

**SECTION 211300 – FIRE SUPPRESSION SYSTEMS**

- 1.0 All new and renovated buildings shall be provided with automatic sprinklers throughout and fire standpipe systems. The design and installation of these systems shall be in accordance with NFPA standards, City of Philadelphia Code, and FM Global requirements. The installation of all sprinklers shall only be executed by an authorized approved sprinkler contractor.
- 2.0 All designs must be submitted to FM Global for review and approval prior to issuing such for bids.
- 3.0 A final acceptance test of the sprinkler and standpipe system must be conducted by a Contractor licensed and certified by the City of Philadelphia, Department of License and Inspection. University of Pennsylvania Fire & Emergency Services MUST be present at all system testing.
- 4.0 System Types
  - A. Generally wet-pipe sprinkler systems shall be provided throughout all buildings or structures except where other type of fire suppression systems are warranted due to the type of hazard or environmental considerations of the space(s) being protected, e.g. areas subject to freezing.
  - B. Dry-pipe sprinkler systems should be provided in areas subject to freezing; cold rooms, loading docks, unheated spaces, etc. Anti-freeze is acceptable for systems with less than 5 heads and will be considered on a case by case basis.
  - C. Single-interlock pre-action sprinkler systems should be considered in spaces containing high value equipment or contents and spaces which are highly sensitive to the effects of accidental sprinkler water discharge. Examples are:
    1. Data center/computer rooms
    2. Laboratory spaces with high value equipment/instrumentation such as NMRs, Mass Spectrometers, robotics, etc.
    3. Electrical switchgear/substation rooms
    4. Museum spaces
    5. Libraries
  - D. Other options should be considered for spaces containing high value equipment or contents and spaces which are highly sensitive to the effects of accidental sprinkler water discharge. These include Clean Agent gaseous suppression where room integrity is guaranteed (Halon replacements) and hybrid water mist systems (Victaulic Vortex). The design and installation of these types of systems shall comply with the appropriate NFPA standards and Insurance Underwriter's standards (e.g. FM Global data sheets).
  - E. New standpipe systems shall be wet, Class I type with 2-1/2 inch hose valve connections for fire department use. Hoses shall not be provided. Occupant use hoses (1-1/2 inch hose) are not permitted. Fire Standpipe Systems shall be provided for multi-story buildings as required by code.
  - F. Closed head, low expansion foam systems (6% concentrate) shall be provided for interior fuel oil storage rooms where quantities exceed 660 gallons. The design and installation of foam systems shall comply with the applicable NFPA standards and the insurance underwriter's recommendations.

## 5.0 Sprinkler Types

- A. Sprinkler heads should be frangible glass bulb type, but may be of the thermo-sensitive fusible solder link type where the sprinkler is subject to damage.
- B. Quick response sprinklers shall be provided in all occupancies except where flammable liquids are stored or handled. Quick response sprinklers should be provided in laboratories per NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.
- C. Dry pendent or dry horizontal sidewall type sprinklers may be cost effective options for small areas requiring suppression which may be subject to freezing conditions, such as small cold rooms, small outside canopy areas, etc.
- D. Use of concealed sprinklers should be considered before others in areas accessible to the public. Other sprinkler styles (pendent, upright, recessed, flush, special application, etc.) shall be chosen based on the following items: the hazard being protected, aesthetics, NFPA 13 requirements, approvals/listings, and manufacturers recommendations.

## 6.0 Fire Water Supply

- A. Fire booster pumps should be avoided and shall be provided only where the water supply is inadequate to provide and maintain the required sprinkler and/or standpipe system demands in accordance with the applicable codes and standards (see Paragraph 1).
- B. A hydrant flow test shall be obtained prior to design commencement. Flow test shall have been performed within the previous 12 months. Flow test shall be obtained from City of Philadelphia Water Department (or local jurisdiction if outside City limits).
- C. Water supplies shall be designed to meet the largest flow and pressure demands of the building fire suppression system(s). Where required, provide a fire pump in order to meet the building fire suppression fire water demand. A minimum 10 psi or 10 percent (10 percent of demand pressure at required flow) safety factor should be provided to accommodate future deterioration and increased demand on fire water supplies.
- D. All sprinkler/standpipe systems shall be hydraulically calculated in accordance with NFPA standards and Insurance Underwriter (e.g. FM Global) requirements to show that the system demand can be met by the available water supply.

## 7.0 Alarms/Monitoring/Control

- A. All valves which control the flow of water to water-based fire suppression systems shall be provided with tamper switches.
- B. Provide each sprinkler/standpipe system and/or zone with a control valve, check valve, waterflow switch, pressure gauge and test & drain.
- C. All waterflow and tamper devices shall be supervised by the main fire system panel as a trouble or alarm point as dictated by the service.
- D. Preaction sprinkler systems should preferably be actuated by heat detectors. If smoke detection is used, it should be an air sampling type system. Heat detectors will help minimize the possibility of tripping a preaction system based on a false trip of a smoke detector.

- E. All alarms and controls for a preaction sprinkler system shall be connected to a local addressable preaction panel listed and approved for release. Provide dry contacts in the local preaction panel in order to transmit alarm and trouble signals for the preaction system to the main building fire alarm panel.

#### 8.0 Materials

- A. Piping for wet systems shall be schedule 40 black steel pipe with threaded or Victaulic grooved fittings.
- B. Piping for dry-pipe and preaction sprinkler systems shall be schedule 40 galvanized. Threaded fittings for dry systems shall be either malleable or ductile; Victaulic grooved fittings are also acceptable.
- C. Fire pumps shall be electric horizontal split case. Vertical pumps shall not be installed in new buildings. Diesel fire pumps will be considered where reliable electrical power cannot be attained.
- D. Fire pump controllers and transfer switches should be manufactured by TornaTech and be equipped with the Vizitouch system (standard).
- E. All products and equipment shall be UL listed and/or FM Global approved for use as part of a fire suppression system.

#### 9.0 Testing and Maintenance

- A. Test, flush, and maintain the fire protection systems in accordance with the applicable codes and standards (see Paragraph 1).
- B. The sprinkler systems shall be designed to minimize maintenance and testing requirements.
- C. The quantity and location of Inspector's Test Connections/drains installed shall be in accordance with the applicable code and standards (see Paragraph 1).
- D. Locate test/drain connections so that their discharge will not cause damage to the building or site. Provide splash blocks where test and drain connections are discharged to grade. All test stations shall be located in areas where testing does not affect occupants or programs, and water discharge does not pool or freeze.
- E. Where standpipe roof hydrants are provided, a valve controlling the roof hydrant shall be provided on the roof within 5 feet of the hydrant.
- F. Where standpipe roof hydrants are provided, test connections capable of receiving full flow from the standpipe shall be extended through the roof.

#### 10.0 Miscellaneous Equipment and Devices

- A. Backflow prevention shall be provided where a fire protection system connects to public or potable water supplies. Backflow devices shall be installed in accordance with the Philadelphia Water Department Cross Connection Control Program.
- B. Where required by the Insurance Underwriter (e.g. FM Global) or the Authority Having Jurisdiction (AHJ), provide durable locks and chain for each interior valve controlling water to a sprinkler or standpipe system and each outside Post Indicating Valve (PIV) controlling

fire water into the building or on the site, so that these valves may be locked in the wide open position.

- C. For sprinkler systems in multi-story buildings, design each floor as an independent zone or zones, complete with a floor control valve assembly (FCVA) consisting of a control valve, flow switch, check valve, pressure gauge and test/drain connection.
- D. For each gridded sprinkler systems provide a minimum ¼ inch relief valve set to operate a maximum pressure of 175 psig or 10 psi in excess of the normal system pressure where the normal system pressure is in excess of 165 psig.
- E. Where system pressures exceed 175 psi, pressure reducing valves shall be installed. Pressure reducing valves shall be installed in accordance with applicable NFPA standards and insurance underwriter's recommendations. Pressure relief valves shall not be used.
- F. Where system pressures exceed 175 psi, fire hose valves shall be pressure reducing and field adjustable. The pressure reducing fire hose valves shall be capable of reducing the pressure in both static and flowing conditions.
- G. Test connections for pressure reducing fire hose valves shall be provided where pressure reducing fire hose valves are installed.
- H. Fire department connections shall be installed in accordance with City of Philadelphia Standards. Locations shall be approved with the City of Philadelphia fire department prior to installation. Signage indicating building name, address, system type and protected area shall be included in fire suppression system contractor's scope of work.

#### 11.0 System Documentation

- A. Provide fire protection drawings and documentation as required by the codes and standards (see Paragraph 1).
- B. As-built documentation shall be provided in both digital and print form for every project regardless of size.
- C. The fire protection drawings shall show, at a minimum, the following:
  - 1. The incoming fire service(s) into the building from a point 5 ft. outside the building,
  - 2. The main sprinkler standpipe system riser assemblies and related devices and equipment at the point where the fire services enter the building,
  - 3. Main sprinkler/standpipe manifold piping on the ground floor,
  - 4. Sprinkler standpipe riser locations and routing,
  - 5. All sprinkler/standpipe system control valve locations,
  - 6. Sprinkler system floor control valve assemblies (FCVA) at each floor of the stair or stairs,
  - 7. Test and Drain risers and connections,
  - 8. Fire hose valve and or hose valve cabinet locations,
  - 9. Releasing devices for preaction and alternative systems,
  - 10. Sprinkler system design criteria; including at a minimum,
    - a) Type of system,
    - b) Zone or area description
    - c) Design density (gpm/sq. ft.)
    - d) Design Area (sq. ft.)

- e) Type of sprinkler
  - f) Maximum sprinkler spacing (sq. ft.)
- D. Proposed sprinkler head locations shall be shown on the architectural reflected ceiling plan(s).