

Part I General

I.1 RELATED SECTIONS

- .1 Section 21 13 13 – Wet Pipe Sprinkler Systems.

I.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 Manitoba, 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.
- .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 Maintain neat record of changes on a set of prints during construction.
 - .2 Submit to Departmental Representative minimum five (5) working days before Substantial Completion.
 - .3 Contractor shall certify and check the accuracy of each drawing.
 - .4 Record additional changes and submit final record drawings at Total Performance.
- .9 As-Built drawings:

- .1 Prior to start of Testing, Adjusting and Balancing for Sprinkler System, 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 Sprinkler System 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.

I.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 29.06 - Health and Safety Requirements.

I.4 MAINTENANCE

- .1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
 - .1 Spare sprinklers and tools in accordance with NFPA 13.
- .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.

I.5 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.

Part 2 Products

2.1 MATERIALS

- .1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .2 Do verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification.

Part 3 Execution

3.1 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.

3.2 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 I - SUBMITTALS.
 - .1 Testing to be witness by Authority Having Jurisdiction.
- .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 I - 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 I - 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 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 I General

I.1 REFERENCES

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

I.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .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 the Province where work is taking place.
 - .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:

- .1 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:
 - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .7 Manufacturers' Instructions:
 - .1 Provide manufacturer's installation instructions.
- .8 Field Quality Control Submittals:
 - .1 Manufacturer's Field Reports: manufacturer's field reports specified.

I.3 CLOSEOUT SUBMITTALS

- .1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.
- .2 Manufacturer's Catalog Data, including specific model, type, and size for: Pipe and fittings.
 - .1 Valves, including gate, check, and globe.
 - .2 Sprinkler heads.
 - .3 Pipe hangers and supports.
 - .4 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".
 - .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.
- .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: 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 hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for aboveground piping and other documentation for incorporation into manual in accordance with NFPA 13.

I.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.

I.5 MAINTENANCE MATERIAL SUBMITTALS

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

I.6 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:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 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.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 DESIGN REQUIREMENTS

- .1 A professional Engineer licensed to practice in Manitoba is required to perform and seal the design.
- .2 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13 latest edition, by pipe schedules for light hazard occupancy or hydraulic calculations for uniform distribution of water over design area.
- .3 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.
- .4 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. Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.
- .5 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.
- .6 Location of Sprinkler Heads:
 - .1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13 for light hazard occupancy 20.9m² per head].
 - .2 Uniformly space sprinklers on branch.
- .7 Water Distribution:
 - .1 Make distribution uniform throughout the area in which sprinkler heads will open.

- .2 Discharge from individual heads in hydraulically most remote area to be 100 % of specified density.
- .8 Density of Application of Water:
 - .1 Size pipe to provide specified density when system is discharging specified total maximum required flow.
 - .2 Application to horizontal surfaces below sprinklers shall be 0.38 lpm per m².
- .9 Sprinkler Discharge Area:
 - .1 Area: hydraulically most remote 279 m² area as defined in NFPA 13.
- .10 Outside Hose Allowances:
 - .1 Include allowance in hydraulic calculations of 378 lpm for outside hose streams.
- .11 Friction Losses:
 - .1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping, 150 for copper tubing, and 140 for cement-lined ductile-iron piping.
- .12 Water Supply:
 - .1 Base hydraulic calculations on existing water supply reading on existing sprinkler system pressure gauges.

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.
- .3 Conceal piping in areas with suspended ceiling and paint piping in areas exposed. Coordinate paint color with Architects and Departmental Representative.

2.3 PIPE, FITTINGS AND VALVES

- .1 Pipe:
 - .1 Ferrous: to NFPA 13.
 - .2 Copper tube: 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 Copper tube: screwed, soldered, brazed, grooved.
 - .3 Provide welded, threaded, grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
 - .4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will [not] be permitted.
 - .5 Rubber 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 Valves:
 - .1 ULC listed for fire protection service.
 - .2 Gate valves: open by counter-clockwise 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 Provide gate valve in piping protecting elevator hoist ways, machine rooms, and machinery spaces.
- .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: pendent chrome link and lever type.
 - .3 Type C: pendent chrome glass bulb type.

- .4 Type D: recessed pendent polished chrome glass bulb type with ring and cup.
- .5 Type E: concealed polished chrome link and lever type.
- .6 Type F: side wall polished chrome link and lever type.
- .3 Provide nominal [1.2] cm orifice sprinkler heads.
 - .1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application.
 - .2 Provide polished stainless steel ceiling plates or chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings.
 - .3 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.
 - .4 Provide sprinkler heads as indicated.
 - .5 Deflector: not more than 75 mm below suspended ceilings.
 - .6 Ceiling plates: not more than 25 mm deep.
 - .7 Ceiling cups: not permitted.

2.5 PRESSURE GAUGES

- .1 ULC listed and to Section 23 05 19.01 - Thermometers and Pressure Gauges - Piping Systems.

2.6 PIPE SLEEVES

- .1 Provide pipe sleeves where piping passes through walls, floors.
- .2 Secure sleeves in position and location during construction.
- .3 Provide sleeves of sufficient length to pass through entire thickness of walls, floors.
- .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 with plastic waterproof cement which will dry to firm but pliable mass, 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 Masonry and Concrete Walls, Floors, and Roofs:

- .1 Provide hot-dip galvanized steel, ductile-iron, cast-iron sleeves.
- .2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.
- .6 Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs:
 - .1 Provide 0.61 mm thick galvanized steel sheet.

2.7 ESCUTCHEON PLATES

- .1 Provide one piece type metal plates for piping passing through walls, floors, and ceilings in exposed spaces.
- .2 Provide polished stainless steel plates, chromium-plated finish on copper alloy plates in finished spaces.
- .3 Provide paint finish on metal plates in unfinished spaces.

2.8 INSPECTOR'S TEST CONNECTION

- .1 Locate inspector's test connection at hydraulically most remote part of each system, provide test connections approximately 3 m above floor for each sprinkler system or portion of each sprinkler system equipped with alarm device.
- .2 Provide test connection piping to location where discharge will be readily visible and where water may be discharged without property damage.
- .3 Provide discharge orifice of same size as corresponding sprinkler orifice.

2.9 SIGNS

- .1 Attach properly lettered and approved metal signs to each valve and alarm device to NFPA 13.
- .2 Permanently fix hydraulic design data nameplates to riser of each system.

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 DISINFECTION

- .1 Disinfect new piping.
- .2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.
- .3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.
- .4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.5 FIELD PAINTING

- .1 Clean, pre-treat, 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 pre-treatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.

- .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 or self-adhering red plastic bands spaced at maximum of 6 m intervals throughout piping systems.
 - .2 Piping in Unfinished Areas:
 - .1 Provide primed surfaces with one coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil in spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.
 - .2 Provide piping with 50 mm wide red enamel bands or self-adhering red plastic 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. Furnish equipment, instruments, connecting devices, and personnel for tests.
 - .5 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.
- .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 I - ACTION AND INFORMATIONAL 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 I - QUALITY ASSURANCE.
- .3 Site Tests:
 - .1 Testing to be witnessed by authority having jurisdiction.
 - .2 Develop, with Departmental Representative, detailed instructions for O & M of this installation.
- .4 Verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification, include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.

- .5 Recycled content.
- .6 Local/regional materials.
- .7 Low-emitting materials.

3.7 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION