics including Net Positive Suction Head (NOSH) required, make and model number

.10 Mounting arrangements.

.11 Operating and maintenance clearances. eg. access door swing spaces.

.4 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify as to current model production.

.5 Certification of compliance to applicable codes.

.6 Power and control diagrams.

.3 Samples

.1 Submit samples of following:

.1 Each type of sprinkler head.

.2 Signs and valve tags.

.4 Quality assurance submittals: submit following in accordance with Section 01 78 00 – Closeout Submittals.

.1 Test reports:

.1 Submit certified test reports for packaged fire pumps from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Test each pump/driver package at factory to provide detailed performance data and to demonstrate compliance with ANSI/NFPA and specification. Submit certified test curves for approval of Departmental Representative.

.3 Test hydrostatically to meet requirements of fire protection system to which it will be connected.

.4 Submit certified test reports for wet pipe fire protection sprinkler systems from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

.4 Manufacturer's Field Reports: manufacturer's field reports specified.

.5 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals in accordance with ANSI/NFPA 20.

.2 Provide detailed hydraulic calculations including: summary sheet, Contractor's Material and Test Certificate for aboveground and underground piping, as well as other deliverables for incorporation into manual specified in Section 01 78 00 – Closeout Submittals, in accordance with ANSI/NFPA 13.

.3 Manufacturer's Catalog Data, including specific model, type, and size for:

.1 Pipe and fittings.

.2 Valves, including gate, check, and globe.

.3 Sprinkler heads.

.4 Pipe hangers and supports.

.5 Mechanical couplings.

.4 Drawings:

.1 Sprinkler heads and piping system layout.

.1 Prepare detail working drawings of system layout in accordance with NFPA 13, "Working Drawings (Plans)".

.2 Show data essential for proper installation of each system.

.3 Show details, plan view, elevations, and sections of systems supply and piping.

.4 Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams.

.2 Electrical wiring diagrams.

.5 Design Data:

.1 Calculations of sprinkler system design.

.2 Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.

.6 Field Test Reports:

.1 Preliminary tests on piping system.

.7 Records:

.1 As-built drawings of each system.

.1 After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes.

.2 Submit drawings on reproducible Mylar film with title block similar to full size contract drawings.

.8 Operation and Maintenance Manuals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

.2 Provide detailed hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for aboveground and

underground piping and other documentation for incorporation into manual specified in Section 01 78 00 – Closeout Submittals in accordance with ANSI/NFPA 13.

.3 Operation and maintenance manual to be approved by, and final copies deposited with, Departmental Representative before final inspection.

.4 Operation data to include:

.1 Operation instruction for each system and each component.

.2 Description of actions to be taken in event of equipment failure.

.3 Valves schedule and flow diagram.

.4 Colour coding chart.

.5 Maintenance data shall include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.6 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified elsewhere.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.

1.16 PERMITS AND TAXES

.1 This Contractor shall apply for and pay all necessary municipal permits. All Provincial and Municipal taxes shall be included in the tendered amount. He shall arrange for all inspections of work by these authorities.

.2 All materials and labour required to conform to any or all of the regulations imposed by the authorities having jurisdiction over the contract shall be included by the Contractor in his tender. There shall be no additional charges to the Owner.

1.17 STAGING

.1 This contractor shall supply all staging and equipment necessary for the installation of his work.

1.18 LABOUR AND WORKMANSHIP

.1 All tradesmen employed by this Contractor for this work shall be properly licensed journeymen and apprentices qualified to do work in each particular trade. The Departmental Representative shall have the right to examine each man's credentials and order any unqualified personnel away from the project.

.2 This Contractor shall be completely responsible for the proper execution of the work as outlined in the plans and specifications. This Contractor shall assume responsibility for workmanship and material defects whether or not they are discovered by the Departmental Representative.

1.19 DEFICIENCY LISTS

.1 The Departmental Representative will notify this Contractor at various intervals of defective workmanship or installation deficiencies, etc. This Contractor shall not request revised or updated lists without first submitting a current detailed, item by item report on the status of all deficiencies as reported to the Contractor on a previous listing.

.2 When the Contractor notifies the Departmental Representative that the contract is ready for final inspection, a comprehensive deficiency listing will be prepared. If such list exceeds twenty (20) items, the contract shall not be considered ready for final inspection and the Departmental Representative need to furnish the Contractor with such listing.

1.20 METRIC DESIGNATION OF NOMINAL PIPE SIZES

.1 For the purposes of this contract only, pipes and tubes shown in this specification and on accompanying drawing(s) have been given metric nominal sizes in accordance with the following table:

ins.	**mm**	**ins.**	**mm**	**ins.**	**mm**	**ins.**	**mm**
1/4	6	2-1/2	65	15	375	36	900
5/16	8	3	75	16	400	39	975
3/8	10	3-1/2	90	18	450	40	1000
1/2	12	4	100	20	500	44	1100
5/8	16	5	125	21	525	48	1200
3/4	20	6	150	22	550	52	1300
7/8	22	7	175	pl.	560	56	1400
1	25	8	200	24	600	60	1500
1-1/8	28	9	225	pl.	630	64	1600
1-1/4	32	10	250	26	650	72	1800
1 3/8	35	11	275	27	675	then by	
1-1/2	40	pl.	280	28	700	multiples	
1-5/8	41	12	300	pl.	710	of 200 mm	
1-3/4	44	pl.	315	30	750	to 4000 mm	
1-7/8	47	14	350	32	800		
2	50	pl.	355	33	825		

PL. – listed in CGSB.41 – Plastic Series.

.2 It should be understood by all concerned that there is no intended physical change in the sizes of pipes, tubes, fittings, valves and screw threads. They are simply given a metric nominal designation.

.3 Pipe thread sizes will be designated as they have been in the past: e.g. 2" NPT means a two inch tapered pipe thread, to ANSI B2.1, pipe threads, specification.

1.21 METRIC SYMBOLS

.1 All metric symbols used in this specification and on the accompanying drawings are those used in National Standard of Canada, CAN3-Z234.1-79, Canadian Metric Practice Guide.

1.22 METRIC DESIGNATION OF SHEET METAL GAUGES

.1 For the purpose of this contract only, sheet metal gauges shown on this specification and on the accompanying drawing(s) are given in millimeter thicknesses in accordance with the following table of gauge equivalents:

Nominal Thickness in mm	Hot or Cold Rolled Steel	Stainless Steel	Galvanized Steel	Aluminium
0.4	28	28	30	26
0.5	26	26	28	24
0.6	24	24	26	22
0.8	22	22	22 to 24	20
1	20	20	20	18
1.2	18	18	18	16
1.5	16	16	16	14
2	14	14	14	12
2.5	12			10
3		12	12	
3.5	10	10		8
4	8			6
4.5		8		

.2 Metric Sheet Metal Products:

.1 The above noted table indicates the metric nomenclature which replaces the gauge numbers of those metal sheets commonly used in construction.

1.23 DEMONSTRATION AND 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 Division 21, manufacturers to provide demonstrations and instructions.

.3 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

1.24 QUALITY ASSURANCE

.1 Quality assurance in accordance with Section 01 45 00 – Quality Control.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.25 DELIVERY STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Protection:

.1 Store materials indoors in dry location.

.2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

Part 2 Products

2.1 MATERIALS

.1 All materials used in this project must be purchased directly through jobbers, manufacturer's agent, wholesalers and suppliers having an established office in the Maritime representatives. By submitting a tender, this Contractor acknowledges this responsibility.

.2 All pipes & fittings shall be manufactured in Canada or the United States and bear the label ULC.

2.2 STANDARD OF ACCEPTANCE

.1 Means that item named and specified by catalogue number forms part of specification regarding performance, quality of materials and workmanship.

.2 Tender price shall be based upon materials as specified. Manufacturer's products that are not named in the specifications must receive approval from the Departmental Representative prior to the tender closing date. See Section 00 21 13 - Instructions to Bidders.

.3 All designs are based on units numbered in schedules on drawings or stated as being "basis of design" in the spec. If approved equal is chosen, contractor shall be responsible for any and all modifications required to make unit fit, including but not limited to mechanical, electrical, architectural and structural modifications.

2.3 PIPE HANGERS

.1 Piping shall be supported by Hangers to conform to NFPA 13 and NFPA14.

.2 Hangers for Pipe Sizes 15 to 40mm: Carbon Steel, adjustable swivel, split ring.

.3 Hangers for Pipe Sizes 50mm and Over: Carbon Steel, adjustable, clevis.

.4 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

.5 Wall Supports for Pipe Sizes to 80mm: Cast iron hook.

.6 Wall Support for Pipe Sizes 100mm and Over: Welded steel bracket and wrought steel clamp.

.7 Vertical Support: Steel riser clamp

.8 Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.4 EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Division 21.

.2 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm high and 50 mm larger than equipment dimensions all around.

.3 Supply anchor bolts and templates for installation by other division.

2.5 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.4 Sizes: minimum 6 mm clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm above other floors.

.6 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Ensure no contact between copper tube or pipe and ferrous sleeve.

.4 Fill future-use sleeves with lime plaster or other easily removable filler.

.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.

2.6 FIRESTOPPING

.1 All penetrations through all fire separations (Wall and floor penetrations) are to be fire stopped.

.2 All firestopping by general contractor with the exception of mechanical firestopping as specified elsewhere in Division 21.

.3 Mechanical contractors to coordinate number, size and locations of openings with general contractor.

2.7 ESCUTCHEONS

.1 On pipes passing through walls, partitions, floors and ceilings in finished areas.

.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

2.8 SPECIAL TOOLS AND SPARE PARTS

.1 Provide one set of special tools required to service equipment as recommended by manufacturers and as specified elsewhere.

.2 Identify spare parts containers as to contents and replacement parts number.

2.9 ACCESS DOORS

.1 Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 x 600 mm for body entry and 300 x 300 mm for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Departmental Representative.

.2 Remaining areas: use prime coated steel.

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

.3 Installation is specified in applicable sections.

2.10 DIELECTRIC COUPLINGS

.1 General:

.1 To be compatible with and to suit pressure rating of piping system.

.2 Where pipes of dissimilar metals are joined.

.2 Pipes 50mm and under: isolating unions.

.3 Pipes 65mm and over: isolating flanges.

2.11 IDENTIFICATION TAGS & SIGNS

.1 Attach properly properly lettered Bilingual and approved metal signs for control drain and test valves: to ANSI/NFPA 13 & ANSI/NFPA 14.

.2 Permanently fix hydraulic design data nameplates to riser of each system.

.3 Required for all control valves, drain valves, inspectors test connections, trim valves, auxiliary drains, and fire pump controllers.

.4 Identification tags shall be red lamicoid with white letters.

2.12 SPRINKLER HEAD GUARDS

.1 Lyn-Car Part 305692

.2 Acceptable Alternates: Reliable, Grinnell, Victaulic, Viking and Tyco.

2.13 SPARE PARTS CABINET

.1 Provide metal cabinet with extra sprinkler heads and sprinkler head wrench adjacent to each alarm valve. Number and types of extra sprinkler heads as specified in NFPA 13.

.2 For storage of maintenance materials, spare sprinkler heads and special tools.

.3 Construct to sprinkler head manufacturers standard.

.4 Acceptable Product: Lyn-Car model F305620, Viking Corporation, Grinnell, Reliable, Victaulic, Tyco or approved equal.

2.14 PRESSURE GAUGES

.1 ULC listed.

.2 Maximum limit of not less than twice normal working pressure at point where installed.

.3 Provide and install a listed 90 mm pressure gauge on all test connection assemblies for each zone.

.4 Acceptable Product: Lyn-Car model F1777-4 or approved equal.

2.15 DRAIN VALVES

.1 Locate at low points and at section isolating valves unless otherwise specified.

.2 Minimum 20mm unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.

Part 3 Execution

3.1 INSTALLATION

.1 Unions or flanges: provide for ease of maintenance and disassembly.

.2 Space for servicing, disassembly and removal of equipment and components: provide as recommended by manufacturer or as indicated.

.3 Equipment drains: pipe to floor drains.

.4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

.5 Provide accessible means for lubricating equipment including permanent lubricated bearings.

.6 A minimum clearance of 2.2 m shall be maintained unless otherwise stated or impossible to achieve. Where headroom will be less than 2.0 m from the finished floor, pipe or duct runs shall be approved by the Departmental Representative.

3.2 PIPE INSTALLATION

.1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.

.2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.

.3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.

.4 Inspect piping before placing into position.

3.3 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS

.1 Notify Contracting Officer in writing at least 15 days prior to connection date.

.2 Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure.

.3 Bolt sleeves around main piping.

.4 Bolt valve to branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service.

.5 Furnish materials required to make connections into existing water supply systems, and perform excavating, backfilling, and other incidental labour as required.

3.4 PROTECTION

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

.2 Protect all equipment, piping, fixtures, ductwork, etc. throughout the construction period and assume responsibility for the same.

3.5 CUTTING AND PATCHING

.1 All cutting and patching shall be the responsibility of the general contractor. Mechanical contractor to coordinate location of openings for mechanical equipment with general contractor.

.2 If, however, cutting and patching is required to fix a defect and/or omission which is the responsibility of the Mechanical contractor, all cutting and patching costs required to fix this defect and/or omission shall be carried by the Mechanical contractor.

3.6 CONCEALMENT

.1 Unless otherwise shown or specified, all ducts and piping shall be run concealed in ceilings, walls, partitions, etc.

.2 Heating risers and water piping shall not be concealed in exterior walls without adequate thermal protection. Departmental Representative's approval shall be required for any such piping to be concealed in exterior walls.

3.7 ELECTRICAL

.1 Electrical work to conform to Division 26 including the following:

.1 Supplier and installer responsibility is indicated on electrical drawings and related mechanical responsibility is indicated on mechanical drawings.

.2 Control wiring and conduit is specified in Division 26. Refer to Division 26 for quality of materials and workmanship.

3.8 PREPARATION FOR FIRESTOPPING

.1 Firestopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation.

.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 firestopping material.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.

3.9 SITE TEST

.1 General:

.1 In accordance with NFPA 25, supplemented as specified.

.2 Testing witnessed by authority having jurisdiction.

.3 Disposal of water used in flushing and testing:

.1 Discuss appropriate measures with Departmental Representative.

.4 Timing:

.1 Connect fire hoses when flushing out and pressure tests have been completed.

.2 Charge system with water when there is no possibility of freeze-up.

.3 Perform tests after pressure booster pumps have been tested.

.5 Co-ordination:

.1 Co-ordinate tests with performance verification of:

.1 Wet pipe sprinkler systems specified Section 21 13 13.

.6 Procedures:

.1 Verify that system is complete prior to start-up and testing procedures.

.2 Verify that ULC labels are visible.

.3 Fill system with water for pressure. Record water supply pressure.

.4 Pressure test piping system as required by authority having jurisdiction.

.5 Start up fire pumps and jockey pumps.

.6 Verify flow switches are operational.

.7 Verify valves in system are visible and monitored.

.8 Flushing: Fill with water, let stand at operating pressure for 1 week. Drain risers separately, then drain main.

.9 Flush buried mains and lead-in connections before making connection to indoor sprinkler system.

.10 Perform flow tests, including tests of pre-action systems, as required by:

.1 Authority having jurisdiction.

.2 Applicable NFPA standards such as 13, 20, 1273.

.3 Local building codes.

.11 Record incoming pressure to building for 10 days prior to activating system.

.12 Adjust PRV on pump discharge to maximum pressure of 620 kPa at top fire hose station.

.13 Adjust PRV's at lower fire hose stations to 550 kPa maximum.

.14 Adjust pressure switches.

.7 Sundry checks:

.1 Verify that properly sized pressure restricting discs are installed where required.

.8 Identification:

.1 Verify devices are properly labelled, identifying area served, etc.

.9 Report:

.1 In addition to reports required by NFPA 25, include the following:

.1 Copy of schematic and valve schedule.

.10 Posted Instructions:

.1 Prepare schematic, mount behind glare-free glass and install where directed.

.2 Prepare valve schedule, mount behind glare-free glass and install where directed.

.11 Training:

.1 Provide training as required.

.12 Documentation:

.1 Provide written certification to Departmental Representative that system was installed, flushed and tested in accordance with appropriate codes, approved plans and calculations.

.2 Certificate to include:

.1 Contractors name.

.2 Contractors address.

.3 Contractors license number.

.4 List of approved materials and devices installed.

.5 Description of system test conducted.

.6 Dates of flushing and testing.

.7 Certification that connections conform to acceptable standards.

.8 Certification that system is complete and in service.

.9 Approved signage has been provided and attached as appropriate.

.10 Hose threads of system and test connections match those of responding fire department.

3.10 PAINTING

.1 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Any piping, ductwork equipment, etc, which needs to be painted as part of the contract shall be painted by the general contractor. The rest of this section is to serve as a guide for painter.

.4 Clean, pre-treat, prime, and paint new systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories.

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

.6 Clean surfaces to remove dust, dirt, rust, and loose mill scale.

.7 Immediately after cleaning, provide metal surfaces with 1 coat of pre-treatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.

.8 Shield sprinkler heads with protective covering while painting is in progress.

.9 Upon completion of painting, remove protective covering from sprinkler heads.

.10 Remove sprinkler heads which have been painted and replace with new sprinkler heads.

.11 Provide primed surfaces with following:

.1 Piping in Finished Areas:

.1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.

.2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.

.3 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6m intervals throughout piping systems.

3.11 CLEANING

.1 Clean interior and exterior of all systems including strainers.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems

3.12 DISINFECTION

.1 Disinfect new piping and existing piping.

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

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

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

3.13 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1.

.1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.

.2 Test, inspect, and approve piping before covering or concealing.

.3 Preliminary Tests:

.1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.

.2 Flush piping with potable water in accordance with NFPA 13.

.3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.

.4 Test alarms and other devices.

.5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.

.4 Formal Tests and Inspections:

.1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.

.2 Submit written request for formal inspection at least 15 days prior to inspection date.

.3 Repeat required tests as directed.

.4 Correct defects and make additional tests until systems comply with contract requirements.

.5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.

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

3.14 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 Pumps

.2 Alarm on valves

.3 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.

.4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.5 Where specified elsewhere in Division 21, manufacturers to provide demonstrations and instructions.

.6 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

.7 Instruction duration time requirements as specified in appropriate sections.

.8 Departmental Representative will record these demonstrations on video tape for future reference.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for wet pipe fire protection and sprinkler systems for heated areas.

.2 Related Sections:

.1 Section 21 05 00 – Common Work Results for Fire Suppression

1.2 REFERENCES

.1 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)

.1 ANSI/NFPA 13-2013, Installation of Sprinkler Systems

.2 ANSI/NFPA 25-2011, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN4 S543-M1984, Standard for Internal Lug Quick Connect Couplings for Fire Hose.

1.3 DESIGN REQUIREMENTS

.1 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, by hydraulic calculations for uniform distribution of water over design area.

.2 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.

.3 Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed shop drawings.

.4 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.

.5 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.

.6 Location of Sprinkler Heads:

.1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13 for light, ordinary and extra hazard occupancy.

.2 Uniformly space sprinklers on branch.

.7 Water Distribution:

.1 Make distribution uniform throughout the area in which sprinkler heads will open.

.2 Discharge from individual heads in hydraulically most remote area to be 100 % of specified density.

.8 Density of Application of Water:

.1 Size pipe to provide specified density when system is discharging specified total maximum required flow.

.9 Sprinkler Discharge Area:

.1 Area: hydraulically most remote 141 m2 area as defined in NFPA 13.

.10 Outside Hose Allowances:

.1 Include allowance in hydraulic calculations of 945 lpm for outside hose streams.

.11 Friction Losses:

.1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping, 150 for copper tubing, and 140 for cement-lined ductile-iron piping.

.12 Water Supply:

.1 Perform pump/flow tests required for calculations.

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 21 05 00 – Common Work Results for Fire Suppression.

.2 Shop Drawings & Samples:

.1 Submit shop drawings and samples in accordance with Section 21 05 00 – Common Work Results for Fire Suppression.

.2 Shop drawings to be stamped by a professional engineer licensed to practice in the province of New Brunswick.

.3 Quality assurance submittals: submit following in accordance with Section 21 05 00 – Common Work Results for Fire Suppression.

.4 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 21 05 00 – Common Work Results for Fire Suppression.

Part 2 Products

2.1 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Section 21 05 00 – Common Work Results for Fire Suppression

2.2 PRIOR APPROVAL OF PRODUCTS

.1 Manufacturers products that are not named in the specifications must receive approval from Departmental Representative prior to the tender closing date.

2.3 ABOVE GROUND PIPING SYSTEMS

.1 Provide fittings for changes in direction of piping and for connections.

.1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.

.2 Perform welding in shop; field welding will not be permitted.

.3 Conceal piping in areas with suspended ceiling.

2.4 PIPE, FITTINGS AND VALVES

.1 Pipe:

.1 Ferrous: to ANSI/NFPA 13.

.2 Copper tube: to ANSI/NFPA 13.

.2 Fittings and joints to ANSI/NFPA 13:

.1 Ferrous: screwed, welded, flanged or roll grooved.

.1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.

.2 Copper tube: screwed, soldered, brazed.

.3 Provide threaded or grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.

.4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.

.5 Rubber gasketted grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.

.6 Fittings: ULC approved for use in wet pipe sprinkler systems.

.7 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.

.8 Side outlet tees using rubber gasketted fittings are not permitted.

.9 Sprinkler pipe and fittings: metal.

.3 Valves:

.1 ULC listed for fire protection service.

.2 Gate valves: open by counter clockwise rotation.

.3 Provide rising stem or OS & Y valve beneath each alarm valve in each riser when more than one alarm valve is supplied from same water supply pipe.

.4 Check valves: flanged clear opening swing-check type with flanged inspection and access cover plate for sizes 100 mm and larger.

.5 Provide gate valve in piping protecting electrical room.

.4 Pipe hangers:

.1 ULC listed for fire protection services in accordance with NFPA.

2.5 SPRINKLER HEADS

.1 General: to ANSI/NFPA 13 and ULC listed for fire services.

.2 All sprinklers shall be manufactured by one manufacturer

.3 Sprinkler Head Type:

.1 Type A: Upright, Quick Response, Standard Coverage such as Tyco Series TY-FRB with K value = 5.6.

.2 Type B: Recessed Pendant, Quick Response, Standard Coverage such as Tyco Series TY-FRB with K value = 5.6.

.3 Type C: Recessed Pendant, Quick Response, Extended Coverage such as Tyco Series EC-5 with K value = 5.6.

.4 Type D: Horizontal Sidewall, Quick Response, Standard Coverage such as Tyco Series TY-FRB with K value = 5.6.

.5 Type E: Concealed Recessed Pendant, Quick Response, Standard Coverage such as Tyco Series RFII with K value = 5.6.

.6 Acceptable alternates: Reliable, Grinnell, Victaulic and Viking or approved equal.

.4 Provide nominal 1.2 cm orifice sprinkler heads.

.1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application.

.2 Provide polished stainless steel ceiling plates or chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings.

.3 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.

.4 Provide sprinkler heads as indicated.

.5 Deflector: not more than 75 mm below suspended ceilings.

.6 Ceiling plates: not more than 25 mm deep.

.7 Ceiling cups: not permitted.

2.6 ESCUTCHEON PLATES

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

.2 Provide polished stainless steel plates in finished spaces.

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

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install, inspect and test to acceptance in accordance with ANSI/NFPA 13 and ANSI/NFPA 25.

3.3 PIPE INSTALLATION

.1 Install piping in accordance with Section 21 05 00 – Common Work Results for Fire Suppression.

3.4 DISINFECTION

.1 Disinfect piping in accordance with Section 21 05 00 – Common Work Results for Fire Suppression.

3.5 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS

.1 Notify Contracting Officer in writing at least 15 days prior to connection date.

.2 Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure.

.3 Bolt sleeves around main piping.

.4 Bolt valve to branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service.

.5 Furnish materials required to make connections into existing water supply systems, and perform excavating, backfilling, and other incidental labour as required.

3.6 FIELD PAINTING

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

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

.3 Clean surfaces to remove dust, dirt, rust, and loose mill scale.

.4 Immediately after cleaning, provide metal surfaces with 1 coat of pretreatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.

.5 Shield sprinkler heads with protective covering while painting is in progress.

.6 Upon completion of painting, remove protective covering from sprinkler heads.

.7 Remove sprinkler heads which have been painted and replace with new sprinkler heads.

.8 Provide primed surfaces with following:

.1 Piping in Finished Areas:

.1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.

.2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.

.3 Provide piping with self-adhering red plastic bands spaced at maximum of 6 m intervals throughout piping systems.

.2 Piping in Unfinished Areas:

.1 Provide primed surfaces with one coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

.2 Provide piping with self-adhering red plastic bands spaced at maximum of 6 m intervals.

3.7 FIELD QUALITY CONTROL

.1 Site tests and inspection in accordance with Section 21 05 00 – Common Work Results for Fire Suppression.

END OF SECTION