1 General

1.1 RELATED SECTIONS

.1 Section 01 10 00 - Summary.

1.2 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop drawings; submit drawings stamped and signed by professional engineer registered or licensed in Province of Prince Edward Island, Canada.

.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 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, Consultant 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 component.
  - .5 Description of actions to be taken in event of equipment failure.
  - .6 Valves schedule and flow diagram.
  - .7 Colour coding chart.
- .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.
- .6 Approvals:
  - .1 Submit 1 copy of draft Operation and Maintenance Manual to Consultant for approval 4 weeks prior to Substantial Completion. Submission of individual data will not be accepted unless directed by Consultant.
  - .2 Make changes as required and re-submit as directed by Consultant.
- .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 Provide sets of white prints as required for each phase of work. 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 weekly 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, 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 Consultant for approval and make corrections as directed.

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

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

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

1.3 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 - Health, Safety and Emergency Response Procedures.

1.4 MAINTENANCE

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

.1 One glass for each gauge glass.

.2 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.3 One trap per 10 trap used each size.

.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.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Section 01 74 19 - Construction Waste Management Disposal.

1.6 DEFICIENCY LIST

.1 Lists of work deficiencies will be issued at anytime. Rectify immediately work to satisfaction of Consultant.

.2 Submit requests for takeover inspection in writing.

1.7 SITE SERVICES

.1 Known Services:

.1 Drawings indicate known existing facilities.

.2 Locate all known services prior to initiating work.

.3 Consult with and follow Engineer's written instructions before commencing work.

.4 Once location has been set out, assume responsibility for all damage during installation. Bear cost of repairs and replacements made necessary.

.2 Unknown Services:

.1 Locate all services whose exact location is not known.

.2 Avoid damaging or displacing existing services where exact position is not known. Should any damage occur, advise Engineer in writing for remedial instructions.

1.8 CO-ORDINATION

.1 Locate distribution systems, equipment and materials to provide minimum interference and maximum usable space.

.2 Where interference occurs, Consultant shall approve location of equipment and materials regardless of installation sequence.

1.9 REGULATIONS

.1 Comply with most stringent requirements of NBC, Provincial and Municipal regulations and by-laws, specified standards, codes and these specifications and plans. Practices contained in these standards or standards suggested or recommended by referenced organizations, are to be taken as minimum requirements.

.2 Furnish certificates confirming work installed conforms to requirements of authorities having jurisdiction.

1.10 DRAWINGS

.1 Drawings:

.1 Are not intended to show structural details or architectural features.

.2 Are not to be scaled.

.3 Except where dimensioned, the drawings indicate general mechanical layouts only.

.2 Provide field drawings to indicate relative position of various services when required by Consultant. Obtain Consultant's approval before commencing work.

.3 As-Built (Record) Drawings:

.1 Maintain as specified in Section 01 78 00 - Closeout Submittals.

1.11 EQUIPMENT LIST

.1 Submit list of manufacturers named within seven (7) days after award of the contract. Do not order equipment until list is approved.

1.12 ENERGY CONSUMPTION

.1 Consultant may reject equipment submitted for approval on basis of performance or energy consumed or demanded.

1.13 APPROVAL OF EQUIPMENT

.1 When equipment list has been reviewed by Consultant, conform to Section 01 33 00 - Submittal Procedures for items shown on equipment list and all other materials and equipment necessary to complete requirements of mechanical systems. This includes equipment named under Standard of Acceptance.

1.14 BREAKDOWN OF COSTS

.1 Price will be broken down at tender time as required by depository instructions.

.2 Immediately upon notice of contract award, further break down tender price as per Par. 1.34.

1.15 APPROVED EQUALS

.1 Submission for an Approved Equal is to contain literature and descriptive information with full specification data. Where the requested item is contained on a printed document with other items, it is to be clearly identified.

.2 The Consultant will not search catalogs, e-mails or websites or contact suppliers to obtain the necessary information for proper evaluation.

.3 Submission by Bidders for evaluation of products requested to be considered as equal must be submitted to Consultant no less than 5 working days prior to closing of tenders. No consideration will be given to approving equals after the close of tenders, except when the specified product is found to have been discontinued by the manufacturer.

.4 The consideration of a product(s) for Approved Equal status and the acceptance of individual products as approved equals is entirely at the discretion of the Consultant.

.5 When products are given Approved Equal status these products may, at the discretion of bidders, be carried in their tender price, provided that ALL costs related to changes to the contract work required to incorporate the Approved Equal product are included in the tender price.

.6 The acceptance of a product by the Consultant as an "Approved Equal," even where not specifically indicated on the Approved Equals listing in the Addendum, is to be understood as being contingent upon the provision of the particular series, model and/or type, complete with all options to meet the specified requirements of the Acceptable Material product.

.7 Products given approved status that are found, during construction period, to not have all specified options available, or to have discontinued production of same, or to have made other design changes since the time of approval, will not be accepted for use on this project, except when financial compensation has been mutually agreed upon between the Contractor and the Owner and deemed acceptable by the Consultant. Compensation will not be paid to the Contractor for products acknowledged by the Consultant to be superior to the specified products.

1.16 AS INDICATED

.1 Means that the item or items specified are shown or noted on the drawings.

1.17 EQUIPMENT REQUIREMENTS & INSTALLATION

.1 Permit equipment maintenance and disassembly by use of unions or flanges to minimize disturbance to connecting piping without interference from building structure or other equipment.

.2 Provide accessible means for lubricating equipment including permanent lubricated "lifetime" bearings.

.3 Mount base mounted equipment on chamfered edge housekeeping pads a minimum of 100mm high and 50mm larger than equipment dimension all around. Pads provided by this Contractor. Co-ordinate sizes with equipment provider.

.4 Pipe drain lines to drains in a manner to avoid disruption of surrounding space.

.5 Line-up equipment, rectangular cleanouts and similar items with building walls wherever possible.

.6 Contractor to provide metal caps and counter flashing for all roof penetrations provided under this section. Installation by this Contractor. This Contractor responsible for all membrane flashing.

1.18 RESPONSIBILITY FOR TEMPORARY TRIAL USAGE

.1 Protect work against damage or loss until accepted by the Consultant.

.2 Obtain written permission to start and test permanent equipment and systems prior to acceptance by Consultant.

.3 Consultant may use equipment and systems for test purposes prior to acceptance. Supply labour, material and instruments required for testing.

.4 See Division 21 for temporary usage. Guarantee period and commencement date shall not be affected.

.5 Clean and renew equipment and system used prior to acceptance. Restore to original, new and full working condition.

.6 Temporary usage includes steam blow.

1.19 ANCHOR BOLTS & TEMPLATES

.1 Supplied and installed by Contractor responsible.

1.20 PROTECTION OF OPENINGS

.1 Protect equipment, system openings including rough-in plumbing from dirt, dust and other foreign materials with materials compatible to the system.

1.21 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Electric equipment shall bear CSA label.

.2 Conform to requirements of Canadian Electrical Code, Local Provincial and Municipal Authorities and specified standards.

.3 Division 21, 22 and 23 responsible for their respective conduit, wiring and connections below 50 V which are related to control systems specified in Division 15 and shown on mechanical drawings. Refer to Electrical section for quality of materials and workmanship for wiring and conduit.

.4 Motors.

.1 Provide motors for mechanical equipment.

.2 If delivery of specified motor will delay delivery or installation of any equipment, install a motor for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

.5 Motors under 372 W: Speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 115V or 208V, unless otherwise specified.

.6 Motors 372 W and larger: EEMAC Class B, squirrel cage induction, continuous duty, drip proof, ball bearing, maximum temperature rise 40EC, three phase, 208V in building, unless otherwise specified.

.7 Provide motors, low voltage 50 V and less, wiring from transformers, and temperature pressure, humidity control devices.

.8 Furnish composite wiring diagrams with remote interlocks for control systems, including performance and sequence of operation description of mechanical systems. Submit for approval by Consultant.

1.22 SLEEVES

.1 Provide pipe sleeves at points where pipes pass through masonry or concrete walls or floors.

.2 Provide acoustical pipe penetration seals where pipes pass through equipment room walls or floors.

.1 Seals to consist of two bolted pipe halves with minimum 19mm neoprene sponge bonded to inner face.

.2 Seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping.

.3 Use cast iron or steel pipe sleeves with annular fin continuously welded at midpoint:
  .1 Through foundation walls.
  .2 Where sleeve extends above finished floor.
.4 Sizes:
  .1 Provide 6mm clearance all around, between sleeve and pipes or between sleeve and insulation.
  .2 Where piping passes below footings, provide minimum clearance of 50mm between sleeve and pipe. Backfill up to underside of footing with concrete of same strength as footing.
.5 Terminate sleeves flush with surface of concrete and masonry and 50mm above floors in mechanical or fan rooms or rooms susceptible to leaks. Not applicable to concrete floors on grade.
.6 For pipes passing through roofs, use cast iron sleeves with caulking recess and flashing clamp device. Provide flashing and counter flashing as necessary for installation by Division 21, 22 or 23 contractor responsible. Anchor sleeves in roof construction; caulk between sleeve recess and pipe; fasten roof flashing to clamp device; make water-tight durable joint.
.7 Fill voids around pipes. Remove plastic sleeves.
  .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof pre-retardant non-hardening mastic.
  .2 Where sleeves pass through walls or floors, caulk space between insulation and sleeve or between pipe and sleeve with waterproof fire retardant non-hardening mastic. Seal space at each end also with same.
  .3 Ensure no contact between copper tube or pipe and ferrous sleeve.
  .4 Fill future-use sleeves with lime plaster.
  .5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M + Amdt - Mar-78.
.8 Temporarily plug all openings during construction.

1.23 ESCUTCHEONS AND PLATES

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

1.24 TESTS

.1 Provide the following supplementary requirements to tests specified:
  .1 Give written 24 hours notice of date when tests will be made.
  .2 Do not insulate or conceal work until tested and approved. Follow construction schedule and arrange for tests.
  .3 Conduct tests in presence of Engineer.
  .4 Bear costs including retesting and making good.
  .5 Pipe pressure:
    .1 Hydraulically test all water supply and steam supply systems at 12 times system operating pressure or minimum 860 kPa.
    .2 Maintain test pressures without loss for 4 hours unless otherwise specified.

.3 Test drainage, waste and vent piping to code.

.4 Prior to test isolate all equipment or other parts which are incomplete or not designed to withstand test pressures.

.5 All piping of the drainage and venting systems shall be tested by means of filling the system with water after all outlets have been plugged. All joints shall be checked and the water level must hold without dropping for a period of one hour before the work is to be backfilled or otherwise built-in. Sections of the system may be tested separately provided they are at least 3000mm high and include at least 1500mm of the section below, where applicable. Any leaks observed must be corrected by additional caulking of joints or if necessary by removal of any section of pipe required.

.6 Testing shall be done before pipe covering is installed. Leaks must be located, corrected and test reapplied before acceptance of building.

.7 Provide test certification for all tests signed by Engineer or designated representative.

1.25 PAINTING

.1 Apply at least one coat of corrosion resistant primer paint to supports, and equipment fabricated from ferrous metals.

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

1.26 SPECIAL TOOLS AND SPARE PARTS

.1 Furnish spare parts as follows:

.1 One set of mechanical seals for pump.

.2 One casing joint gasket for pump.

.3 One set of gaskets for each heat exchanger.

.4 One glass for each gauge glass installed.

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

.3 Provide one set of special tools required to service equipment as recommended by manufacturers.

.4 Furnish one grease gun and adapters to suit different types of grease and grease fittings complete with 2 tubes of each kind of grease.

1.27 ACCESS DOORS

.1 This section to supply access doors for furred ceilings 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. Provide ULC rated doors in fire rated construction. Installation by General Contractor.

.2 Access doors shall be flush mounted with integral drywall bead, sized 600 x 600 mm for body entry 300 x 300 mm for hand entry, or as noted on the drawings. Doors shall open 180 degrees have rounded safety corners, concealed hinges, screwdriver latches and anchor straps. Steel shall be prime coated. Doors shall be of approved manufacturer with published literature.

.3 Provide stainless steel access doors for tiled, marble or terrazzo surfaces or special surfaces, including all surfaces in the pool area.

.4 Provide cam type locking device with hand or key lock when located in public corridors and washrooms complete with master keys.

.5 Standard of Acceptance: Williams #WB-DW, Acudor #DW-5040, MIFAB #MDW.

1.28 DIELECTRIC COUPLINGS

.1 Provide wherever pipes of dissimilar metals are jointed.

.2 Provide insulating unions for pipe sizes NPS 2 and under and insulating flanges for pipe

sizes over NPS 2.

.3 Cast brass adapters may be used where approved by Engineer.

.4 Provide felt or rubber gaskets to prevent dissimilar metals contact.

1.29 DRAIN VALVES

.1 Minimum NPS 19mm unless otherwise specified: straight pattern bronze with hose end male thread and complete with cap and chain.

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

.3 Acceptable Product: Dahl

1.30 INSTRUCTION OF OPERATING STAFF

.1 Provide certified personnel to instruct operating staff on operation of mechanical equipment. Provide maintenance specialist personnel to instruct operating staff on maintenance and adjustment of mechanical equipment and any changes or modification in equipment made under terms of guarantee.

.2 Provide instruction during regular work hours prior to acceptance and turn-over to operating staff for regular operation.

.3 Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn one manual over to Owner and the balance to Engineer.

.4 This Contractor to ensure mechanical systems are complete and fully operational as per the requirements of these documents and the applicable codes. Premature failure of any mechanical system(s) and/or related accessories deemed to be the result of poor workmanship shall be the financial responsibility of the Contractor responsible.

1.31 CLEANING AND FINAL ADJUSTMENT

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

.2 Clean and refurbish all equipment and leave in first class operating condition including replacement of all filters in all piping systems.

.3 Balance and adjust all systems and each piece of equipment to operate efficiently.

1.32 CUTTING & PATCHING

.1 All cutting and patching required to properly accommodate the work of this Division shall be the financial responsibility of respective Division 21, 22 or 23 and carried out by trades to the applicable Specifications provided in this document.

1.33 FIRESTOPPING AND SMOKE SEALS

.1 All firestopping and smoke seals required to properly accommodate the work of this Division shall be the financial responsibility of the respective Division 21, 22 or 23 and carried out by trades to the applicable Specifications provided in this document.

.2 Work must be performed by a company with experience in the application of firestopping and smoke seals to ULC requirements.

1.34 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate waste material and place in on site bin in accordance with Waste Management Plan.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 REPAIRS/ RESTORATION

.1 To Section 09 91 00 - Painting.

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

.3 Restore to new condition, finishes which have been damaged extensively for priming and touch-up.

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

- .1 Radiographic testing.
- .2 Pressure test.

.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 Consultant 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 Steam and condensate lines and appurtenance.

.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 Where specified elsewhere in Division 22 or 23 manufacturers to provide demonstrations and instructions.

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

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

.7 Consultant 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

1 General

1.1 REFERENCE STANDARDS

.1 Conform to the following except where specified elsewhere:
  .1 National Building Code of Canada 2010 Edition.
.2 NFPA 13 - Installation of Sprinkler Systems - 2014 Edition.
.3 NFPA 25 - Inspection, Testing and Maintenance of Water Based Fire Protection Systems - 2014 Edition.
.4 Section 21 05 01 Common Work Results - Mechanical shall apply as if repeated here.
.5 NFPA 14-2016 - Installation of Standpipe and Hose Systems.

1.2 SHOP DRAWINGS

.1 Submit shop drawings & calculations in accordance with Section 01 33 00 - Submittal Procedures, working plans on computerized CADD file using AutoCAD and design requirements. Drawing standards to be the same as project drawings.
.2 Shop drawings to be submitted for preliminary review prior to submitting to approving authorities.
.3 Shop drawings shall be stamped and signed by a professional engineer registered and licensed in the Province of Prince Edward Island.

1.3 GENERAL REQUIREMENTS

.1 Work covered by this Section to include renovation of the existing wet sprinkler system, all materials, labour, equipment, working plans, field testing for building and services necessary for or incidental to the design, supply, installation and completion of wet pipe automatic sprinkler system in all renovation areas noted. Work to be coordinated with construction schedule. All bidders are responsible for determining exact site requirements and the extent of work required to maintain fire protection in accordance with NFPA 13.
.2 Quality Assurances: Execute work of this Section by skilled tradesmen only, employed by qualified Fire Protection Contractor in the province regularly engaged in the installation of automatic sprinkler systems and other fire protection equipment.
.3 Systems to include:
  .1 Modifications and additions to the existing wet system as required to suit the revised floor plans and construction to meet the requirements of NFPA 13.
  .2 Auxiliary drain connections as required.
  .3 Sprinkler types as noted.

1.4 ENGINEERING DESIGN CRITERIA

.1 Design modifications to the existing automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, including hydraulic calculations for uniform distribution of water over design area, where required by the Authorities Having Jurisdiction. Occupancy hazard shall be as required by NFPA 13.
.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.
- .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 required in NFPA 13.

.8 Density of Application of Water:
- .1 Size pipe to provide specified density when system is discharging specified total maximum required flow.
- .2 Application to horizontal surfaces below sprinklers shall be as required for NFPA 13.

.9 Sprinkler Discharge Area:
- .1 Area: hydraulically most remote m² area as defined in NFPA 13.

.10 Outside Hose Allowances:
- .1 Include allowance in hydraulic calculations of outside hose streams per NFPA.

.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 Use existing sprinkler information available on site to determine basis of design in accordance with NFPA 13.

.13 Show the following in the drawings submitted to the Owner's Representative for approval.
- .1 Show the layout and size of all piping and equipment from the point of connection to the water supply, to the sprinkler cross mains. The contract drawings must include a detailed sprinkler riser diagram. Water velocity in the piping should not exceed 6 m/s (20 ft/s).

1.5 OPERATIONS

.1 For Systems: indicate on building central fire alarm system panel.

1.6 CERTIFICATES

.1 Provide written certificate that components are compatible, and where applicable, certified for intended use in accordance with requirements of approving authorities.

1.7 MAINTENANCE DATA

.1 Provide maintenance data in English and French for sprinkler equipment for incorporation into operation and maintenance manual specified in Section 01 78 00 - Closeout Submittals.

1.8 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide spare sprinklers in accordance with NFPA 13 latest edition and these specifications.

2 Products

2.1 PIPE AND FITTINGS

.1 Steel Pipe: Schedule 40 screwed or cut groove couplings.

.2 Fittings: 1206 kPa 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 Mechanical groove - malleable iron to ASTM A-47, ductile iron to ASTM A-536.

.1 Coatings - rust inhibiting lead-free paint (standard colour orange).

.2 Gaskets - elastomeric to ASTM D-2000.

.3 Bolts and nuts - carbon steel to ASTM A-183 minimum 68.95 Mpa tensile strength.

.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 1205 kPa minimum working pressure (water) and of one manufacturer wherever possible throughout this section.

.1 Rising stems, to be repackable under pressure and with malleable iron wheel handles.

.2 Sprinkler valves where required and indicated on drawings, to be equipped with contacts and devices necessary for operation of supervisory system specified under Division 16.

.2 Gate Valves:

.1 NPS 2 and under: Screwed bronze body and trim to ASTM B61 solid wedge, rising stem. Ball valves are acceptable as alternate.

.2 NPS 2 and over: Iron body, bronze mounted, OS&Y solid wedge, flanged or roll grooved ends or butterfly gear operated (up to NPS 6).

.3 Globe Valves:

.1 NPS 2 and under: Bronze body and trim to ASTM B61 (screwed), replaceable composition disc. Ball valves are acceptable as alternate.

.4 Drain Valves:

.1 Angle or globe for 1206 kPa cold water or 362 kPa saturated steam.

2.3 SUPERVISORY AND ALARM SWITCHES

.1 Supervisory Switches:

.1 ULC listed and FM approved, cast aluminum housing with red enamel finish, tamper proof.

.2 Cord type plug in supervisory devices are not acceptable.

.2 Alarm Switches:

.1 ULC listed and FM approved, cast aluminum housing with red enamel finish, tamper proof.

2.4 PIPE HANGERS

.1 Pipe hangers to be in accordance with NFPA 13 and Section 21 05 01.

2.5 SPRINKLER HEADS

.1 General: to NFPA 13, ULC listed and FM approved for fire service.

.2 Sprinkler heads shall be Quick response frangible bulb type.

.3 Temperature ratings of sprinkler heads to be as per NFPA 13.

2.6 SLEEVES AND ESCUTCHEON PLATES

.1 Provide sleeves and escutcheon plates for sprinkler piping systems.

2.7 FINISHES

.1 Finished Areas: Chromeplated valves and fittings.

.2 All piping, fittings, etc. in areas where there is no suspended ceiling to be painted by Division 09.

3 Execution

3.1 INSPECTION

.1 Piping, accessories, etc., not to be recessed, painted, or concealed before it has been inspected and approved.

3.2 INSTALLATION

.1 Install horizontal valves with stems in vertical upright position where spaces allow.

.2 Provide additional pipe hangers to allow for expansion and contraction in sprinkler system.

.3 In areas with suspended ceilings, allow ample clearance between sprinkler piping in ceiling spaces and top of light fixtures for relocation of fixtures under future renovations.

.4 Where applicable, sprinkler heads installed in suspended tile ceilings to be centered in tiles where possible, or a minimum of 150mm from any edge of tile. This section shall be responsible for coordinating the location and layout of the sprinkler system and sprinkler heads with Division 26 and other related sections of Divisions 22, 23 or 25.

.5 Provide chromeplated valves, nozzles, fittings, except in unfinished areas where satin brass finish is acceptable.

.6 Exposed piping passing through floors, ceilings and walls shall be supplied with chromeplated escutcheon plates, unless otherwise approved by Consultant.

.7 Coordinate locations of all holes required for pipes and otherwise meet specified requirements of Section 21 05 01 Common Work Results - Mechanical.

.8 Allow for extra sprinkler heads in Mechanical Rooms, for air handling equipment and large ducts, and in areas where large ducts may be located exposed under ceilings, to maintain adequate coverage.

.9 All pendent sprinklers shall be installed on return bends

3.3 PROTECTION OF COMPLETED WORK

.1 Paint exposed steel pipe and fittings, except special finishes.

.2 Provide red plastic coated wire baskets around sprinkler heads in mechanical, electrical, storage, elevator machine and telephone rooms, around ventilation equipment, under stair landings, in service areas, and other areas that may be requested by authorities having jurisdiction, to protect against possible mechanical injury.

3.4 TESTING

.1 Systems and equipment to be subjected to operational test.

.2 Sprinkler Systems:

.1 Test and certify in accordance with NFPA 25. Test is to be witnessed by representatives of authorities having jurisdiction.

.2 All inspections, examinations, and tests required shall be arranged and paid for by this Section. Deliver Inspection Certificates to the Consultant. Finally, adjust equipment for operation to the satisfaction of approving authorities and Consultant.

.3 Submit all test certificates, reports and letters of approval from authorities at least 14 days prior to requesting certificate of substantial completion.

.3 Testing to be witnessed by Commissioning Agent.

3.5 SYSTEM(S) FLUSHING

.1 Where applicable ensure that sprinkler system and pressure tanks have been flushed thoroughly before making final connections and putting system into operation.

END OF SECTION