

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 23 05 29 - Hangers and Supports For HVAC Piping and Equipment.
- .2 Section 23 05 49.01 - Seismic Restraint Systems (SRS).
- .3 Section 23 05 53.01 - Mechanical Identification.

### **1.2 REFERENCES**

- .1 American National Standards Institute (ANSI)/American Petroleum Institute (API).
    - .1 ANSI/API Spec 5L, Specification for Line Pipe.
  - .2 American Society for Testing and Material (ASTM).
    - .1 ASTM A-47M, Standard Specification for Ferritic Malleable Iron Castings.
    - .2 ASTM A-53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - .3 ASTM A-135, Standard Specification for Electric-Resistance-Welded Steel Pipe.
  - .3 Canadian Standards Association/CSA International.
    - .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
    - .2 CSA W47.1, Certification of Companies for Fusion Welding of Steel.
    - .3 CAN/CSA B64.10-01, Selection and Installation of Backflow Preventers.
  - .4 Electrical Equipment Manufacturers Association of Canada (EEMAC).
  - .5 National Research Council Canada (NRCC).
    - .1 National Building Code of Canada (CNB).
    - .2 National Fire Code of Canada (CNPI).
    - .3 National Plumbing Code of Canada (CNP).
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- .4 National Fire Protection Association (NFPA).
  - .1 ANSI/NFPA 13, Installation of Sprinkler Systems.
  - .2 NFPA 25, Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
  - .3 NFPA 30, Flammable and Combustible Liquids Code.
  - .4 NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.
  - .5 NFPA 72, Standard for the Installation, Maintenance, and Use of Protective Signaling Systems.
  - .6 NFPA 72E, Standard on Automatic Fire Detectors.
  - .7 NFPA 170, Standard for Fire Safety and Emergency Symbols.
  - .8 NFPA 291, Fire Flow Testing and Marking of Hydrants.
- .6 Workplace Hazardous Materials Information System (SIMDUT).
  - .1 Material Safety Data Sheets (MSDS).
- .7 Correctional Service Canada.
  - .1 Chapter 3-6 Norms on the Protection Against Fire for Detention Facilities.
- .8 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S524, Fire Alarm Systems Installation.
  - .2 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
  - .3 CAN/ULC-S537, Fire Alarm Systems Verification.
  - .4 CAN/ULC S543, Internal Lug Quick Connect Coupling for Fire Hose.

### **1.3 SUBMITTALS**

- .1 Submit shop drawings and specifications as required.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Submit all required documents and items after completion of work for incorporation into "Operating and Maintenance Manual" according to architectural specifications.
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.2 Maintenance Data Sheets.

.1 Maintenance data sheets must include the following elements:

.1 Technical data from catalogs and product literature, including the model number, type and size for the items mentioned below:

- .1 Piping and fittings;
- .2 Alarm check valves;
- .3 Cabinet;
- .4 Compressor;
- .5 Pipes hangers and suspension;
- .6 Monitoring switches;
- .7 Mechanical couplings.
- .8 Sprinklers.

.2 Relevant details concerning operation, maintenance, and servicing.

.3 A list of recommended spare parts.

## **1.5 SPARE PARTS AND MAINTENANCE**

.1 Provide extra material spare parts for maintenance in according to prescriptions.

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

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

.1 All products used in fire safety installations must be "cUL" or "ULC" listed and shall be labelled as such.

.2 Provide accessories that can withstand the normal pressure exerted in the fire protection network.

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## **2.2 PIPES AND FITTINGS**

- .1 Pipes:
  - .1 Pipes NPS 2 or less:
    - .1 Black steel, Schedule 40, grooved or threaded, complying with NFPA 13 and ASTM A-53 or ASTM A-135 Standards.
  - .2 Pipes NPS 2 ½ and over:
    - .1 Black steel, Schedule 10, roll grooved, complying with NFPA 13 and ASTM A-135 Standards.
  - .3 Acceptable products: Allied; Bull Moose; Wheatland.
- .2 Fittings and couplings as per NFPA 13 Standard:
  - .1 Use of couplings and joints with a galvanized finish when using galvanized pipe.
  - .2 Fittings and couplings up to NPS 2:
    - .1 Fittings and joints, rigid, provided by same manufacturer.
    - .2 Fittings, screwed with teflon tape, to ASTM A-47M, grade 32510.
    - .3 Joints for pipes with grooved ends, standard coupling to CSA B242 and ANSI/API Spec 5L.
    - .4 Fittings with grooved ends, to ASTM A-536, grade 65-45-12.
  - .3 Acceptable products:
    - .1 Fittings: Victaulic Firelock or EZ Firelock; Gruvlock, Rigidlite, 7400 Series.
    - .2 Joints: Victaulic Vic-plus ou "Flushseal"; Gruvlock.

## **2.3 HANGERS**

- .1 Hangers for fire protection service, in conformity with NFPA 13 Standard.
  - .2 Refer to Sections 23 05 29 and 23 05 49.01.
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## **2.4 PREACTION SYTEM**

- .1 The fire protection system with independent cabinet and integrated accessories includes:
    - .1 Independent cabinet;
    - .2 An alarm valve with release and monitoring devices, downstream pressurizing device and all required accessories;
    - .3 Sprinkler networks;
    - .4 Fire detection networks.
  - .2 All components must be compatible and certified.
  - .3 Provide a separate circuit for the air compressor connection inside the preaction cabinet.
  - .4 "Double interlock preaction" unit type, self-contained with electropneumatic release including all hydraulic, pneumatic, and electrical components required for control the system. The system includes the following:
    - .1 Independent cabinet:
      - .1 A robust freestanding cabinet in 14 gauge steel with integrated control panel equipped with emergency battery measuring:
        - .1 2-inch systems: 91.4 cm x 50.8 cm x 108.3 cm (36 in x 20 in x 71 in).
      - .2 A complete deluge valve, calibrated to 250 lb/in<sup>2</sup>, including all the accessories needed to operate the system.
      - .3 Galvanized steel release liner, gauge 40 with solenoid valve and all release devices and supervision required.
      - .4 Gauges for system pressure indications, from supply pipe to the priming chamber of the deluge valve and the air pressure of the piping network.
      - .5 Steel manifold, Schedule 40, grooved end, allowing the water supply connection to the preaction cabinet.
      - .6 Steel manifold, Schedule 40, NPS 2 for drain connections.
      - .7 A test connection.
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- .8 Integrated electrical terminal connections with screw terminals, for connection of detection system, audible devices, auxiliary contacts and power of air compressor.
  - .9 A bell or horn (24 VDC) installed near preaction cabinet.
  - .10 An integrated and supervised butterfly valve installed on the riser inside the cabinet for flow testing.
  - .11 An integrated sight glass to visually confirm the water flow.
  - .12 Double front doors, with locks, reducing the access space to the cabinet and can be removed without tools to facilitate the installation and maintenance work.
  - .13 Individual access doors for the hydraulic and electrical sections and the emergency release with a neoprene gasket to avoid vibrations.
  - .14 Shut-off valve.
  - .2 Detailed operating instructions and an indication of the type of system (double locking preaction system) should be displayed inside the cabinet.
  - .3 The cabinet is protected by a rust finish, red light painting, baked polyester powder coating baked on phosphate base.
  - .4 The entire cabinet is pre-assembled, pre-wired, and factory tested.
  - .5 Double Interlock Preaction System Operation:
    - .1 The release of a detection condition and the opening of a sprinkler are necessary to cause the discharge of water.
    - .2 Operation in cross zone:
      - .1 The release of one or the other of the detection zones causes an alarm indication to the control panel and the release of an alarm signal. The releasing of two detection areas causes indication on alarm control panel, the releasing of an alarm signal, the powered of solenoid valve and the operation of the auxiliary contacts indicating a common alarm, but it does not cause filling the sprinkler piping with water.
    - .3 Pressure loss in the sprinkler network causes the activation of a supervisory signal to the control panel.
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- .4 The opening of a sprinkler or broken piping without electrical detection causes the operation of the pneumatic actuator, activated a supervisory signal to the control panel and activate dry contacts for auxiliary functions, but not cause filling the sprinkler piping with water.
- .5 The operation of the manual emergency release depressurize the priming chamber of the deluge valve, causing filling the sprinkler piping with water, and activates an alarm signal and operation an auxiliary contact indicating a flow of water to the control panel.
- .6 Acceptable Products:
  - .1 Compact preaction system: FireFlex Systems Inc., model TotalPac2; Tyco, model Red-E Cabinet; Victaulic, model 745 Firepack.
  - .2 Deluge valve: Viking, model E1, with EZ-Trim; Tyco, model DV-5; Victaulic, model NXT Firelock.
  - .3 Control panel: Viking, model VFR-400; Potter, model PFC-4410RC; System Sensor, model PDRP-2001C.

## **2.5 SYSTEM DRAINAGE**

- .1 The single drain manifold of the cabinet must be connected to an open drain. the drain piping used for connecting the drain manifold should not be smaller diameter than manifold, and must be unrestricted.

## **2.6 AIR SUPPLY**

- .1 The piping downstream of the alarm valve is monitored by an air pressure from the compressed air supply.
- .2 The air compressor is enough capacity to restore normal operating air pressure within 30 minutes.
- .3 Features:
  - .1 Types: compressor without tank, installed on the riser.
  - .2 Power:  $\frac{1}{6}$  HP.
  - .3 Voltage: 115 V.
  - .4 Number of phases: 1.

- .5 Frequency: 60 Hz.

## **2.7 DETECTION SYSTEM**

- .1 Supply and install a complete electrical detection system including the pipework, wiring, fire detectors, signaling devices and other accessories required for carrying out the work.
  - .1 Smoke detectors are connected in cross areas.
  - .2 Smoke detector and sound devices such as bells, horns, and strobe lights, are compatible with the preaction system control panel.
  - .3 Fire detectors are provided with a maximum of 15 per zone to the extent possible.
- .2 Acceptable Products:
  - .1 Ionization smoke detector: System Sensor Model C2W-BA with base No. B110LP.

## **2.8 SPRINKLERS**

- .1 General Requirements: Sprinkler heads complying with NFPA 13 Standard, and approved for fire protection service.
- .2 Sprinkler guard for sprinkler exposed to mechanical shock, with zinc coated steel rod, provided by the same manufacturer as the sprinkler it protects.
- .3 Acceptable Products: Tyco, models G1 and G4.
- .4 Upright Sprinklers:
  - .1 Upright sprinkler, quick-response, with frangible bulb, "K" factor of  $80.6 \text{ L/min}/(\text{Bar})^{1/2}$  ( $5.6 \text{ gal US/min}/(\text{lb}/\text{po}^2)^{1/2}$ ):
    - .1 Acceptable products:
      - .1 Standard response sprinkler: Viking Micromatic, model M, VK-100; Victaulic V2703; Tyco, model TY3151 or TY3111.
    - .2 Temperature ratings: 68°C, 93°C, 141°C, as needed or as required.
    - .3 Finish: Bronze, brass, white polyester, black polyester, color to the choice of the Architect, corrosion resistant, as indicated on drawings.



- .4 Maximal area per sprinkler:
  - .1 Light hazard:
  - .2 Incombustible construction: 20.9 m<sup>2</sup> (225 ft<sup>2</sup>).
  - .3 Combustible construction: 12.1 m<sup>2</sup> (130 ft<sup>2</sup>).
  - .4 Ordinary hazard:
    - .1 Maximal coverage: 12.1 m<sup>2</sup>.
    - .2 Maximal distance between heads: 4.6 m (15 ft).
  - .5 Extra hazard:
    - .1 Maximal coverage: 9.3 m<sup>2</sup>.
    - .2 Maximal distance between heads: 3.6 m (12 ft).
- .5 Pendant Sprinklers:
  - .1 Semi-recessed pendant sprinklers, with semi-recessed escutcheon, quick response, with frangible bulb, "K" factor of 80.6 L/min/(Bar)<sup>1/2</sup> (5.6 gal US/min/(lb/po<sup>2</sup>)<sup>1/2</sup>):
    - .1 Acceptable products:
      - .1 Standard response sprinkler: Viking Microfast, model M, VK-102; Victaulic, style V2707; Tyco, model TY3231;
    - .2 Temperature ratings: 68 °C, 93 °C, 141 °C, as needed or as required.
    - .3 Finish: bronze, brass, white polyester, black polyester, color to the choice of the Architect, corrosion resistant, as indicated on drawings.
  - .4 Maximal area per sprinkler:
    - .1 Light hazard:
    - .2 Incombustible construction: 20.9 m<sup>2</sup> (225 ft<sup>2</sup>).
    - .3 Combustible construction: 12.1 m<sup>2</sup> (130 ft<sup>2</sup>).
    - .4 Ordinary hazard:
      - .1 Maximal coverage: 12.1 m<sup>2</sup>.

- .2 Maximal distance between heads: 4.6 m (15 ft).
- .5 Extra hazard:
  - .1 Maximal coverage: 9.3 m<sup>2</sup>.
  - .2 Maximal distance between heads: 3.6 m (12 ft).

## **2.9 IDENTIFICATION**

- .1 Indicating plates for test/drain valves: to NFPA 13 Standard.
- .2 Provide nameplate indicating the same elements as the existing cabinet; this plate must be permanently installed at the base of the riser.
- .3 Fire protection equipment identification to NFPA 170, Standard for Fire Safety and Emergency Symbols.

## **PART 3 - EXECUTION**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Conformity: Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 Install, inspect, and perform acceptance tests of sprinkler systems in accordance with NFPA 13 and NFPA 25 Standards.
  - .2 Execute installation in accordance with established Standards and laws, regulations and current codes, and Standards Requirements.
  - .3 Proper operation and installation coordination of the system, including automatic sprinkler system, system's monitoring points as well as the systems commissioning are all under the fire protection Contractor's responsibility.
  - .4 Connect the compressor located in the cabinet preaction.
  - .5 Connect the fire detectors in preaction system control panel.
  - .6 Clearly identify main shut-off valves, drain valves, by-pass valves, and all auxiliary valves.
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- .7 Install shop painted sprinkler guard on pendant sprinklers as indicated on drawing.
- .8 Install piping from the preaction system with a slope to drain towards the lowest point of the system. Slope of 0.4% on branch lines, and 0.2% on the supply lines.
- .9 Install on low points of the preaction system drainage devices in accordance with NFPA 13.
- .10 Install drain pipe on preaction system test valves to open drains.
- .11 Drain the network at the end of the test.

### **3.3 TRAINING**

- .1 Contractor shall organize a 4-hour training session for the building's operation and maintenance staff.
- .2 Staff training shall cover normal sprinkler system operation, emergency procedure and system maintenance, as per NFPA 25 Standard.

### **3.4 TESTS AND VERIFICATIONS**

- .1 Carry out the following tests on the sprinkler systems, complying with NFPA 13 Standard:
    - .1 Execute complete air leakage testing on the automatic sprinkler systems piping and appurtenances at a pressure of 275 kPa (40 lb/in<sup>2</sup>) for 24 hours. Correct any air leaks to a pressure drop of more than 10 kPa (1.5 lb/in<sup>2</sup>) for 24 hours of testing.
    - .2 Execute complete hydrostatic testing on the automatic sprinkler systems piping and appurtenances at a pressure of 1,380 kPa (200 lb/in<sup>2</sup>) for 2 hours.
    - .3 Complete a flow test through the test connection of each zones in order to confirm flow switches operation. The alarm signals must be transmitted to the alarm panel within 60 secondes maximum starting at test connection opening and during test flow.
    - .4 Complete a flow test through the test connections fully opened to ensure that no pressure build-up occurs in the drainage piping which could affect the proper operation of the system.
    - .5 Execute opening and closing of all water supply control valves while under system pressure.
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- .6 Perform a test demonstrating that normal air pressure can be restored in the system in less than 30 minutes.
- .7 Verify the installation of the fire alarm system according to CAN/ULC-S537.
- .2 Conduct tests in presence of the Departmental Representative and supply test certificates, as required by NFPA 13 and CAN/CSA B64.10-01 Standards.
- .3 Contractor must supply a test certificate as required by CAN/CSA B64.10-01 for each backflow preventer installed.

### **3.5 SPECIAL REQUIREMENTS - OCCUPIED BUILDINGS**

- .1 Protect with polyethylene fabrics furniture and effects of the occupants.
- .2 Tell ahead Departmental Representative of the sequence of local affected by the work, as and when they progress.

### **3.6 REPORT AND CERTIFICATE**

- .1 Provide both inspection report and inspection attestation to the Departmental Representative at the end of the project, in addition to the properly completed and signed contractor materials and tests certificate. Record all tests results in a notebook appended to the report.

### **3.7 CLEANING**

- .1 After installation work and performance control completed remove materials, the rubbish, tools, and equipment.

**END OF SECTION**

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