

**PART 1 - GENERAL**

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| <u>1.1 RELATED REQUIREMENTS</u>                | <ul style="list-style-type: none"><li>.1 Section 09 91 23 - Interior Painting.</li><li>.2 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.</li></ul>  |
| <u>1.2 ACTION AND INFORMATIONAL SUBMITTALS</u> | <ul style="list-style-type: none"><li>.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.</li><li>.2 Product Data:<ul style="list-style-type: none"><li>.1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.</li></ul></li><li>.3 Shop drawings:<ul style="list-style-type: none"><li>.1 Drawings to show:<ul style="list-style-type: none"><li>.1 Mounting arrangements.</li><li>.2 Operating and maintenance clearances.</li></ul></li><li>.2 Drawings and product data accompanied by:<ul style="list-style-type: none"><li>.1 Detailed drawings of bases, supports, and anchor bolts.</li><li>.2 Acoustical sound power data, where applicable.</li><li>.3 Points of operation on performance curves.</li><li>.4 Manufacturer to certify current model production.</li><li>.5 Certification of compliance to applicable codes.</li></ul></li><li>.3 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.</li></ul></li></ul>   |
| <u>1.3 CLOSEOUT SUBMITTALS</u>                 | <ul style="list-style-type: none"><li>.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.</li><li>.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.<ul style="list-style-type: none"><li>.1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.</li><li>.2 Operation data to include:<ul style="list-style-type: none"><li>.1 Control schematics for systems including environmental controls.</li><li>.2 Description of systems and their controls.</li><li>.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.</li><li>.4 Operation instruction for systems and component.</li><li>.5 Description of actions to be taken in event of equipment failure.</li><li>.6 Valves schedule and flow diagram.</li><li>.7 Colour coding chart.</li></ul></li><li>.3 Maintenance data to include:<ul style="list-style-type: none"><li>.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.</li><li>.2 Data to include schedules of tasks, frequency, tools required and task time.</li></ul></li><li>.4 Performance data to include:<ul style="list-style-type: none"><li>.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.</li><li>.2 Equipment performance verification test results.</li><li>.3 Special performance data as specified.</li></ul></li></ul></li></ul> |

**1.3 CLOSEOUT  
SUBMITTALS  
(Cont'd)**

- .2 Operation and Maintenance Data:(Cont'd)
  - .4 Performance data to include:(Cont'd)
    - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
  - .5 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.
  - .6 Additional data:
    - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
  - .7 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.
  - .8 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.
  - .9 Submit copies of as-built drawings for inclusion in final TAB report.

**1.4 DELIVERY,  
STORAGE AND  
HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .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 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

**PART 2 - PRODUCTS**

2.1 NOT USED .1 Not used.

**PART 3 - EXECUTION**

3.1 EXAMINATION .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.  
.1 Visually inspect substrate in presence of Departmental Representative.  
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.  
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PAINTING  
REPAIRS AND  
RESTORATION .1 Do painting in accordance with Section 09 91 23 - Interior Painting.  
.2 Prime and touch up marred finished paintwork to match original.  
.3 Restore to new condition, finishes which have been damaged.

3.3 SYSTEM CLEANING .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork.

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.

3.5 CLEANING .1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.  
.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 00 10 - General Instructions.  
.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.  
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

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

**PART 1 - GENERAL**

- 1.1 RELATED REQUIREMENTS .1 Section 23 05 05 - Installation of Pipework
- 1.2 REFERENCES .1 National Fire Protection Association (NFPA)  
.1 NFPA (Fire) 14, Standard for the Installation of Standpipe and Hose Systems ,  
2013 Edition.  
.2 Underwriters Laboratories of Canada (ULC).
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

**PART 2 - PRODUCTS**

- 2.1 DESCRIPTION .1 Design system to NFPA (Fire) 14 and following parameters:  
.1 Combined with sprinkler systems: hydraulic.
- 2.2 PIPE, FITTINGS AND VALVES .1 Pipe:  
.1 Ferrous: to NFPA (Fire) 14.  
.2 Copper tube: to NFPA (Fire) 14.  
.2 Fittings and joints to NFPA (Fire) 14:  
.1 Ferrous: screwed, welded, flanged or roll grooved.  
.1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.  
.2 Copper tube: screwed, soldered, brazed.  
.3 Valves:  
.1 ULC listed for fire protection service.  
.2 Up to NPS 2: bronze, screwed ends, grooved, OS&Y gate.  
.3 NPS 2-1/2 and over: cast or ductile iron, flanged or roll grooved ends, indicating butterfly valve.  
.4 Pipe hangers:  
.1 ULC listed for fire protection services.  
.5 Drain valve: NPS 1, complete with hose end, cap and chain.

- 2.3 CABINETS .1 To NFPA (Fire) 14 and ULC listed: flush, type as indicated, constructed of 1.6 mm thick steel, 180 degrees opening door of 2.5 mm thick steel with hinge same side as water supply and latching device.
- .2 Cabinets to maintain fire resistive rating of construction in which they occur.
- .3 Cabinet door: with 5 mm full glass panel.
- .4 Large enough to accommodate fire extinguisher and NPS 2-1/2 fire department valve.
- .5 Tub: prime coated.
- .6 Door and frame: No. 4 satin finish stainless steel.

- 2.4 FIRE DEPARTMENT VALVE .1 ULC listed, NPS 2-1/2 forged or cast brass angle valve: with thread compatible with local fire department, complete with handwheel, cap and chain. Cap to be part of ULC listing for valve.

### **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 and test to acceptance in accordance with NFPA (Fire) 14.
- .2 Install pipework in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified.
- .3 Water Supply for Combined Standpipe and Sprinkler Risers:
- .1 Standpipe piping may be used to supply water for automatic fire sprinkler systems.
- .2 Standpipe systems: hydraulically designed.

- 3.3 SITE TEST .1 General:
- .1 In accordance with NFPA (Fire) 14.

**PART 1 - GENERAL**

- 1.1 REFERENCES .1 National Fire Prevention Association (NFPA)
- .1 NFPA (Fire) 13, Standard for the Installation of Sprinkler Systems, 2013 Edition.
  - .2 NFPA (Fire) 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 2014 Edition.

- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

**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 (Fire) 13.
- .2 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.
- .3 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.
- .4 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.
- .5 Design systems for earthquake protection.
- .6 Location of Sprinkler Heads:
- .1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA (Fire) 13 for light hazard occupancy.
  - .2 Uniformly space sprinklers on branch.

- 2.2 PIPE & FITTINGS .1 Pipe:
- .1 Ferrous: to NFPA (Fire) 13.
  - .2 Copper tube: to NFPA (Fire) 13.
- .2 Fittings and joints to NFPA (Fire) 13:
- .1 Ferrous: screwed, welded, flanged or roll grooved.
    - .1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.
  - .2 Copper tube: screwed, soldered, brazed, grooved.
  - .3 Provide welded, threaded or grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
  - .4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.

<u>2.2 PIPE &amp; FITTINGS (Cont'd)</u>	.2	(Cont'd)
	.5	Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
	.6	Fittings: ULC approved for use in wet pipe sprinkler systems.
	.7	Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
	.8	Side outlet tees using rubber gasketed fittings are not permitted.
	.9	Sprinkler pipe and fittings: metal.
	.3	Pipe hangers:
	.1	ULC listed for fire protection services in accordance with NFPA.
<u>2.3 SPRINKLERS</u>	.1	General: to NFPA (Fire) 13 and ULC listed for fire services.
<u>2.4 CONCEALED SPRINKLER</u>	.1	Fully concealed pendant, quick response for hazard coverage as indicated, 5.6 K factor, enclosed escutcheon, separate two-piece design of mounting cup & coverplate, internal threaded closure, 68°C (155°F) rated, 13 mm (½") adjustment, FM approved, white enamel chrome finish, glass bulb type and white finish cover.
<u>2.5 SEMI-RECESSED SPRINKLER</u>	.1	Semi-recessed pendant, quick response for hazard coverage as indicated, 5.6 K factory, extended adjustable escutcheon, chrome white enamel finish, FM approved, glass bulb type; 68°C (155°F) rated, 13 mm (½") orifice.
<u>2.6 UPRIGHT SPRINKLER</u>	.1	Upright bronze, quick response for hazard coverage as indicated, 5.6 K factor, FM approved, chrome finish, glass bulb type c/w wire guard; 68°C (155°F) rated, 13 mm (½") orifice.

### **PART 3 - EXECUTION**

<u>3.1 MANUFACTURER'S INSTRUCTIONS</u>	.1	Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.
<u>3.2 INSTALLATION</u>	.1	Install, inspect and test to acceptance in accordance with NFPA (Fire) 13 and NFPA (Fire) 25.
<u>3.3 PIPE INSTALLATION</u>	.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.



3.3 PIPE  
INSTALLATION  
(Cont'd)

- .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.