

# Sprinkler Systems

## *SP Applications*



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**Sprinkler systems are designed to automatically distribute water on a fire to contain the spread of the fire. A sprinkler system consists of a series of pipes and sprinkler heads at or near the ceiling of a space. The sprinkler system is fitted with sprinkler heads designed to release water on a fire.**

Fire sprinkler systems are crucial to public safety. Fire sprinklers are used to minimize injury and death in the event of a fire emergency. The most common system used in sprinkler design is the traditional wet pipe system. Sprinkler systems shall comply with Chapter 9 of 2014 NYC Building Code (BC), NYC Fire Code as well as applicable NFPA standards as modified by Appendix Q of the 2014 NYC BC.

### **Building Code**

Among the essential elements regulated by the building code and enforced by the Building Department are site safety, structural standards, fire protection, exits, height and area limitations, and accessibility. Some of the main building systems are further regulated in conjunction by the Mechanical Code, Plumbing Code, and Fuel Gas Code.

### **Fire Code**

Sprinklers may be required depending on the available access provided for firefighting operations.

*This publication is a general overview of the requirements for this type of work. There may be additional, applicable Zoning Resolution, Construction Code, Multiple Dwelling Law or Energy Code requirements.*

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### FIRST STEPS

- Review PW1 to verify scope of work
- Confirm the correct code. The Applicant is to indicate the standard, as modified by Appendix Q, used in the sprinkler system design (NFPA – 13 2007, NFPA – 13R 2007 (multi-family up to 6 stories), or NFPA – 13D 2007 (one-two family dwellings))
- Lot diagram (indicate block/lot number, dimensions of zoning and tax lot, building, yards, distance to corner street intersection, street names, street status as mapped or improved, street width, zoning use group, building occupancy group, construction classification, number of stories, buildings on adjacent lots, distance to nearest fire hydrant)
- Construction Code determinations (CCD1), if applicable

### ADMINISTRATIVE

#### DOB Forms

- **PW1** – Plan/Work Approval Application
- **PW1B** – Plumbing schedule showing new fixtures as well as fixtures to be relocated and includes sprinkler work (verify number of sprinkler heads indicated on Schedule B to match the number shown on floor plans)
- **TR1** – Indicates sprinkler systems, fire-resistant penetrations and joints, and other special inspections as applicable
- **PW3** – Cost Affidavit (verify estimated cost on PW3 to match the number of sprinkler heads or area of coverage)

#### Technical Documents

- Hydraulic calculations for hydraulically calculated systems substantiating pipe sizes shown and fire flow demands

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### Related Applications

- Standpipe
- Alterations to remove or install partitions

### BIS Required Items

- Check current Department memos and service notices
- Check all required related work types filed (SP or PL work type)

### ZONING

- N/A

### MULTIPLE DWELLING LAW

- Article 3 Section 60 (2d) Motor Vehicle Storage
- Article 6, Section 187 (1b), Egress
- Article 6, Section 189, Stair and Public Hall Construction
- Article 6, Section 194, Sprinkler heads in rooms
- Title 2-A, Section 248, Single Room Occupancy
- Article 7-B, JLWQA, and Gen. Residential occupancy of loft, commercial, or manufacturing buildings

### HOUSING AND MAINTENANCE CODE

- N/A

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### FIRE CODE

- Substandard street width – FC 503.3.2
- Sprinkler systems – FC 903

### BUILDING CODE

- Required locations, design, installation and operation of fire protection systems – [BC 901.1](#)
- Special provisions for Prior Code buildings – [BC 901.9](#)
- Where the provisions of the Code require that a building or portion of a building be equipped throughout with an automatic sprinkler system, such system shall be installed in accordance with [BC 903.3](#).
- When the domestic water is used to supply sprinklers as permitted, the number of heads in each fire section shall not exceed twenty, except that the number of heads in each fire section may exceed twenty in buildings classified in Occupancy Group R-2, or R-3 not exceeding six stories or 75 feet in height and in spaces classified in occupancy group R-2, or R-3 in buildings not exceeding six stories or 75 feet in height, provided that no more than 10 heads are supplied from any one domestic water riser. (NFPA 13-2007 section 23.1.1(d)(6) as modified by Appendix Q)
- Special inspector for sprinkler systems to witness all tests and verify system installation as well as verify that forms are transmitted to the Fire Department and DOB – [BC 1704.23](#)

### Occupancy Group Identify the type of sprinkler system being proposed: 2014 BC 902 and NFPA 13-2007 (as modified by Appendix Q)

- Wet Pipe Sprinkler System – A sprinkler system employing automatic sprinklers attached to a piping system containing water and connected to a water supply so that water discharges immediately from sprinklers opened by heat from a fire.

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- Dry Pipe Sprinkler System – A sprinkler system employing automatic sprinklers that are attached to a piping system containing air or nitrogen under pressure. The release of the air or nitrogen,(as from the opening of a sprinkler) results in the water pressure opening a valve known as a dry pipe valve, resulting in the flow of water into the piping system and out of the open sprinklers heads.
- Antifreeze Sprinkler System – Where exposure to freezing temperatures is expected, a wet pipe sprinkler system installed may employ automatic sprinklers that are attached to a piping system containing an antifreeze solution (composed of pure glycerin or propylene glycol) and is connected to a water supply. The glycerin or propylene glycol solution is discharged, followed by water, immediately upon operation of sprinklers opened by heat from a fire.
- Combination Standpipe and Sprinkler System – A system where the water piping services both 2½ in. (65mm) outlets for fire department use and outlets for automatic sprinklers.
- Limited Area Sprinkler System – An automatic sprinkler system serving fewer than 20 sprinkler heads on any single connection.
- Pre-action Sprinkler System – A sprinkler system employing automatic sprinklers that are attached to a piping system that contains air that may be under pressure, with a supplemental fire detection system installed in the same areas as the sprinklers.
- Water Spray Fixed System – A special fixed pipe system connected to a reliable fire protection water supply and equipped with open water spray nozzles for specific water discharge and distribution over the surface or area to be protected.
- Deluge Sprinkler System – Is equipped with open sprinkler heads designed to wet down an entire area involved in a fire. This system is needed when there is danger of a fire rapidly spreading throughout the building. Deluge systems are suitable for hazardous occupancies. This includes buildings in which flammable liquids or other hazardous materials are handled or stored.
- Plumbing Work Type application – may be used for up to thirty (30) sprinkler heads taken off the domestic water riser ([AC 28-401.3](#))



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- Sprinkler design, installation and water supply requirement – shall be based on the occupancy classification and commodity class (NFPA 13-2007 section 5.1 and 5.6 as modified by Appendix Q)
- Special provisions – shall apply to alterations, enlargements and additions as well as changes of use or occupancy in prior code buildings ([BC 901.9](#))

### Plans

Construction documents ([BC 903.1.2](#)) shall include drawings and specifications for the following:

1. The location and size of water supplies.
2. The location, spacing, number, and type of sprinkler heads to be used, with approximate location and size of all feed mains, valves and other essential features of the system.
3. Sprinkler system riser diagram. The riser diagram shall clearly identify number and types of existing and proposed electrical or automatic devices, sprinkler heads, valves, manifolds, pumps and pipe sizes. The riser diagram shall include: Siamese connection, curb box, valve assemblies, fire pumps, test tees, alarms and all code required components and systems.
4. Submit hydraulic calculations for hydraulically calculated systems substantiating pipe sizes shown and fire flow demands and hydraulic reference points and areas must be indicated on the plan.
5. Where a new separate system is required, show available water pressure at the top and bottom floors of each zone on the riser diagram for new systems.
6. Submit NYC DEP flow test letter giving the minimum water pressure of the water main serving the building ([BC 903.1.2](#), Item 5).
7. A diagram showing the proposed sprinkler system in relation to principal construction features of the building, such as its size, walls, columns, and partitions; and such other information as may be necessary for the system evaluation.
8. Show associated fire alarm devices such as tamper switch, flow switch etc. on the riser diagram ([BC 903.4](#)).

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9. Indicate hazard category, based on occupancy classification for sprinkler design, for proposed work and commodity class as applicable.
  - Indicate Fire Department Connection
    - Fire Department connection is required for any sprinkler system covering 2000 sq. ft. or more or having more than 36 sprinkler heads per NFPA 13-2007 section 8.17.2.2 as modified by Appendix Q
    - A minimum 3” [76mm] Single Inlet Fire Department Connection per NFPA 13R-2007 section 6.7.4 as modified by Appendix Q in accordance with the NYC BC for residential building [except R-1] 6 stories or less in height.
    - Fire Department Connections are not required for one- and two-family buildings per NFPA 13D-2007 section 4.3.3 as modified by Appendix Q/NFPA 13R section 6.7.4 as modified by Appendix Q but may be installed at the owner’s discretion.
  - Indicate notes on plan stating inspection and tests to be performed as required in [BC 903](#) and [BC Chapter 17](#)

### Indicate Source of Supply

#### Domestic Water Service

- Indicate compliance with NFPA 13-2007 section 23.1.1 (d) as modified by Appendix Q for proposed sprinkler system water supply.
- Limited area sprinkler systems serving fewer than 20 sprinklers on any single connection are permitted to be connected to the domestic service where a wet automatic standpipe is not available. Limited area sprinkler systems connected to domestic water supplies shall comply with NFPA 13-2007 as modified by Appendix Q. The domestic service shall be capable of supplying the simultaneous domestic demand and the sprinkler demand required to be hydraulically calculated by NFPA 13, NFPA 13R or NFPA 13D as modified by Appendix Q. ([BC 903.3.5.1.1](#))
- For residential buildings up to 6 stories and 1-and 2-family dwellings, a common supply main to the building, serving both sprinklers and domestic uses, may be used if provision is made to prevent flow on the domestic water system upon operation of sprinklers, and closure of the main sprinkler control valve (the house control valve) will shut off the domestic water supply. (NFPA 13R-2007 section



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6.6.3 as modified by BC Q104 and NFPA 13D-2007 section 6.2(6) as modified by BC Q103)

### Direct Street Water Connection

- Indicate direct street connection on riser diagram.
- Provide hydrant flow test letter from DEP for the proposed work when sprinkler demand is increased. Test has to be done within 2 years/ fire hydrant within 250'. (BC 903.1.2, Item 5)
- Provide calculation for pipe schedule systems to confirm acceptable residual pressure for the sprinkler head at the highest elevation (NFPA 13-2007 section 11.2.2.8.1 as modified by BC Q102)
- Where the pressure from the city water main is insufficient to comply with the requirements of this referenced standard, but is sufficient to provide at least 5 PSI (34 kPa) at the highest level of sprinklers as determined by test, an automatic, electrically driven pump installed for the purpose of boosting or increasing the city water pressure in the sprinkler system may be used subject to certain conditions. (NFPA 13-2007 section 23.2.2.4 as modified by BC Q102)
- Fire pumps must be located in a two-hour fire resistance rated enclosure. (NFPA14-2007 section 9.1.5(2)(f) as modified by BC Q105)

### Gravity Tank Capacity

- Check occupancy hazard classification for proposed work
- Provide hydraulic calculation to confirm acceptable capacity of water for fire protection for systems sized in accordance with the pipe sizing schedules. (NFPA 13-2007 section 11.2.2.10 as modified by BC Q102)
- Tank shall be at least 5,000 gallons for the combined water supply where any of the sprinkler heads are supplied from domestic water tanks. (NFPA 13-2007 section 23.2.4 as modified by BC Q102)
- Alterations of prior code systems where permitted by BC 901.9 shall follow the following:
- Verify the capacity of tank size to comply with §RS 17-2, Table 2-2.1 (1968 NYC Building Code)

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- Provide hydraulic calculation for proposed works (for number of new sprinkler head > 30 or hazard condition) §27-965 (1968 NYC Building Code)
- Confirm the capacity of automatic mechanical means of water make up is sufficient for 30 minutes of sprinkler demand. (NFPA 14-2007 section 9.2 and 9.3 as modified by BC Q 102). Reconsideration may be required by Commissioner for mechanical automatic means of make up for 20 minutes.

### Use the Correct Design Method

- Indicate design criteria on plan:
  - Design Criteria for Hydraulically Designed (NFPA 13 – 2007 section 22.4) or Pipe Schedule (NFPA 13 – 2007 section 22.5)
  - Design Criteria for Hydraulically Designed (NFPA 13R – 2007 section 6.8.1) – Design density, Hydraulically Remote Area, Hazard Occupancy, Commodity Class, number of heads calculated, K – Factor, coverage area per sprinkler head, flow, etc.
  - Design Criteria for Hydraulically Designed (NFPA 13D – 2007 section 8.1) – Design density, Hydraulically Remote Area, Hazard Occupancy, Commodity Class, number of heads calculated, K – Factor, coverage area per sprinkler head, flow, etc.
  - Pipe installed in a one- or two-family building in compliance with NFPA 13D – 2007 shall be sized by hydraulic calculation per section 8.4.4. All pressure losses must be calculated.
  - Pipe schedule design method for new sprinklers off of the existing is only permitted for systems covering 5,000 sq. ft. or less per NFPA 13-2007 section 11.2.2.3 as modified by BC Q102 or for systems where the residual pressure exceeds 50 psi per NFPA 13-2007 section 11.2.2.5 as modified by [BC Q102](#)

### **Title 1 of the Rules of the City of New York**

- [1-RCNY 24-01](#) – Construction and Maintenance of Refuse Chutes and Refuse Rooms
- [1-RCNY 29-01](#) – Installation of Automatic Sprinklers in Halls and Rooms in Class “A” Multiple Dwellings Used For Single-Room Occupancy under the Provisions of Subdivision 7-A of §4 and §248 of the Multiple Dwelling Law

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- [1-RCNY 29-02](#) – Installation of Automatic Wet-Pipe Sprinklers in Certain Class A and Class B Multiple Dwellings, Including Hotels, Under the Provisions of §67, Multiple Dwelling Law
- [1-RCNY 29-03](#) – Installation of Automatic Wet-Pipe Sprinkler Systems and Alarm Systems in Certain Class B Multiple Dwellings (Lodging Houses)
- [1-RCNY 29-04](#) – Installation of Automatic Wet-Pipe Sprinkler Systems and Alarm Systems in Certain Class B Multiple Dwellings (Lodging Houses)
- [1-RCNY 29-05](#) – Installation of Automatic Wet-Pipe Sprinklers in Fireproof Multiple Dwellings Converted to Business Use
- [1-RCNY 29-06](#) – Installation of Automatic Sprinklers in the Public Halls of Multiple Dwellings Under the Provisions of §187 (Converted Dwellings) and §218, Subdivision 5 (Old-Law Tenements), of the Multiple Dwelling Law, and of the Sprinklers in Cooking Spaces in all Types of Multiple Dwellings under the Provisions of §33 of the Multiple Dwelling Law
- [1-RCNY 29-07](#) – Installation of Wet-Pipe Sprinklers
- [1-RCNY 29-08](#) – Installation of Sprinklers in Rooms of Class B Non-fireproof Converted Dwellings and in Rooms Used for Class B Occupancy in Non-Fireproof Class A Converted Dwellings under the Provisions of §194 of the Multiple Dwelling Law
- [1-RCNY 29-09](#) – Installation of Chlorinated Poly Vinyl Chloride (CPVC) Sprinkler Pipe and Fittings

### ENERGY CODE

- N/A

### APPLICABLE BULLETINS, DIRECTIVES, PPNS, MEMOS

- [BB 2010-029](#) – This document clarifies the installation standards to be utilized when an existing automatic sprinkler system that was designed and approved under the 1968 Building Code or Prior Codes is to be altered.

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- [BB 2011-019](#) – This document clarifies the exceptions for existing buildings subject to the retroactive sprinkler requirements of Local Law 26 of 2004 (LL 26/2004).
- [BB 2012-009](#) – This document clarifies temporary sprinkler installation and compartmentation requirements for existing buildings undergoing interior alterations.
- [BB 2014-024](#) – This bulletin rescinds 3 Buildings Bulletins (BBs), 10 Technical Policy and Procedure Notices (TPPNs), 1 Directive, and 2 Memos that are no longer applicable under any code, including Memo 7-10-80.
- [LL 58/09](#) – Exposed standpipes and sprinkler risers must be painted red. Valve handles must also be painted as follows: Standpipe – red, combination valve handles – yellow, sprinkler – green. Branch piping should not be painted.
- [LL 64/09](#) – Vacant Buildings Being Demolished: Existing standpipes must be dry standpipes and have an air-pressurized alarm.
- [Directive 9/74](#) – Not required in Toilet Rooms, LL 5/73
- [Memo 4-30-74](#) – H-2 Occupancy Substituting Sprinklers In Lieu of smoke detectors
- [Memo 6-10-82](#) – Sprinkler/Drain Pipes within Stair Enclosures Local Law 31/81
- [Letter 12-3-85](#) – Sprinkler/Standpipe System in Research Laboratory as Light Hazard Occupancy
- [Letter 8-14-86](#) – Sprinkler System - RS 17-2 Water Reserve for 20-minute Duration
- [Letter 1-25-88](#) – Combined Standpipe And Sprinkler Risers In Office Buildings (low rise buildings)
- [Letter 10-7-88](#) – Combined standpipe and sprinkler systems (not permitted in Occupancy Group F)
- [Memo 10-13-88](#) – Sprinkler Requirements for Catering Establishments and Banquet Halls
- [Letter 12-12-88](#) – Combined Fire Standpipe and Sprinkler Systems (Low Rise Buildings)

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- [Letter 1-29-90](#) – Plastic Piping (for Fire Sprinkler System)
- [Letter 5-29-91](#) – Water Flow Valves (Flow Detectors) for Sprinkler Standpipe Systems

### OTHER AGENCY APPROVALS CODE

- NYS Department of Environmental Conservation: Hydrant flow test letter required for new sprinkler installation
- NYC Fire Department: variance where Fire Code provisions not met
- Landmarks Preservation Commission: approval if in Landmark District or building