

SECTION 22 33 00 - DRY FIRE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 RELATED WORK

- A. Basic Mechanical and Electrical Requirements.
- B. Excavation and Backfill.
- C. Piping and Accessories.
- D. Valves.
- E. Water Supply.
- F. Motors, Starters, and Auxiliaries.
- G. Electric Wiring in Plumbing Work.

1.3 QUALITY ASSURANCE

- A. Follow all requirements, recommendations and appendices to comply with the latest edition of the following publications, codes, standards, and listings/approvals:
 - 1. National Fire Protection Association (NFPA):
 - a) NFPA 13: Standard for the Installation of Sprinkler Systems.
 - b) NFPA 25: Recommended Practice for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Protection Equipment Directory with Supplement.
 - 3. Building and Fire Code of New York State, as amended.
 - 4. OSHA Rules and Regulations.
 - 5. Requirements of insurance and other authorities having jurisdiction.
- B. Equipment, devices, hangers, and components shall be UL listed and FM approved and labeled for the intended fire protection service.

- C. The fire protection work shall be performed by an experienced firm regularly engaged in the installation of fire protection sprinkler systems.
- D. The requirements of this Project's Contract Documents may meet or exceed the requirements of NFPA and other Codes and Standards listed by this Section. The Fire Protection Contractor shall comply with all requirements of the Project Documents in such cases. In situations where NFPA may allow several different methods for sprinkler and fire protection related work and hydraulics, ultimately the method utilized for this project will be determined by these Contract Documents and the Project Engineer. Verify all such situations prior to the bid date.

1.4 SYSTEM DESCRIPTION

- A. The fire protection system shall be a dry pipe automatic sprinkler system arranged to properly protect all spaces within the building.
- B. Water supply shall be through the 6 in. underground fire protection water main to the system's main riser. Calculated water supply data at the municipal main indicates the following:
 - 1. 80 psi static.
 - 2. 71 psi residual.
 - 3. 1307 gpm flowing.
- C. Fire department connection shall be provided to allow the servicing fire department to augment the system's normal automatic water supply.
- D. The system shall be hydraulically calculated by the contractor in accordance with all provisions of the Contract Documents.
- E. Use of the room design method will not be permitted. Calculations shall be based upon the specific hazard for the areas being protected. The following minimum requirements shall be provided as actually installed in the protected spaces.
 - 1. Light hazard: Offices, Admin Areas, Toilet Rooms, Conference Rooms, etc...
 - a) Water density: 0.10 gpm/sq. ft.
 - b) Hydraulic remote area: 1500 sq. ft.
 - c) Combined hose demand: 100 gpm
 - 2. Ordinary Hazard Group 1: Mechanical Rooms, Storage Rooms, Janitor's Closets, etc...
 - a) Water density: 0.15 gpm/sq. ft.
 - b) Hydraulic remote area: 1500 sq. ft.
 - c) Combined hose demand: 250 gpm

3. Ordinary Hazard Group 2 :
 - a) Water density: 0.20 gpm/sq. ft.
 - b) Hydraulic remote area: 1500 sq. ft.
 - c) Combined hose demand: 250 gpm

- F. Maximum coverage for any sprinkler head shall not exceed NFPA requirements.

- G. A minimum 5 psi safety factor shall be provided between the available municipal water supply curve and the total system demand point. The total system demand point shall be at the municipal water main and include the calculated sprinkler and interior hose stream demands plus the exterior hose stream demand at the residual pressure required for proper system operation.

- H. The maximum velocity of flow shall not exceed 20 ft. per second in above ground piping except as resulting from throttling of flow in sprinkler riser/drop nipples or 15 ft. per second in pipe segments which contain paddle type waterflow indicators.

- I. Include allowances in hydraulic calculations for head losses through paddle type flow switches and roll grooved pipe segments.

- J. All water supply control valves shall be electrically supervised and mechanically locked for proper position. Waterflow and supervisory circuits shall be in accordance with the requirements of electrical specifications. Electric connections to sprinkler system equipment shall be by the Division 16 Contractor. Furnish wiring diagrams for all equipment.

- K. Provide 3/16 in. x 1 in. cadmium plated carbon steel chains and master keyed all brass case hardened padlocks to lock water supply valves in the proper position.

1.5 SUBMITTALS

- A. Product Data:
 1. Submit manufacturer's catalog cut, specifications and installation instructions for each item or component of fire protection system. Clearly indicate pertinent information such as, but not limited to:
 - a) Manufacturer, model number.
 - b) Materials, size and type connection.
 - c) Pressure ratings of components.
 - d) FM approval/UL listing.

- B. Samples:
 1. Submit sample of sprinklers.

- C. Drawings:

1. Submit complete NFPA 13 drawings with hydraulic calculations and cross references to applicable drawings, water supply data, and equipment schedule with ratings including those of all components for the system to the Owner's Representative, Insurance Underwriter, and other authorities having jurisdiction.
 - a) Hydraulic calculations shall be submitted for each design density/remote area with items in NFPA 13 incorporated including sketches to indicate flow quantities, sprinklers operating and direction of flow for pipes in looped and gridded systems.
- D. Record Drawings:
 1. Submit Record Drawings, hydraulic calculations, test reports, and NFPA Above and Below Ground Material and Test Certificates to the Owner's Representative, Insurance Underwriter and other Authorities Having Jurisdiction.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Mixing of manufacturers or models of the same or similar component will not be acceptable.

2.2 FIRE DEPARTMENT CONNECTION - VERIFY TYPE WITH FIRE MARSHALL

- A. General: Cast brass; straight or angle body as required; two-way lug swivel inlets with individual drop clappers; cast brass, raised letter escutcheon labeled automatic sprinkler; matching brass plugs and chains.
 1. 2-1/2 in. x 2-1/2 in. x 4 in.
 2. 2-1/2 in. NST hose threads shall match those in use by the Rush Volunteer Fire Department.
 3. Polished brass escutcheon, inlets, plugs, and chains.
 4. Design equipment: Croker model 6010 PB, labeled "Auto Sprinkler".
 5. Manufacturers: Badger-Powhatan, Croker-Standard, Guardian, Elkhart, or approved equal.
 - a) Horizontal Flush Wall Type: Elkhart #166.
 - b) Projecting Wall Type: Elkhart #156.
 - c) Free Standing Sidewalk Type: Elkhart #15.
 - d) 18 in. long brass cover sleeve with matching finish.

- B. General: Aluminum adapter with storz inlet, female NPT outlet. Cast brass escutcheon plate. Hardcoated aluminium storz cap with attachment cable. 45 degree body style.
 - 1. Branding: "Auto Sprk".
 - 2. Finish: Aluminum with brass plate.
 - 3. Verify size and type of FDC with fire marshal.
 - 4. Manufacturers: Badger-Powhatan, Croker-Standard, Elkhart, or approved equal.

2.3 GAUGES

- A. Accuracy: ANSI B40.1 Grade B, $\pm 2\%$ of span; 0 to 300 psi standard range.
 - 1. Case: Anodized aluminum, glass lens; copper alloy tube, tip and socket; brass movement.
 - 2. Connection: 1/4 in. NPT male bottom connection.
 - 3. Manufactures: Viking Model 01124A Air Pressure Gauge and 01934A Water Pressure Gauge or approved equal.

2.4 SPRINKLER EQUIPMENT

- A. Manufacturers: Central, Gem, Reliable, Star, Viking.
- B. Dry Pipe Valve:
 - 1. Design equipment: Tyco dry valve with PS10-2A pressure switch and accelerator.
 - 2. Air compressor: 120 volt, single phase: Sized to pump system to 40 psi in less than 30 minutes; automatic controls, and valves with vibration isolators for floor mounting.
 - a) Design equipment: General, Reliable, Emglo, GAST, or approved equal.
- C. Sprinklers: Brass or bronze 1/2 in. orifice, 1/2 in. NPT. 165°F ordinary temperature classification for light hazards. Use 286°F sprinklers in Mechanical, Electrical, and Elevator Rooms; in vicinity of heat equipment/sources; and in accordance with Contract Documents. **Fire protection contractor to coordinate color(s) of all sprinklers, escutcheon plates and concealed sprinkler head(s) with owner/architect prior to ordering.**
 - 1. Finished ceiling areas: Chrome plated finish sprinklers with matching two piece adjustable semi-recessed, equal to Viking model M with

escutcheon for all areas.

2. Unfinished ceiling areas: Natural brass/bronze finish pendent or upright sprinklers as required.
 3. Attic spaces shall be Tyco BB, SD, HIP, AP attic sprinklers or approved equal.
 4. Dry pendent/sidewall: Viking Model M.
- D. Mechanical Guards For Sprinklers:
1. Design equipment: Gem F774, Viking Model D-1, or approved equal.
- E. Sprinkler Cabinets And Spare Sprinklers:
1. Steel or aluminum construction with shelves and shelf holes to accommodate spare sprinklers.
 2. Red with hinged front door and label.
 3. With sprinkler wrenches compatible for each type used.
 4. Provide a stock of 12 spare sprinklers for each system, of the type and proportion to those used in each system.
 5. Design equipment: Gem F740, Reliable Model A1, Viking Model 01724A or 01725A.

2.5 ALARM EQUIPMENT

- A. Electric Waterflow:
1. Pressure switches: At main riser to indicate waterflow condition, remote low air pressure supervisory alarm, and for air compressor operation to maintain dry system air pressure.
 - a) Case: Drip proof.
 - b) Service and range: As required for air or water service.
 - c) Adjustable differential.
 - d) S.P.D.T. contacts.
 - e) 24 VDC.
 - f) Design equipment: Potter Electric, Autocall.
 2. Paddle type waterflow indicators: Adjustable pneumatic retard feature.
 - a) Dual S.P.D.T. contacts.
 - b) 24 VDC.
 - c) Design equipment: Autocall WF-5, Potter Electric VSR-D or VSR-T.

- B. Electric Tamper Switches: Supervise valves controlling water supplies in the open/proper position. Integral with the valve or separate with provisions to actuate a supervisory alarm upon valve movement and upon removal of the device cover, with mounting brackets and hardware.
 - 1. 24 VDC, S.P.D.T contacts.
 - 2. Design equipment: Potter Electric Model OSYSU-A for OS&Y valves and Model PIVSU-A for post indicator and butterfly valves.

2.6 SYSTEM COMPONENT IDENTIFICATION

- A. Control, drain and test valves shall be provided with permanently marked identification signs of baked enamel substantial metal construction. The signs shall be permanently mounted on the piping or wall at the valve, or on the valve, but shall not be hung on the valve with wires or chains which permits easy removal of the sign. The sign shall clearly indicate the valve's purpose and what portion of the structure it serves. Additional signs, shall be provided at each dry pipe valve to clearly indicate hydraulic calculation data.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The nature of the work requires coordination with other trades. Shop fabrication shall be done at the Contractor's risk. Relocation of piping and components to avoid obstructions may be necessary. Relocation, if required, shall be done at the Contractor's expense. The installation shall be performed in a workmanlike manner as determined by the Owner's Representative and in accordance with the Contract Documents, manufacturer's printed installation instructions, and submitted and Owner's Representative reviewed drawings.
- B. Piping shall not pass directly over electric panelboards, switchboards, motor control centers, and similar electric and telephone equipment. However, protection for these spaces shall be provided.
- C. Piping shall be installed concealed above finish ceiling area with sprinklers located in the quarter points of ceiling tiles where ceiling tiles are used.
- D. Provide a readily removable flushing connection consisting of a cap at each end of cross mains.
- E. Provide mechanical guards for heads in mechanical and storage spaces, less than 8 ft. above finished floor subject to mechanical damage.
- F. Pipe ball drip valves to discharge at a floor drain or to the exterior. Pipe 2 in. main drains and water motor gong drains to discharge to the exterior at approximately 24 in. above finished grade.

- G. Securely install the spare sprinkler cabinets to the building wall at the main riser.
- H. Inspector's test valves and dry system auxiliary drains shall be installed 7 ft. or less above the finished floor.
- I. Fire department connections shall be installed 3 ft. above finished grade and water motor gongs approximately 10 ft. above finished grade.
- J. Exposed pipe shall be left clean for painting.
- K. Coordinate and activate the systems or portions of the system to operational status as soon as possible.

3.2 PIPING, VALVES, HANGERS, ETC.

- A. Refer to other applicable sections. Run slightly off level to low points; provide drain valves arranged per Contract Documents.

3.3 ADDITIONAL SPRINKLERS

- A. Include an allowance for providing 10 additional sprinklers and associated piping/supports installed at locations where job conditions or equipment selections may require. Provide a credit for sprinklers, piping and supports not installed.

3.4 ELEVATOR HOISTWAYS AND MACHINE ROOMS

- A. Sidewall spray sprinklers shall be installed at the bottom of each elevator hoistway not more than 2 ft (0.61 m) above the floor of the pit.
 - 1. The sprinkler required at the bottom of the elevator hoistway by shall not be required for enclosed, noncombustible elevator shafts that do not contain combustible hydraulic fluids.
- B. Automatic sprinklers in elevator machine rooms or at the tops of hoistways shall be of ordinary- or intermediate-temperature rating.
- C. Upright, pendent, or sidewall spray sprinklers shall be installed at the top of elevator hoistways with flow switch.
 - 1. The sprinkler required at the top of the elevator hoistway by shall not be required where the hoistway for passenger elevators is noncombustible and the car enclosure materials meet the requirements of ASME A17.1, Safety Code for Elevators and Escalators.

3.5 STAIRWAYS

- A. Sprinklers shall be installed beneath all stairways of combustible construction.
- B. In noncombustible stair shafts having noncombustible stairs with noncombustible

or limited combustible finishes, sprinklers shall be installed at the top of the shaft and under the first landing above the bottom of the shaft.

- C. Where noncombustible stair shafts are divided by walls or doors, sprinklers shall be provided on each side of the separation.
- D. Sprinklers shall be installed beneath landings or stairways where the area beneath is used for storage.
 - 1. Sprinklers shall be permitted to be omitted from exterior stair towers when the exterior walls of the stair tower are at least 50 percent open and when the stair tower is entirely of noncombustible construction.
- E. Stairs Serving Two or More Fire Divisions. Sprinklers shall be installed in the stair shaft at each floor landing where two or more doors open from that landing into separate fire divisions.

3.6 TESTS

A. General:

- 1. Pipe installation shall be inspected by Owner's Representative prior to being covered by building construction or backfill.
- 2. Give the Owner's Representative advance notice of final tests. Perform tests in a safe manner. Provide written certification that tests have been successfully completed. Use NFPA Above and Below Ground Material and Test Certificate Forms.
- 3. Correct system leaks prior to final test. Do not utilize water additives, caulking, etc., to correct leaks. Provide appliances, equipment, instruments, devices and personnel.
- 4. Flushing: Follow Contract Documents and utilize open end pipe sections if possible.

B. Pressure Tests:

- 1. Hydrostatic tests: Minimum 200 psi and in accordance with NFPA 13 for two hours.
- 2. Air test: Minimum 40 psi for 24 hours with loss not to exceed 1.5 psi within the 24 hour duration.
- 3. Do not subject existing systems to excess pressures.

C. Alarm Tests:

- 1. Demonstrate activation of alarms and operational trip test and water delivery time for dry systems by use of Inspector's test valve.

3.7 SYSTEM TURNOVER

- A. Prior to final acceptance, instruct the Owner's Representative in the proper operation, maintenance, testing, inspection and emergency procedures for all systems furnished, for a period of time as needed. Provide one new original pamphlet of NFPA 25. Indicate in writing to the Owner's Representative the provisions for proper maintenance, testing, and inspection of the systems as required by local fire codes.

END OF SECTION