

Part 1 General

1.1 SECTION INCLUDES

- .1 Painting of concrete masonry unit wall.
- .2 Painting of structural steel decking.

1.2 REFERENCE STANDARDS

- .1 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .2 Maintenance Repainting Manual - current edition.
- .4 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for paint and coating products and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 30 - Health and Safety Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Provide and maintain dry, temperature controlled, secure storage.
 - .2 Store painting materials and supplies away from heat generating devices.
 - .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.
- .4 Fire Safety Requirements:

- .1 Supply dry chemical Type ABC 9 kg fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers, and materials subject to spontaneous combustion in ULC approved, sealed containers, and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.

1.5 SITE CONDITIONS

- .1 Heating, Ventilation, and Lighting:
 - .1 Co-ordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
 - .2 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity, and Substrate Moisture Content Levels:
 - .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
 - .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
 - .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.
- .3 Additional application requirements:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

Part 2 Products

2.1 MATERIALS

- .1 Supply paint materials for paint systems from single manufacturer.
- .2 Conform to latest MPI requirements for painting work including preparation and priming.
- .3 Materials in accordance with "Approved Product" listing.
 - .1 Use MPI listed materials having E2 or E3 rating.
 - .2 Primer: VOC limit 100 g/L maximum to GS-11.
 - .3 Paint: VOC limit 100 g/L maximum to GS-11.
- .4 Colours:
 - .1 Submit proposed Colour Schedule to Departmental Representative for review.
- .5 Mixing and tinting:
 - .1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations. Obtain written approval from Departmental Representative for tinting of painting materials.
 - .2 Use and add thinner in accordance with paint manufacturer's recommendations.
 - .1 Do not use kerosene or similar organic solvents to thin water-based paints.

- .3 Thin paint for spraying in accordance with paint manufacturer's written recommendations.
- .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.
- .6 Gloss/sheen ratings:
 - .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss Level-Category	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish	Max. 5	Max. 10
Gloss Level 2 - Velvet	Max.10	10 to 35
Gloss Level 3 - Eggshell	10 to 25	10 to 35
Gloss Level 4 - Satin	20 to 35	min. 35
Gloss Level 5 - Semi-Gloss	35 to 70	
Gloss Level 6 - Gloss	70 to 85	
Gloss Level 7 - High Gloss	More than 85	

- .7 Interior painting:
 - .1 Concrete Masonry Units.
 - .1 INT 4.2D – High Performance Architectural Latex finish, gloss level to match existing adjacent walls.
 - .2 Structural Steel Decking.
 - .1 INT 5.1R –High Performance Architectural Latex, Gloss Level 4 Finish.
- .8 Interior re-painting:
 - .1 Concrete Masonry Units.
 - .1 RIN 4.2K – High Performance Architectural Latex finish, gloss level to match existing adjacent walls.
 - .2 Structural Steel Decking.
 - .1 RIN 5.1R – High Performance Architectural Latex, Gloss Level 4 Finish.

Part 3 Execution

3.1 GENERAL

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.
- .2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual and MPI - Maintenance Repainting Manual except where specified otherwise.

3.2 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

3.3 PREPARATION

- .1 Protection of in-place conditions:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
 - .1 Remove electrical cover plates and other surface mounted equipment, fittings, and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-install after painting is completed.
 - .2 Move and cover portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.
 - .4 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual specific requirements and coating manufacturer's recommendations.
 - .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
 - .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

3.4 APPLICATION

- .1 Paint only after prepared surfaces have been accepted by Departmental Representative.
- .2 Use method of application approved by Departmental Representative.
 - .1 Conform to manufacturer's application recommendations.
- .3 Apply coats of paint in continuous film of uniform thickness.
 - .1 Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 MINIMUM STANDARDS

- .1 Conform to the following standards:
 - .1 FC 403(M)-1985, Sprinkler Systems.
 - .2 NFPA 10-2007, Standard for Portable Fire Extinguishers.
 - .3 NFPA 13-2007, Standard for the Installation of Sprinkler Systems.
 - .4 National Building Code of Canada 2010.
 - .5 National Fire Code of Canada 2010.

1.2 INSPECTION AND TEST

- .1 Notify the Departmental Representative that the installation of fire protection system is complete. Provide certificate that components are compatible and the systems conform to the requirements of the specifications, applicable codes and standards. A copy of the contractor's Material and Test Certificate shall be submitted prior to the final inspection.
- .2 Fire protection systems shall be subject to the final inspection and test by the Departmental Representative, Commissioning Agent and Authority having jurisdiction. Work shall not be considered complete until a satisfactory inspection report from the Contractor is obtained by the Departmental Representative.

1.3 SHOP DRAWINGS AND PRODUCT DATA SHEETS

- .1 Submit shop drawings and product data sheets in accordance with Sections 01 11 00, 01 33 00, 01 78 00 and 23 05 00 for review before commencing work.
- .2 Shop drawings shall bear the stamp of a Registered Professional Engineer, registered in the Province of Saskatchewan.
- .3 Submit hydraulic calculations for review. Hydraulic calculations derived by computer shall be verified by the Insurers Advisory Organization Inc. (IAO) prior to submittal to Departmental Representative for review.
- .4 Shop drawings and product data sheets shall include the following equipment:
 - .1 Sprinkler system and components.
 - .2 Hydraulic calculations.

1.4 ENGINEERING DESIGN CRITERIA

- .1 Design system in accordance with NFPA 13, using following parameters:
 - .1 Hazard:
 - .1 Ordinary hazard group 1 for Laundry area unless noted otherwise.
- .2 Pipe size and layout:
 - .1 Hydraulic design.
 - .2 Sprinkler head layout: to NFPA 13.
- .3 Water supply:
 - .1 Conduct flow and pressure test of water supply in vicinity of project to obtain criteria for bases of design in accordance with NFPA 13.
- .4 Zoning:
 - .1 System zoning as indicated.

Part 2 Products

2.1 PIPE, FITTINGS AND VALVES

- .1 Pipe: ferrous to NFPA 13 for Sprinkler Systems.
- .2 Fittings and joints to be ferrous, screwed, welded, flanged or roll grooved to NFPA 13 for Sprinkler Systems.
- .3 Valves:
 - .1 ULC listed and labeled for fire protection service.
 - .2 NPS 2 and smaller to be bronze, screwed ends, OS&Y gate.
 - .3 NPS 2½ or over to be cast iron, flanged or roll grooved ends, indicating butterfly valve.
 - .4 Swing check valves.
 - .5 Ball drip.
- .4 Pipe hangers to be ULC listed for fire protection services.
- .5 Drain valve to be NPS 1 complete with hose end, cap, and chain.
- .6 Inspectors test connections to be NPS 1 gate valves.

2.2 SPRINKLERS

- .1 Where dropped ceilings are being installed, provide semi-recessed, chrome, pendent type sprinklers of current manufacture, to match existing sprinkler heads.
- .2 Where ceilings are exposed provide standard upright type sprinklers of current manufacture.
- .3 Sprinklers shall be ULC listed and labeled.
- .4 Provide minimum 12 mm nominal diameter discharge orifice.

2.3 SUPERVISORY SWITCHES

- .1 General: to NFPA 13 and ULC listed for fire service.
- .2 Valves:
 - .1 Mechanically attached to valve body, with normally open and normally closed contacts and supervisory capability.
- .3 Flow switch type:
 - .1 With normally open and normally closed contacts and supervisory capability.
- .4 Pressure alarm switch:
 - .1 With normally open and normally closed contacts and supervisory capability.

Part 3 EXECUTION

3.1 INSTALLATION

- .1 Install material and fixtures in accordance with referenced standards and manufacturer's written instructions.

3.2 TESTS

- .1 Conform to Section 23 05 00 for tests.
- .2 Conduct tests in the presence of the Departmental Representative.
- .3 Hydrostatically test sprinkler systems at 350 kPa in excess of nominal working pressure but at not less than 1.4 MPa for 2 h without loss under supervision of Departmental Representative.
- .4 During tests, repair any leaks and remove and replace any defective parts. Repeat test until satisfactory results are obtained.
- .5 Refer to other Sections for requirements of commissioning.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL 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 Saskatchewan, 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 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 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.

- .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. 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, 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 in accordance with Section 01 35 30 - Health and Safety Requirements.

1.3 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.

Part 2 Products

2.1 MATERIALS

- .1 Materials and products in accordance with Section 01 61 00 – Common Product Requirements.

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

- .1 Do painting in accordance with Section 09 91 99 – Painting for Minor Works.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 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 DEMONSTRATION

- .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 the following equipment and systems:
 - .1 Fire Protection Sprinklers.
- .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 Instruction duration time requirements as specified in appropriate sections.
- .6 Departmental Representative will record these demonstrations on video tape for future reference.

3.4 PROTECTION

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

3.5 DEMOLITION

- .1 As shown on drawings, some mechanical equipment and material is to be removed. Departmental Representative has first claim on all salvaged material. All material not claimed by the Departmental Representative shall become the property of the Subcontractor and shall be removed from the site.

3.6 EXISTING SYSTEMS

- .1 Carefully dismantle existing mechanical equipment to be removed or relocated together with reusable materials. Existing equipment, piping, ductwork, conduit, light fixtures which interfere with the new installation shall be temporarily disconnected, remove that

which the Departmental Representative does not wish to retain which shall become the Subcontractor's property and removed from the site when so directed, relocate and reconnect as required. Where noted, this existing equipment shall be reused in new work after first repairing and reconditioning any defective items. Permanently disconnected mechanical and electrical connections shall be safely capped and sealed flush within finished surfaces. Remove existing inactive services which interfere with work execution.

- .2 Arrange work so that interruption of services is kept to a minimum.
- .3 The Subcontractor shall be responsible for all costs required to repair all damages to the existing building, equipment, etc. caused through the execution of work in this contract.

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 Run all piping parallel to building lines. Where a number of pipes are to be hung side by side, pipes shall be hung using individual hangers; they shall not be supported by resting on pipe channel, angle or similar method. That is, trapeze hangers shall not be used unless approval has been obtained.
- .2 Hangers and supports shall secure pipes in place, prevent vibration, maintain grade by adjustment, provide for expansion and contraction. Hangers or supports shall be located adjacent to all valves, pumps, equipment, etc. in order to prevent undue stresses in piping and equipment. All exposed hangers shall be prime-coated. All exposed supports (rod, fasteners, brackets) shall be galvanized or cad plated.
- .3 Do not use perforated band iron, wire or chain as hangers. All hanger rods are to have machine threads, capable of vertical adjustment after pipe is erected. Where excessive lateral or axial movements may occur, provide hangers with suitable linkage to permit swing.
- .4 Support horizontal steel piping as follows:

Nominal Pipe Size	Distance Between Supports (m)	Hanger Rod Diameters
15 mm	2	9 mm
20 mm to 40 mm	2.5	9 mm
50 mm and 65 mm	3	9 mm
80 mm and 100 mm	3.5	16 mm
150 mm to 300 mm	4	22 mm

- .5 Expansion of Pipes, Expansion Joints, Anchors and Guides
 - .1 Supply and install all pipe Work shown on the plans in such a manner as to allow it to expand and Contract with temperature changes without producing undue stress in piping and connections and install pipe loops as shown or required.
 - .2 Piping shall be rigidly anchored to the building at all points shown or necessary using substantial steel angles or channels. Anchors shall be to the approval of the Departmental Representative.
 - .3 Provide thrust restraint as necessary throughout the Project.

Part 2 Products

- .1 Hangers and supports shall be suitable for the service and selected in accordance with the manufacturer's recommended maximum loading. All hangers shall have a safety factor of 5 to 1. Hanger types shall be as follows:

.1 Steel Piping Systems:

Nominal Pipe Size (mm)	Service	Hanger Type	Material
15 mm - 40 mm	All services	Adjustable wrought ring	Carbon Steel
50 mm - 100 mm	All services	Adjustable wrought clevis (heavy duty)	Carbon Steel
150 mm - 300 mm	All services	Adjustable wrought clevis (heavy duty)	Carbon Steel

2.2 ESCUTCHEON PLATES

- .1 Provide escutcheon plates of chrome or nickel plated brass, solid type, with set screws for ceiling or wall mounting. In Equipment Rooms provide cast iron type.

Part 3 Execution

- .1 Piping hung or supported by ring or clevis hangers shall be placed directly onto the hanger.
- .2 Provide lateral or sway bracing as necessary throughout the Project.
- .3 Provide thrust restraint as necessary throughout the Project.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 National Fire Prevention Association (NFPA)
 - .1 NFPA 13-2010, Standard for the Installation of Sprinkler Systems.
 - .2 NFPA 25-2008, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Saskatchewan, Canada.
 - .2 Indicate:
 - .1 Materials.
 - .2 Finishes.
 - .3 Method of anchorage
 - .4 Number of anchors.
 - .5 Supports.
 - .6 Reinforcement.
 - .7 Assembly details.
 - .8 Accessories.
- .4 Samples:
 - .1 Submit samples of following:
 - .1 Each type of sprinkler head.
 - .2 Signs.
- .5 Test reports: 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.
- .6 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .7 Manufacturers' Instructions: Provide manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 01 78 00.
- .2 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 Pressure or flow switch.
 - .6 Mechanical couplings.

- .3 Drawings:
 - .1 Sprinkler heads and piping system layout.
 - .1 Prepare 760 mm by 1050 mm 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.
- .4 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.
- .5 Field Test Reports:
 - .1 Preliminary tests on piping system.
- .6 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 760 mm by 1050 mm drawings on reproducible Mylar film with title block similar to full size contract drawings.
- .7 Operation and Maintenance Manuals:
 - .1 Provide detailed hydraulic calculations including summary sheet, and Material and Test Certificate for piping and other documentation for incorporation into manual in accordance with NFPA 13.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company or person specializing in wet sprinkler systems with documented experience.
- .2 Supply grooved joint couplings, fittings, valves, grooving tools and specialties from a single manufacturer. Use date stamped castings for coupling housings, fittings, valve bodies, for quality assurance and traceability.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00.
 - .2 Provide spare sprinklers and tools in accordance with NFPA 13,

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 11 00.
- .2 Delivery and Acceptance Requirements:
 - .1 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.
- .3 Storage and Protection:
 - .1 Store materials indoors in a 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 DESIGN REQUIREMENTS

- .1 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, by pipe schedules for ordinary hazard occupancy.
- .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 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 ft² specified density.
- .8 Friction Losses:
 - .1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping.

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

2.3 PIPE, FITTINGS AND VALVES

- .1 Pipe:
 - .1 Ferrous: to NFPA 13.
- .2 Fittings and joints to 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 Provide welded, threaded, grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.

- .3 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.
 - .4 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
 - .5 Fittings: ULC approved for use in wet pipe sprinkler systems.
 - .6 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
 - .7 Side outlet tees using rubber gasketed fittings are not permitted.
 - .8 Sprinkler pipe and fittings: metal.
- .3 Valves:
 - .1 ULC listed for fire protection service.
 - .2 Gate valves: open by counterclockwise rotation.
 - .3 Check valves: flanged clear opening swing or spring actuated check type with flanged inspection and access cover plate for sizes 10 cm and larger.
 - .4 Pipe hangers:
 - .1 ULC listed for fire protection services in accordance with NFPA.

2.4 SPRINKLER HEADS

- .1 General: to NFPA 13 and ULC listed for fire services.
- .2 Sprinkler Head Type:
 - .1 Type A: upright bronze.
 - .2 Type B: pendant chrome link and lever type.
- .3 Provide nominal 1.2 cm orifice sprinkler heads.
 - .1 Release element of each head to be of temperature rating or higher as suitable for specific application.
 - .2 Provide all sprinkler heads as indicated or required to meet applicable code.
 - .3 Deflector: not more than 75 mm below suspended ceilings.
 - .4 Ceiling plates: not more than 25 mm deep.

2.5 PIPE SLEEVES

- .1 Provide pipe sleeves where piping passes through walls.
- .2 Secure sleeves in position and location during construction.
- .3 Provide sleeves of sufficient length to pass through entire thickness of walls.
- .4 Provide 2.5 cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.
 - .1 Firmly pack space with mineral wool insulation.
 - .2 Seal space at both ends of sleeve or core-drilled hole and provide mechanically adjustable segmented elastomeric seal.
 - .3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.
- .5 Sleeves in other than Masonry and Concrete Walls, Floors, and Roofs:
 - .1 Provide 0.61 mm thick galvanized steel sheet.

2.6 ESCUTCHEON PLATES

- .1 Provide one-piece type metal plates for piping passing through walls, 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.

2.7 INSPECTOR'S TEST CONNECTION

- .1 Inspector's test connections are existing.

2.8 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.

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 NFPA 13 and NFPA 25.

3.3 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.

3.4 ELECTRICAL CONNECTIONS

- .1 Provide electrical work associated with this section in accordance with Electrical Division.
- .2 Provide control wiring in accordance with National Electrical Code.
- .3 Provide wiring in rigid metal conduit or intermediate metal conduit.

3.5 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 50 mm wide red enamel 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 mechanical equipment room and spaces where walls or ceiling are not painted or not constructed of a prefinished material.
 - .2 Provide piping with 50 mm wide red enamel bands spaced at maximum of 6 m intervals.

3.6 FIELD QUALITY CONTROL

- .1 Site Test, Inspection:
 - .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 Departmental Representative will witness formal tests and approve systems before they are accepted.

3.7 CLEANING

- .1 Clean in accordance with Section 01 74 11.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment

END OF SECTION