Part 1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Division 01 – General Requirements.

.2 Shop drawings; submit drawings stamped and signed by a professional engineer registered or licensed in the Province of New Brunswick.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop drawings and product data 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 current model production.
- .5 Certification of compliance to applicable codes.

.5 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.6 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
- .3 Operation data to include:
  - .1 Control schematics for systems including environmental controls.
  - .2 Description of systems and their controls.
  - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
  - .4 Operation instruction for systems and components.
  - .5 Description of actions to be taken in event of equipment failure.
  - .6 Valves schedule and flow diagram.
- .4 Maintenance data to 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.
- .5 Performance data to include:
  - .1 Equipment manufacturer’s performance datasheets with point of operation as left after commissioning is complete.
  - .2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93 – Testing, Adjusting and Balancing for HVAC.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental Representative.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information daily to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.9 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Departmental Representative for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 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.

1.3 EQUIPMENT INSTALLATION

.1 In accordance with Manufacturer’s instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

1.4 CLEARANCES

.1 Provide space for disassembly, removal of equipment and components as recommended by Manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment or components.

1.5 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 FIRESTOPPING

.1 All fire stopping work is to be performed by individual sub-trades as per Section 07 84 00 – Firestopping.

.2 All Sub-Contractors shall coordinate all fire rated assembly penetrations with General Contractor.

.3 Sub-Contractor shall provide required clearances between outside surface of pipe and inside surface of sleeve, core drilled hole or listed fire rated system.

1.8 TESTS

.1 Give 48 hours written notice of date for all tests.

.2 Insulate or conceal work only after testing and approval by Departmental Representative and Commissioning Agent.

.3 Conduct tests in presence of Departmental Representative and Commissioning Agent and local authority having jurisdiction where applicable.

.4 Bear costs including retesting and making good.

.5 Equipment: test as specified in relevant sections and Commissioning Sections.

.6 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.9 INTERPRETATION OF PLANS AND SPECIFICATIONS

.1 These specifications are to be considered as an integral part of the plans which accompany them and neither the plans not 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 by this Contractor.

.2 Misinterpretation of the plans or specifications shall not relieve this Contractor of responsibility; final interpretation of details and clauses remains with the Departmental Representative.

.3 Where uncertainty exists in the passing of pipes and location of equipment, the General Contractor and or project manager shall be consulted before work is started. Where such materials and equipment have been installed so as to cause interference with the inside treatment of the building, they shall be removed and relocated without additional cost to the Departmental Representative.

.4 The plans do not necessarily show all valves, duct offsets, access panels, connections, balancing fittings, bases, isolators, flexible connections, drains, etc., and this Contractor shall not avail himself of these obvious omissions, but shall install the work complete in essential details so that it will function properly, can be easily balanced and so that repairs and removal of equipment can easily be made.

.5 Building dimensions shall not be scaled from the Mechanical plans but shall be obtained from on-site dimensions of the building. Any discrepancy between the drawings and the building shall be questioned before proceeding with any installation.

1.10 CO-OPERATION OF CONTRACTORS

.1 This Contractor shall become familiar with the work of other contractors and in laying out and installing the work shall co-operate with the other Contractors, so as to facilitate the progress of the work as a whole and avoid interference or delays. Where interference exists, this Contractor shall notify the General Contractor and/or project manager and the Departmental Representative before installing the work. Any changes in the work or alterations of the Mechanical Contractor's schedule of procedure required for such co-operation will not be considered as a claim for extra compensation.

.2 Due to the complexities of many sub-trades, and the restrictive space available in this project, it is required that all trades co-operate closely so as to install all systems in their allotted locations as indicated on the drawings, or coordination on site.

.3 The drawings are not intended to show all elbows, fittings and offsets required to perform the installation of the work where indicated on drawings. Contractor shall coordinate with all other trades and General Contractor on site. It is the responsibility of the Contractor to review site conditions prior to execution of work. Where services are shown to cross other building services, Contractor shall coordinate with other trades and determine best routing on-site prior to execution of work.

.4 The Contractor shall review all Structural, Mechanical, Electrical and Architectural drawings to determine possible conflicts.

.5 Contractor shall coordinate location of all hangers and seismic bracing systems as to avoid interference with other trades.

.6 No extras will be allowed for lack of coordination or if additional fittings are required to perform the work as shown on the drawings.

1.11 ERRORS AND OMISSIONS

.1 The drawings are not intended to show every item of accessory equipment, but the Contractor shall tender on and install all essential details to provide for efficiency of operation and ease of maintenance.

.2 Should this Contractor discover errors or discrepancies in the plans or specification, he shall refer the matter to the Departmental Representative for change or clarification and shall not proceed with that portion of the work until advised by the Departmental Representative to do so.

Part 2 Products

2.1 MATERIALS

.1 Choose products and materials with recycled content or resource efficient characteristics whenever possible. Use least toxic sealants, adhesives, sealers and finishes necessary to comply with the requirements of the project.

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 The Environmental Choice guideline CCD-047a, CCD-047b, CCD-047c, CCD-048 and the Master Painters Institute list of Green Approved Products provides acceptable standards for products that provide reduced environmental impacts.

.2 Low VOC paints are preferable.

.3 Prime and touch up marred finished paintwork to match original.

.4 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

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

.2 Manufacturer's Field Services:

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

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 DEMONSTRATION

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

.2 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.

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

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

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

3.5 PROTECTION

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

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 Division 01 – General Requirements.

.2 Division 21 – Common Work Results for Mechanical.

1.2 REFERENCES

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

.1 ANSI/NFPA 13-2002, Installation of Sprinkler Systems.

.2 ANSI/NFPA 25-2002, 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).

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 ordinary and light hazard occupancy as required by NFPA spacing.

.2 Uniformly space sprinklers on branch.

.7 Water Distribution:

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

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Division 01 – General Requirements.

.1 Submit required copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Division 01 – General Requirements.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Division 01 – General Requirements.

.1 Shop drawings: submit drawings stamped and signed by Professional Engineer registered or licensed in Province of New Brunswick, Canada.

.2 Indicate:

.1 Materials.

.2 Finishes.

.3 Method of anchorage

.4 Number of anchors.

.5 Supports.

.6 Reinforcement.

.7 Assembly details.

.8 Accessories.

.3 Quality assurance submittals: submit following in accordance with Division 01 – General Requirements:

.1 Test reports:

.1 Submit certified test reports for wet pipe fire protection sprinkler systems.

.2 Instructions: submit manufacturer's installation instructions.

.4 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual in accordance with ANSI/NFPA 20 and Division 01 – General Requirements.

.2 Manufacturer's Catalogue 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 Pressure or flow switch.

.6 Mechanical couplings.

.7 Seismic Restraints (if required).

.3 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, pipe, and fittings.

.4 Field Test Reports:

.1 Preliminary tests on piping system.

.5 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 with title block similar to full size contract drawings.

.6 Operation and Maintenance Manuals:

.1 Provide maintenance data for incorporation into manual in accordance with Division 01 – General Requirements.

.2 Contractors Material and Test Certificate for aboveground piping and other documentation for incorporation into manual Division 01 – General Requirements in accordance with ANSI/NFPA 13.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in wet sprinkler systems with documented experience of 20 years minimum.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Division 01 – General Requirements.

1.6 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Division 01 – General Requirements.

.2 Provide spare sprinklers and tools as required by ANSI/NFPA 13.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Division 01 – General Requirements.

.2 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.

.3 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Division 01 – General Requirements.

1.8 FEES

.1 Fire Protection Contractor shall pay for all fees for testing, site inspections and drawing reviews by local authorities having jurisdiction. Contractor to be advised that new fee structure will be implemented by the Department of Public Safety, Technical Inspection Services on April 1, 2009.

1.9 DRAWINGS INTERPRETATION

.1 The Fire Protection piping layout is a suggested layout and is intended to be used for tender purposes only. Contractor will have leeway to modify the proposed layout to best suit site conditions.

.2 No extras will be allowed for additional fittings or increased branch pipe sizes due to increased number of fittings required to perform the work as shown on the drawings.

.3 Contractor shall not reduce pipe sizes shown on the drawings.

1.10 COORDINATION

.1 Fire Protection Contractor shall coordinate work with other trades and General Contractor as restrictive site conditions are present on site. No extras will be considered due to lack of on-site coordination.

.2 Fire Protection Contractor shall verify actual site conditions and other trades work prior to fabrication of system. Contractor shall not fabricate system based solely on proposed drawing layout.

Part 2 Products

2.1 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Division 01 – General Requirements.

2.2 ABOVE GROUND PIPING SYSTEMS

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

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

.2 Conceal piping in areas with suspended ceiling.

.3 Coordinate location of sprinkler piping with General Contractor and other trades prior to site take-offs and production.

2.3 PIPES AND FITTINGS

.1 Pipe: only made in USA or Canada pipe will be accepted. No overseas or South American piping will be allowed:

.1 Wet pipe system: to ANSI/NFPA 13. Black steel piping for all wet systems. Schedule 10 for pipe 65 mm and greater. Schedule 40 for pipe 50 mm and smaller.

.2 Dry pipe system: to ANSI/NFPA 13. Galvanized steel piping for all dry systems. Schedule 10 for pipe 65 mm and greater. Schedule 40 for pipe 50 mm and smaller.

.2 Fittings and joints to ANSI/NFPA 13:

.1 Pipe up to and including NPS 2 shall be scheduled 40 threaded connections. Pipe NPS 2 ½ and over shall be schedule 10 with roll groove connections.

No offshore pipe will be approved. All pipe shall be marked as to brand, schedule, date and ASTM number.

.1 Standard of Acceptance: Wheatland, Steelpipe and AMS Tube.

.2 Fittings: 1200 kPa working pressure.

.1 Cast iron screwed to ANSI B16.4 – Latest Edition, 860 kPa.

.2 Malleable iron, screwed to ANSI B16.3 – Latest Edition, 860 kPa.

.3 Cast iron flanged to ANSI B16.1 – Latest Edition, 1000 kPa.

.4 Mechanical groove coupling to ANSI B31.3 – Latest Edition, 1200 kPa.

.5 Mitred fittings are unacceptable.

.3 Flange Bolts: square or hex head bolts with heavy hex nuts to ASTM A307-82a.

.4 Flange Gaskets: 1.6 mm thick plain or cloth inserted red rubber to ANSI B16.20 – Latest Edition and ANSI B16.21 – Latest Edition.

.5 All roll grooved fittings to be ULC listed for fire protection service and be of one manufacturer. All couplings to be designed with an angle bolt pad to provide a rigid joint. Acceptable Material: Victaulic Fire Lock 005.

.6 Where galvanized piping is installed, galvanized fittings to be installed c/w flush seat gaskets.

.3 Pipe hangers:

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

2.4 SPRINKLER HEADS

.1 To NFPA 13 and ULC listed for fire services, match existing sprinkler heads.

.2 Sprinkler Head Type A: Recessed pendant sprinkler head, quick response, glass bulb, 12.7 mm orifice size, 80.8 LPM/bar ½ (5.6 GPM/psi ½) k factor, 74°C temperature rating, 15 mm (1/2") N.P.T. thread size. Chrome finish c/w two piece chrome escutcheon cup. Acceptable Manufacturer and Model: Match existing.

2.5 ESCUTCHEON PLATES

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

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

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

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 INSPECTION

.1 Do not recess, paint or conceal piping, accessories or work prior to inspection and approval by authorities having jurisdiction or authorized representative.

.2 Contractor shall provide quarterly inspections services as per NFPA 25 in Contract for first year of operation.

3.4 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.

.5 Install systems in accordance with Manufacturer’s recommendations and ANSI/NFPA 13. Contractor’s Foreman shall hold a current bronze provincial sprinkler installation certificate.

.6 Allow for expansion and contraction when installing pipe hangars.

.7 Discharge drains to safe location outside building, allowing at least 1.2 m past drain valve in interior of building to visible point of free discharge at catch drain.

.8 Install signs required by local Fire Department for all fire protection devices including valves.

.9 Secure outdoor signs with stainless steel bolts.

.10 Install horizontal valves with stems upright where space allows.

.11 Install low point drains on all trapped sections of piping c/w pipe plug and valves. Where piping contains more than 20 litres of water low point drains are to be piped to a floor drain, sump pump or the exterior.

.12 Inspect and pressurize system with air and test to acceptance in accordance with ANSI/NFPA 13.

.13 Testing to be witnessed by authority having jurisdiction. Pipe shall be inspected on site for compliance to specification and ASTM standard.

.14 Install permanently attached nameplate located at the base of the riser that gives the system maximum demand.

.15 All sleeves, fire stopping and piping identification of fire protection system shall be the responsibility of this Contractor. Refer to Section 23 05 53 01 – Mechanical Identification.

3.5 FIELD QUALITY CONTROL

.1 Site Test, Inspection:

- .1 Perform test to determine compliance with specified requirements in presence of Departmental Representative, Engineer and local authority having jurisdiction.
- .2 Test, inspect, and approve piping before covering or concealing.
- .3 Preliminary Tests:
  - .1 Air test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.
  - .2 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.
- .4 Formal Tests and Inspections:
  - .1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.
  - .2 Submit written request for formal inspection at least 15 days prior to inspection date.
  - .3 Repeat required tests as directed.
  - .4 Correct defects and make additional tests until systems comply with contract requirements.
  - .5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.
  - .6 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.

.2 Verification requirements in accordance with Division 01 – General Requirements:

3.6 CLEANING

.1 Proceed in accordance with Division 01 – General Requirements.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION