

ARTICLE 16. SPRINKLER SYSTEMS

(15.1). §C26-1336.0 Installation of Sprinkler Systems.-

a. General.-Sprinkler systems required to comply with any provision of law or installed to obtain advantages under any provision of law shall be installed in accordance with the requirements of this article and the rules of the board.

(15.1.1). b. Filing and Approval of Plans for Automatic Sprinkler Systems.-

1. Before any automatic or non-automatic sprinkler equipment is installed, plans of the proposed equipment shall be submitted to the department for approval. Such plans shall be accompanied by an application for a permit and by specifications, on suitable forms adopted as standard forms by the commissioner, in such manner as may be prescribed by the commissioner.

When the equipment to be installed is an addition to an existing installation, enough of the old system shall be indicated on the plans to make all conditions clear.

2. It shall be unlawful to commence any sprinkler work required or voluntary, until the plans and application have been approved and a permit for the proposed work has been issued by the superintendent.

3. Applications, specifications and plans shall be filed only by the owner or his duly authorized agent.

4. After examination of the application, specifications and plans, the superintendent shall promptly notify the applicant, in writing, of approval or disapproval. In the case of disapproval, the superintendent shall list his criticisms and objections and such changes in plans as may be necessary to make such plans conform to the provisions of this title and to the rules of the board. When the applicant has fully corrected his plans, and has satisfactorily answered all the objections raised, such applicant shall be notified that his application and plans are approved. The superintendent may require the applicant to file a maximum of two sets of clean, correct plans on cloth before issuing a permit for the proposed work to proceed. If the structure is equipped with an approved stand-pipe system, the plans shall include a notation to such effect.

(15.2). §C26-1337.0 Scope of Plans for Sprinkler Systems.-

a. The plans for sprinkler systems shall be drawn to an indicated scale of at least one-eighth of an inch to one foot. The plans shall give the name of the owner of the property, the correct address of the property, the name and address of the applicant, and the points of the compass.

b. The plans shall show the floors of the structure and a longitudinal section or cross-section of the structure with story heights, and the essential features of construction of the structure, including the size, location and direction of joists, timbers, beams or other structural members, and walls, partitions and such other information as may be necessary.

c. The plans shall show the sizes and locations of the water supplies, and the location, spacing, number and type of sprinklers. The plans shall show the approximate location and the correct size of all feed mains, risers and connections and any valves placed therein. Such plans need show only the essential features of the equipment.

d. The application forms signed by the applicant, shall contain a statement that the equipment will be installed as shown on the approved plans, and that all details not required to be shown on the plans will be installed in accordance with the requirements of this article and the rules of the board.

e. Plans for non-automatic dry-pipe systems shall also indicate the number, type and location of the automatic fire alarm devices required.

f. Equipment for sprinkler systems shall be installed in accordance with such approved plans, unless amended plans are filed at a later date by the owner or his duly authorized agent. When such amended plans are approved, the installation shall be made in accordance with such plans. Amendment need not be filed where changes involve ten or less sprinklers or where minor adjustments are required by field conditions, provided the protection in the area affected is not impaired.

g. Where additions or alterations to an existing sprinkler system involves not more than twenty heads in a fire area an application shall be filed by the contractor stating the number of heads to be installed or relocated.

(15.3). §C26-1338.0 Test of Sprinkler Systems.-When a sprinkler system is entirely completed in accordance with the approved plans, application shall be made to the fire department for inspection and a hydrostatic pressure test of the completed installation. The test shall be conducted at the owner's risk, by his representative and before a representative of the fire department. The fire commissioner shall notify the superintendent in writing of the results of the inspection and test. When the sprinkler equipment is approved the applicant shall be so advised in writing by the superintendent.

(15.4). Definition of Sprinkler Systems.-A “sprinkler system” shall consist of a system of piping connected to one or more acceptable sources of water supply, provided with distributing devices so arranged and located as to discharge an effective spray over the interior of the building area.

(15.5.1). §C26-1339.0 Classification of Sprinkler Systems by Type.-For the purpose of this article, sprinkler systems shall be classified as:

1. Automatic Wet Pipe Sprinkler Systems.-Automatic wet pipe sprinkler systems are those systems in which all pipes and sprinkler heads are at all times filled with water or other approved liquids.

(15.5.2). 2.

(a) Automatic Dry Pipe Sprinkler Systems.-Automatic dry pipe sprinkler systems are those systems in which the pipes and sprinkler heads are filled with air, either compressed or at atmospheric pressure, and the water supply is controlled by a dry pipe valve as defined in subdivision h of section C26-1365.0.

(b) Combined Dry Pipe and Pre-action Systems-Combined dry and pre-action systems are those systems in which the dry pipe valves will operate as both type A and type B dry pipe valves as described in subdivision h of section C26-1365.0.

(15.5.3). 3. Non-automatic Sprinkler Systems.-

(a) Non-automatic sprinkler systems are those systems in which all pipes and sprinkler heads are maintained dry, the only water supply of which is a Siamese fire department hose connection.

(b) An approved automatic fire alarm system connected to the fire department headquarters, or to an approved central station of one of the fire alarm companies whose sole business is fire protection service, shall be provided in connection with each required non-automatic sprinkler system.

(15.5.4). 4. Deluge System.-A system employing open sprinklers or a combination of open and closed sprinklers attached to a piping system connected to a water supply through a valve which is opened by the operation of a heat responsive system installed in the same areas as

the sprinklers. When this valve opens, water flows into the piping system and discharges from all opened sprinklers attached thereto.

(15.6). §C26-1340.0 Approved Devices for Sprinkler Systems.-Siamese connections, fire pumps and their control devices, check, control and other valves, pipe line fittings and other units of equipment and accessories in sprinkler systems, shall be of approved makes and shall be as classified for the water pressures or other operating and service conditions to which they will be subjected. Approved devices shall include those approved by the board at any time, or those tested and approved by any nationally recognized standard testing laboratory which possesses adequate equipment, experience and competency in this field.

(15.7). §C26-1341.0 Water Supply for Sprinkler Systems.-

a. General.-Approved sources of water supply shall be classified as “automatic” and “auxiliary.” Capacities of automatic sources specified in sections C26-1342.0, C26-1345.0, C26-1346.0 and C26-1347.0 are for ordinary hazard occupancies. For light hazard occupancies these shall not be less than 50 percent of the requirements for ordinary hazard. For extra hazard they shall not be less than 150 percent of the requirements for ordinary hazard.

(15.7.1). b. Automatic Sources of Water Supply for Sprinkler Systems.-Automatic sources of water supply for sprinkler systems shall include a gravity tank, pressure tank, automatic fire pump or direct connection to the public water system.

(15.7.2). c. Auxiliary Sources of Water Supply for Sprinkler Systems.-Auxiliary sources of water supply for sprinkler systems shall include a manually actuated fire pump or Siamese fire department connection.

(15.7.3). d. Combination Sprinkler and Standpipe Tanks.-Tanks used to provide the required primary water supply to a standpipe system may also be used as a supply for an automatic sprinkler system in the structure as provided in section C26-1409.0.

(15.7.4). e. Non-automatic Sources of Water Supply for Sprinkler Systems.-Non-automatic sources of supply for sprinkler systems shall include Siamese fire department hose connections.

(15.8.1). §C26-1342.0 Gravity Tanks for Sprinkler Systems.-

a. Capacity and Elevation of Gravity Tanks.-

1. Gravity tanks for sprinkler systems shall contain an available quantity of water sufficient to supply twenty-five percent of the number of sprinkler heads in the average protected fire area for twenty minutes, and in any case at least five thousand gallons. Where there are more than two hundred and not more than four hundred sprinklers in such average protected fire area, the available quantity of water in excess of 20,000 gallons need not be greater than an amount sufficient to supply twelve and one half percent of the sprinklers in excess of two hundred in such average protected fire area for a period of twenty minutes. If the number of sprinklers in such average fire area exceeds four hundred, the available quantity of water in excess of 30,000 gallons need not be greater than an amount sufficient to supply six and one fourth percent of the sprinklers in excess of four hundred in such average protected fire area for a period of twenty minutes. The bottom of such tanks shall have an elevation of at least twenty feet above the highest line of sprinklers supplied from such tank. It shall be unnecessary to elevate gravity tanks above the highest sprinklers in pent houses or bulkheads having all area of less than twenty-five hundred square feet, exclusive of mechanical equipment rooms, unless such

pent houses or bulkheads contain a hazardous occupancy or are used for the storage of highly combustible material.

2. Where a tank supplies both sprinklers and yard hydrants, the capacity of such tank shall be at least thirty thousand gallons, and the hollow of such tank shall be at least seventy-five feet above the ground level.

3. Where a tank capacity in excess of thirty thousand gallons is required by this title, the amount of water required shall be provided in separate tanks not grouped together, except when tanks of unlimited capacities are supported on structures altogether independent of buildings and except that the superintendent may, in his discretion, permit grouping of tanks in specific cases.

(15.8.2). b. Means of Filling for Gravity Tanks.-

1. Gravity tanks shall be filled at the rate of at least sixty-five gallons per minute. Tank may be filled through a by-pass around the check valve in the discharge pipe, which by-pass shall be at least two inches in diameter. Such piping shall have therein an approved outside screw and yoke gate valve on either side of a check valve, the O.S. & Y. valves shall be kept closed except when the tank is being filled.

2. Where separate filling lines are used the filling pipe shall be carried up inside the frostproof casing as provided in paragraph one of section C26-1343.0, and may extend through the tank bottom to discharge at the top of the tank above full water level, except where the tank is located on an independent structure. The portion of such pipe inside the tank shall be of brass or copper or other non-corrosive material.

3. It shall be unlawful to feed tanks through sprinkler lines, except as otherwise provided.

4. The sprinkler and standpipe tanks may be fed from a common source of supply, either a pump or a direct service main connection, provided that there are separate feed mains from the basement or lowest story and a control valve in each feed line. Gravity tanks and pressure tanks for sprinkler supply may be fed through one riser common to both tanks, if an O.S. & Y. control valve is provided in the branch to each tank.

(15.8.3). c. Overflow Pipes for Gravity Tanks.-

1. An overflow pipe shall be provided on each gravity tank. Such pipe shall be at least one size larger than the filling pipe but in any case such pipe shall be three inches or more in diameter.

2. The top of such overflow pipe shall be at least one inch below the bottom of the spider rod hole in a steel tank for the bottom or the bottom of the flat cover joists of a wood tank, but in any case such top shall be three inches or more below the top of the tank proper.

3. The overflow pipe may extend through the bottom of the tank provided the portion inside the tank is of brass or copper or other non-corrosive metal and without joints, or such pipe may extend through the side of the tank. For tanks over roofs, overflow pipes shall terminate twenty-four inches above the roof and shall be fitted with a ninety degree elbow to discharge horizontally.

(15.8.4). d. Emergency Drains for Gravity and Pressure Tanks.-

1. Each gravity tank and each pressure tank shall be provided with an emergency drain four inches in diameter except that if a pressure tank is located on the lowest floor of the building or at grade or below grade outside the building a two inch drain may be accepted.

2. Such drain shall be equipped with a gate valve and arranged to discharge horizontally twenty-four inches above the roof. When such tank or tanks are located on a separate structure independent of buildings, such drain connections shall be allowed to discharge at a level twenty-four inches above the ground. The valve controlling the emergency drain of such tanks on a separate structure shall be located three feet or less above the ground level. Emergency drain piping from the tank up to and including the drain control valve shall be protected from freezing in an approved manner.
3. The water in all gravity tanks shall at all times, be maintained at a temperature between forty degrees Fahrenheit and one hundred degrees Fahrenheit.
4. Where direct heating of the water in a gravity tank is necessary to obtain the required temperature, the method of heating shall be in accordance with the rules of the board.
5. If tanks are in an adequately heated enclosure, interior heating of such tanks may be omitted. Tank enclosures shall be properly lighted and drained, and the pipes properly flashed.

(15.9). §C26-1343.0 Frost Protection for Sprinkler Systems.-Pipes, fittings and valves exposed to freezing temperature, unless used in a dry pipe system or a system filled with calcium chloride solution or other approved non-freezing solution, shall be frost proofed by either hair felt and builders' paper or by wood boxing or equivalent protection, in accordance with the following specifications:

(15.9.1). 1. Insulation Against Frost.-

(a) The discharge, fill, overflow and heating pipes of each tank, if not within an enclosure in which the temperature is maintained at forty degrees Fahrenheit or more at all times, shall each be frost-proofed in one of the following manners:

1. Each pipe shall be painted with two coats of red lead in linseed oil with a small percentage of litharge as a hardener; such pipe or group of pipes shall then be successively covered with: one wrapping of waterproof building paper; three layers of one-inch thick hair felt, each such layer wrapped with waterproof building paper; a covering jacket of eight-ounce or heavier canvas securely sewed in place; two coats of waterproof paint applied to such canvas jacket.
2. Each pipe or group of pipes shall be surrounded by wooden boxing consisting of an inner layer of at least five-eighths of an inch of matched sheathing separated by a two-inch air space from an outer layer made of two thicknesses of such sheathing with insulating paper between.
3. As otherwise provided in the rules of the board.

(b) All exterior surfaces of frostproofing shall be painted with at least two coats of waterproof paint except as otherwise prescribed in the rules of the board.

(15.9.2). 2. Fire Protection of Wood Boxing.-If tank connections are frost-proofed by wood boxing and are exposed to ignition from adjoining buildings, such wood boxing shall be covered by from three-quarters of an inch to one inch of cement plaster, consisting of one part of standard cement and three parts of clean sharp sand, with at most fifteen percent of slaked lime added; the plaster shall be applied to at least No. 28 U.S. gage approved expanded metal lath, securely fastened to the wood boxing, or by at least No. 24 U.S. gage, corrosion resisting metal, securely fastened in place, by one-half inch locked joints and copper or brass nails.

(15.9.3). 3. Penstock Type of Discharge.-

(a) Frostproofing may be omitted if the penstock type of tank discharge, thirty-six inches or more in diameter, is used, provided approved internal heating connections are installed. Painting shall be the same as that applied to the tank.

(b) It shall be unlawful to use the penstock type of discharge when the tank is over the roof of a structure.

(15.10). §C26-1344.0 Tank Ladders and Supports.-

a. Easy access to the top of each tank shall be provided by means of a ladder constructed as described in section C26-1417.0.

b. Tanks shall be constructed according to the requirements of this title and supporting structures shall be approved by the superintendent. Tanks not enclosed and exposed to the weather shall be covered with a double roof of acceptable construction consisting of a tight flat cover of matched boards and above this a conical roof which shall be covered with an approved roofing.

(15.11). §C26-1345.0 Pressure Tanks for Sprinkler Systems.-

a. Pressure tanks shall contain sufficient water to supply twelve and one-half percent of the number of sprinklers in the average protected fire area for twenty minutes, but there shall be at least three thousand gallons of water for a wet pipe system where supplemented by an auxiliary water supply, and at least five thousand gallons of water for a dry pipe system. Where there are more than two hundred and not more than four hundred sprinklers in such average protected fire area, the available quantity of water in excess of 10,000 gallons need not be greater than an amount sufficient to supply six and one-fourth percent of the sprinklers in excess of two hundred in such average protected fire area for a period of twenty minutes. If the number of sprinklers in such average protected area exceeds four hundred, the available quantity of water in excess of 15,000 gallons need not be greater than an amount sufficient to supply three percent of the sprinklers in excess of four hundred in such average protected fire area for a period of twenty minutes. If there is a secondary supply consisting of a gravity tank or tanks, as specified in C26-1342.0; a city connection or connections as specified in C26-1346.0 or an automatic fire pump, as specified in C26-1347.0, the total available quantity of water in the pressure tanks need not exceed 15,000 gallons. The maximum gross capacity of a single pressure tank shall be nine thousand gallons. Each such tank shall be kept at a maximum of two-thirds full of water; a minimum of one-third of its capacity shall be filled with air under a minimum pressure of seventy-five pounds per square inch. Each such tank shall be so proportioned and located that a pressure of at least fifteen pounds per square inch will be available on the highest line of sprinklers below the main roof, when all the water has been discharged from the tank.

b. Tank supports shall be figured on the basis of the tanks being full of water plus the weight of the tanks.

c. The tank shall be supplied with water through a fixed pipe, independent of the sprinkler piping, at least two inches in size. The water supply and connection shall be capable of supplying the tank at a rate of at least sixty-five gallons per minute without reducing the pressure in the tank. The tank shall have a fixed water level plate on the end of the tank opposite the gauge glass, or other acceptable device to indicate the level of the water in the tank.

d. The air compressor shall be of sufficient capacity to deliver at least sixteen cubic feet of free air per minute for tanks up to seventy-five hundred gallons total capacity and at least twenty cubic feet per minute for larger sizes.

(15.12). §C26-1346.0 Public Water System Connection for Sprinkler Systems.-

a. General-A direct connection to a city water main shall be acceptable as a supply to automatic sprinklers, provided it is capable of maintaining a pressure of at least fifteen pounds per square inch at the top of the highest sprinkler riser, with five hundred gallons of water flowing per minute at a two and one-half inch outlet from a hydrant at the street level within two hundred-fifty feet of the structure. The hydrant test shall be made between the hours of eight a.m. and five p.m. on a working day. If the pressure found in this test is insufficient to comply with the above requirement a minimum of twelve pounds per square inch at top of the highest sprinkler riser may be accepted provided all propping in the affected area and supply piping thereto four inches and under are increased one pipe size.

(15.12.1). b. Size of connections.-Subject to the requirements of the department of water supply, gas and electricity, the size of each connection shall be as large as that of the main riser, except that two six-inch connections, when taken from separate street mains, shall, at the option of the owner, be accepted in lieu of one eight-inch connection and, except in sprinkler systems in multiple dwellings, at least four inches and shall have a conveniently accessible shut-off valve fixed to it. Such valve shall be located under the sidewalk in a flush sidewalk box, of approved type, located within two feet and on the street side of the property line or, as otherwise acceptable to the superintendent. The purpose of such shut-off valve shall be clearly indicated on a sign as required by section C26-1346.0 sub-division (c)2. A four-inch, a six-inch or an eight-inch tap in a street main shall, if immediately increased to the next larger size, be considered the equivalent of a six-inch, eight-inch or ten-inch connection, respectively, or an eight-inch tap shall, if immediately increased to twelve-inch be considered the equivalent of a twelve-inch connection.

(15.12.2). c. Location of shut-off valves.

1. The location of the shut-off valve shall be indicated by an easily legible sign placed on the structure directly opposite the sidewalk flush box.

2. This sign shall have a white background with one-inch red letters, bearing the following description: "AUTOMATIC SPRINKLER SHUT-OFF VALVE...FEET OPPOSITE THIS SIGN."

3. Where the design or decoration of the front of a building may be marred by a white and red sign, the superintendent may permit the use of a brass, bronze or other metal sign with one inch letters, raised or counter-sunk one-eighth of one inch.

(15.12.3). d. House service water supply connections.-A house service water supply connection may be taken from the sprinkler water supply connection to the city main on the inlet side of the fire meter, up to one and one-half inches in diameter for a four-inch connection, and two inches in diameter for a six-inch or larger connection.

(15.12.4). e. Water Main Data.-The department of water supply, gas and electricity shall upon application and payment of such department's charge furnish a certificate to the owner or his agent stating the size of street main or mains, distance to and size of mains from which it or they are fed, the location of control valves, the static pressure on the hydrant nearest the premises and the residual pressure in the street main taken on a hydrant near the premises when the flow from the nearest hydrant is equal to the flow required under this section.

(15.12.5). f. **Booster Pump Required.**-Where the pressure from the city water supply is insufficient to comply with the requirements of this article, but is sufficient to give at least five pounds at the highest line 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 accepted under the following conditions:

1. Pumps shall be of approved centrifugal type, capable of delivering at least 250 gallons of water per minute in light hazard occupancy, 500 gallons of water per minute in ordinary hazard occupancy and 750 gallons of water per minute in extra hazard occupancy at a pressure of at least twenty-five pounds at the top of the highest sprinkler riser.
2. Pumps shall be maintained under approved automatic control with closed circuit supervisory attachment acceptable to the superintendent. The supervisory attachments shall be directly connected to a local watch engineer's office, where a competent supervisor is in attendance during twenty-four hours of each day, or directly connected to the central station of an operating fire alarm company, whose sole business is fire protective service, and which is directly connected to fire department headquarters. The supervisory alarm service shall be arranged to provide positive indication at central office or sprinkler alarm panel board that pump has operated and whenever the source of electrical supply has failed. The acceptance of local supervisory service is entirely in the discretion of the superintendent.
3. Such pumps shall also comply with the requirements of section C26-1347.0, except that no enclosure will be required.

(15.13). §C26-1347.0 Fire Pumps for Sprinkler Systems.-

- a. An approved fire pump or pumps for sprinkler systems shall receive water supply from an independent suction tank or a direct connection to the city water main or other approved source capable of supplying the pump at its rated capacity for sixty minutes. The rated capacity of the pump shall be at least five hundred gallons per minute, and shall be sufficient to supply twenty-five percent of the number of sprinklers in the average protected fire area at an average discharge of twenty gallons per minute per sprinkler at a pressure of at least twenty-five pounds per square inch on the highest line of sprinklers. This regulation shall not require a pump of capacity larger than 1,000 gallons per minute except when supplying yard hydrants.
- b. Fire pumps shall be located in a room constructed of materials or assemblies having a fire resistive rating of at least one hour, properly heated, ventilated, lighted and drained, with all openings shut off by approved fire doors, The pump room shall be accessible to the street level by means of a fireproof cut-off passage or stairway, or a direct opening from the street. Pumps shall be set on approved concrete foundations, extending at least twelve inches above the floor level. The pump may be located in a room or area containing other mechanical equipment, except when, in the opinion of the superintendent, the nature of the other equipment is such as to render such location dangerous or otherwise undesirable.
- c. A reliable source of energy for driving the pump shall be provided. For steam pumps, provision shall be made for sufficient steam power to operate fire pumps at full rated capacity, and a steam pressure of at least fifty pounds shall be maintained at the pumps at all times. Where there is more than one boiler, the pipes and valves shall be so arranged as to permit the cutting out of anyone boiler without interrupting the steam supply to the pump from the other boilers.

d. Where electric current is taken from an approved underground or overhead public service, it shall be considered an acceptable source of power supply.

e. Where the power supply is from overhead lines and can be obtained from two separate street feeders adjacent to the property, two separate and distinct services shall be installed.

f. Power lines shall be protected by approved conduits from a point where they enter the structure to the control panel in the pump room.

g. Private power plants shall be located in cut-off rooms constructed of materials or assemblies having a fire resistive rating of at least four hours with openings in fire walls shut off by approved automatic fire doors.

(15.13.1). h. Transmission Lines.-The lines between the power plants and the pump room shall be of such number, so arranged, and so located as to minimize the chance of interrupting service to the motor, due to accident to the lines. All wiring in the pump room shall be in approved conduits.

(15.13.2). i. Load and Voltages.-

1. Each line between the power plant and pump room shall be of such size that the load carried will be within its safe carrying capacity as fixed in title B of chapter thirty of the code.

2. Where direct current motors are used, the voltage at the motors shall not drop more than five percent below the voltage rating of the motors when the pumps are being driven at rated output, pressure and speed, and the lines between motors and power stations are carrying their peak loads. When alternating current motors are used, the voltage at the motors under such conditions shall not drop more than eight percent below the voltage rating of the motors.

(15.13.3). j. Overload Protective Devices.-

1. The overload protective devices at the power plants, and where provided at various points on the lines, shall be of such rating and so set that they will open the circuit only under short circuit conditions.

2. An approved circuit breaker, set at one hundred percent above, the circuit breaker on the pump control panel, shall be installed in a protecting steel cabinet, at a point where feed lines for the pump enter the structure.

(15.13.4). k. Transformers.-Transformers, when installed, shall comply with title B of chapter thirty of the code.

(15.14). §C26-1348.0 Sprinkler Discharge.-For computing the capacity of water supplies other than at the fire pump, standard one-half inch sprinkler heads shall be assumed to have an average discharge of twenty gallons per minute.

(15.15). §C26-1349.0 Fire Area.-

a. For the purposes of this article, a fire area is any floor space, enclosed on all sides by exterior walls or fire walls or a combination of both, constructed in accordance with article eleven of this title, and sections C26-412.0 through C26-467.0.

b. The number of sprinklers in the average protected fire area shall be determined by the number of sprinklered fire areas or stories in such structure. In determining the required capacity of water supplies, the number of sprinklers in the average protected fire area may exclude those located in low positions, such as under benches, low shelves, closets and platforms and in blind spaces. No fire area or story with a net area of less than thirty percent of the typical floor shall be used in averaging the number of sprinklers required.

(15.16). §C26-1350.0 Fire Department Connection.-

- a. Every automatic or non-automatic sprinkler system shall be provided with at least one approved two-way Siamese hose connection.
- b. Structures facing on only one street shall have a Siamese hose connection for each two hundred fifty feet or fraction thereof of street frontage of the protected structure.
- c. Structures at the corner of two intersecting streets shall have a Siamese hose connection on each street front of the protected structure when continuous frontage is over two hundred fifty feet, or when the shortest frontage is over twenty-five feet.
- d. Structures fronting on two streets not intersecting shall have one Siamese hose connection for each two hundred fifty feet, or fraction thereof of each street frontage of the protected structure.
- e. Structures fronting on more than two streets where frontage is continuous shall have two Siamese hose connections where the total frontage is three hundred feet or less. Where the total frontage is greater than three hundred feet, there shall be one Siamese hose connection on each street frontage. When street frontages are not continuous there shall be at least one Siamese hose connection on each street frontage.
- f. Piping from the Siamese connection to the sprinkler riser, or trunk main shall be four inches in diameter when supplying a four-inch riser or feed main, but need not be more than five inches in diameter when supplying larger riser or feed mains. When more than one Siamese is required the piping from each Siamese connection need not exceed 4 inches in diameter.
- g. Siamese hose connections installed after January first, nineteen hundred thirty-eight, except those for fire boat use, shall be three inch, female connections. Siamese hose connections on piers, warehouses, and similar structures, intended for fire boat use, shall be at least three and one-half inch female connections with standard fire department threads.
- h. It shall be unlawful to make fire boat connections to a sprinkler equipment supplied with water directly from a city main containing potable water.
- i. The Siamese hose connection shall be placed between eighteen inches and three feet above the sidewalk or in other locations acceptable to the superintendent, in a horizontal position accessible to the fire department. Each inlet shall be provided with a clapper valve machined to a true face.
- j. If not of the flush type, at least three feet shall be maintained between the centers of automatic sprinkler and standpipe Siamese hose connections.
- k. Each Siamese hose connection shall be designated by raised letters at least one inch in height, cast in the fitting in a clear and prominent manner and showing the service designated. If the entire structure is sprinklered the fitting shall be marked "Auto Spkr." Where only a portion of the building is protected a metal sign indicating the portion protected shall be securely fastened to or above the Siamese connection. When areas protected are scattered throughout premises, the sign shall read "Part Sprinklered." Siamese connections for structures erected after January first, nineteen hundred thirty-eight, shall be placed in a wall recess of ample size to preclude projection of Siamese connections beyond the property line and to permit the convenient attachment of fire department hose, or shall be the flush type of Siamese hose connection.
- l. Where structural conditions prevent the installation of wall or flush type Siamese, the superintendent may permit sidewalk riser to be used. Where this type installation is used or a defective sidewalk riser is replaced, brass or other non-corrosive material must be used.

m. In each fire department hose connection there shall be an approved straightway check valve installed in a horizontal position; the piping shall be arranged to drain between the check valve and the Siamese connection by an approved ball drip, having a three-quarter inch pipe connection, or by a three-quarter inch gate valve with outlet plug.

n. The caps of each automatic sprinkler Siamese connection shall be painted green and the entire Siamese connection of a non-automatic sprinkler system shall be painted aluminum.

(15.17.1). §C26-1351.0 Automatic Sprinkler Systems Classified by Sources.-

a. One Source Systems.-The term “one source system” shall mean a system supplied with water from any one of the automatic sources specified in section C26-1341.0.

(15.17.2). b. Two Source Systems.-The term “two source system” shall mean a system supplied with water from a combination of any two of the automatic sources; two pressure or two gravity tanks with a total water capacity twice that required for a one source supply shall be accepted as a two source system. Direct connection to the city water supply on two different streets, so located that the closing of the controlling valve on one main will leave the main on the other street open, shall be accepted as a two-source system; a direct connection to the city water supply with either a gravity tank or a pressure tank, shall be accepted as a two source supply.

(15.17.3). §C26-1351.0 Sprinkler Systems Classified by Occupancies.-

a. Light hazard occupancies: This class includes buildings housing occupancies such as:

- Apartments
- Asylums
- Churches
- Clubs
- Colleges and universities
- Dormitories
- Dwellings
- Hospitals
- Hotels
- Institutions
- Libraries
- Museums
- Office buildings
- Prisons
- Public buildings
- Rooming houses
- Schools
- Tenements

1. The rules for installation of sprinkler systems in light hazard occupancies shall apply to all portions of the occupancies listed above or similar light hazard occupancies, except that in certain sections of the above occupancies such as attics, basements, kitchens, laundries, storage areas and work rooms, ordinary hazard spacing with light hazard pipe sizing and water supplies shall be required.

2. The rules for installation of sprinkler systems in light hazard occupancies may also apply in small stores and similar occupancies incidental to the properties listed above, provided such occupancies do not individually exceed 3,000 square feet in floor area in anyone store in any floor and provided floor openings are properly protected.

3. It is important that sprinkler systems designed for light hazard occupancies shall not be installed in any building, the occupancy of which is likely to be changed subsequently to a classification not so listed.

b. Ordinary hazard occupancies: This class includes buildings housing occupancies such as:

- Abrasive works
- Automobiles, garages, sales and service
- Bakeries
- Beverage manufacturing
- Bleacheries
- Boiler houses
- Bottling works
- Breweries
- Brick, tile, and clay storage and manufacturing
- Canneries
- Cement plants
- Cereal mills
- Chemical works-Low hazard
- Chemical works-Ordinary hazard
- Clothing factories
- Cold storage warehouses
- Confectionery products mfg.
- Cotton and woolen mills
- Dairy products mfg. and processing
- Distilleries
- Dry cleaning except those using volatile inflammable oils
- Dyeing and print works
- Electric generating stations
- Flour mills
- Foundries
- Fur processing
- Glass and glass products factories
- Grain elevators, tanks, and warehouses
- Ice manufacturing
- Laundries
- Leather goods mfg.
- Lithographing
- Macaroni factories
- Machine shops
- Meat packing and curing
- Mercantiles
- Metal working
- Millinery manufacturing
- Mining properties
- Paper and pulp mills
- Pharmaceutical mfg.
- Piers and wharves

Power plants
Printing and publishing
Restaurants
Rope, cordage and twine factories
Shoe factories
Slaughter houses
Smelters
Steel mills
Sugar refining
Tanneries
Television studios
Textile knitting and weaving mills
Theatres and auditoriums
Tire manufacturing
Tobacco products mfg.
Warehouses and storage
 General
 Household furniture
 Tobacco
Watch and jewelry manufacturing
Waterworks and pumping stations
Wineries

Where hazards in those buildings or portions of buildings of the above occupancies are severe as determined by the fire commissioner, extra hazard rules shall apply.

c. Extra hazard occupancies: This class includes only those buildings or portions of buildings housing occupancies where the hazard is severe as determined by the fire commissioner.

These include occupancies such as:

Aircraft hangars
Chemical works-using volatile inflammable oils
Cotton picker and opening operations
Dry cleaning plants in which volatile inflammable oils are used
Explosives and pyrotechnics manufacturing
Linseed oil mills
Linoleum and oil cloth manufacturing
Oil refineries
Paint shops
Pyroxylin plastic manufacturing and processing
Shade cloth manufacturing
Solvent extracting
Varnish works

-and other occupancies involving processing, mixing, storage and dispensing of volatile flammable liquids. Storage garages shall not be included in this classification.

(15.18). §C26-1352.0 Sprinkler Spacing.-

A. General Sprinkler heads shall be spaced as hereinafter provided.

(15.18.1). B. Sprinkler spacing in heavy timber or mill construction.-

1. Under heavy timber or mill construction ceilings of smooth solid plank and timber construction, with five- to twelve-foot bays, one line of sprinklers shall be placed in the center of each bay and the maximum permissible distance between the heads on each line shall be:

a. For standard one-half inch heads-

1. With light hazard occupancy, the protection area allotted per sprinkler shall not exceed 168 square feet with the distance between lines and between sprinklers on lines not in excess of 14 feet.

With ordinary hazard occupancy, the protection area allotted per sprinkler shall not exceed 100 square feet with the distance between lines and between sprinklers on lines not in excess of 12 feet. The following table gives the proper spacing of sprinklers on lines in bays of given width. Measurements should be taken from center of beams or trusses.

8 feet in 12-foot bays;

9 feet in 11-foot bays;

10 feet in 10-foot bays;

11 feet in 9-foot bays;

12 feet in 6- to 8-foot bays.

With extra hazard occupancy, the protection area allotted per sprinkler shall not exceed 80 square feet with the distance between lines and between sprinklers on lines not in excess of 10 feet.

b. For approved type one-inch heads-for light and ordinary hazards:

20 feet in 5- to 12-foot bays

c. For approved type one and one-quarter inch heads for light and ordinary hazards:

25 feet in 5- to 12-foot bays

d. For spray sprinklers see section C26-1352.2.

2. Measurements shall be taken from center to center of timbers.

(15.18.2). C. Sprinkler spacing under ceilings of modified or semi-mill construction.

1. This is a modified form of standard mill construction in which the bays usually are from three to seven feet wide and beams are supported on girders. Where bays are less than three feet wide this shall be treated as open joist construction.

2. Where girders and beams are framed into each other the construction is designated as panel construction. Under such construction sprinkler branch lines usually shall be run at right angles to the beams or panels.

3. Where beams are six-inch by twelve-inch or smaller, including thickness of nailing strips on steel beams, sprinklers may be placed under beams and in bays, depending on the width of bays and distance between girders, occupancy and other conditions. Sprinklers shall be "staggered" on adjacent branch lines. Where beams are larger than six-inch by twelve-inch, including thickness of nailing strips on steel beams, sprinklers shall be placed in the bays. Sprinklers shall be staggered in alternate bays or arranged "two and one" depending upon width of bays and distance between girders.

a. With standard one-half inch heads:

1. With light hazard occupancy, the protection area allotted per sprinkler shall not exceed 144 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet.

2. With ordinary hazard occupancy, the protection area allotted per sprinkler shall not exceed 90 square feet with the distance between lines and between sprinklers on lines not in excess of ten feet.

Where lines are run in beam panels sprinklers may be staggered not to exceed twelve feet apart on a line. Where beams are supported on top of girders and sprinklers are spaced 1 1/3, 1 1/2, 2 1/2 or 3 beam spaces apart, a progressive stagger shall be used.

3. With extra hazard occupancy, the protection area allotted per sprinkler shall not exceed 80 square feet with the distance between lines and between sprinklers on lines not in excess of ten feet.

b. Approved type one-inch sprinklers shall be spaced as may be required by the superintendent.

c. Approved type one and one-quarter inch sprinkler shall be spaced as may be required by the superintendent.

d. For spray sprinklers see section C26-1352.2.

(15.18.3). D. Sprinkler spacing in open joisted construction:

Wood joist or wood plank and beam construction with bays less than three feet wide, center to center, and construction consisting of combustible flooring on steel joists not conforming to definition of bar joists in section C26-1352.0 sub-division E shall be treated as joist construction. Under open-finish joisted construction, ceilings, floors, decks, and roofs, the lines shall be run at right angles to the joists and the sprinklers shall be "staggered" so that they will be opposite a point one-half the distance between sprinklers on the adjacent lines.

a. For standard one-half inch heads:

1. With light and with ordinary hazard occupancy, the protection area allotted per sprinkler shall not exceed eighty square feet and the distance between sprinklers shall not exceed eight feet at right angles to joists or ten feet parallel with the joists with the end sprinklers on alternate lines not more than two feet from walls or partitions and the end sprinklers on other lines not more than four feet from walls or partitions. Open joisted bays, with joists on top of girders, ten feet one inch to twelve feet six inches, in width, require two lines of sprinklers except where numerous bays of this width prevail, in which case two and one lines may be installed in adjoining bays, with two lines in the bays next to side or end walls.

In small rooms the exact number of sprinklers shall be determined by the superintendent in accordance with the width of bay, hazards of occupancy, water pressure, etc. The maximum allowable distance between sprinklers on lines shall be eight feet and the maximum allowable distance between lines shall be limited to ten feet. In bays eleven feet or twenty-two feet in width one and two lines respectively may be placed in each bay with the sprinklers not over seven feet apart. Where there are two sets of joists under a roof or floor and there is no flooring over the lower set, sprinklers shall be installed above and below the lower set of joists where there is a clearance of from six inches to twelve inches between the top of the lower joist and bottom of the upper joist.

2. With extra hazard occupancy, the protection area allotted per sprinkler shall not exceed 70 square feet and the distance between sprinklers shall not exceed seven feet at right angles to the joists or ten feet parallel with the joists.

b. For one inch approved type heads for light and ordinary hazards-Only one line of sprinklers shall be required in each bay where girders project below the under side of the joists and divide the ceiling into bays not exceeding twenty feet in width, measured from center to center of girders. In bays exceeding twenty feet in width at least two lines shall be installed in each such bay, and in no case shall the distance between adjacent lines exceed twenty feet. The distance between heads on each line shall be sixteen feet or less, and the end heads on alternate lines shall be spaced four feet or less from a wall or partition.

c. For one and one-quarter inch approved type heads for light and ordinary hazards-Only one line of sprinklers shall be required in each bay where girders project below the under side of the joists and divide the ceiling into bays not exceeding twenty-five feet in width measured from center of girders. One line shall be placed in the center of each bay. In bays exceeding twenty-five feet in width at least two lines shall be installed in each bay and in no case shall the distance between adjacent lines exceed twenty-five feet. The distance between the heads on each line shall be twenty feet or less and the end head on alternate lines shall be spaced five feet or less from a wall or partition.

d. For spray type sprinklers see section C26-1352.2.

(15.18.4). E. Sprinkler spacing in bar joist construction:

Bar joists construction.-The term "bar joist construction" refers to construction employing joists consisting of steel truss-shaped members formed of rods or small steel shapes.

a. For standard one-half inch sprinklers:

1. With light hazard occupancy-Incombustible floor or roof deck. The protection area allotted per sprinkler shall not exceed 196 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet.

Combustible floor or roof deck. The protection area allotted per sprinkler shall not exceed 144 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet.

2. With ordinary hazard occupancy:

Incombustible floor or roof deck. The protection area allotted per sprinkler shall not exceed 100 square feet. Where spacing of joists is three feet or more, the distance between lines and between sprinklers on lines shall not exceed twelve feet. Where spacing of joists is less than three feet the distance between lines shall not exceed twelve feet, with the distance between sprinklers on lines not in excess of eleven feet.

Combustible floor or roof deck. The protection area allotted per sprinkler shall not exceed ninety square feet. Where spacing of joists is three feet or more, the distance between lines and between sprinklers on lines shall not exceed twelve feet. Where spacing of joists is less than three feet, the distance between lines shall not exceed eleven feet, with the distance between sprinklers on lines not in excess of ten feet.

3. With extra hazard occupancy:

Incombustible floor or roof deck. The protection area allotted per sprinkler shall not exceed ninety square feet, with the distance between lines and between sprinklers on lines not in excess of ten feet.

Combustible floor or roof deck. The protection area allotted per sprinkler shall not exceed eighty square feet with the distance between lines and between sprinklers on lines not in excess of ten feet.

4. The distance between sprinklers and floor or roof deck may be increased where conditions warrant but the distance shall not exceed sixteen inches. Sprinklers on alternate lines shall be staggered.
 - b. For approved type one-inch heads for light and ordinary hazards.-Area per sprinkler not to exceed 360 square feet and distance between lines or sprinklers on lines not to exceed twenty feet.
 - c. For approved type one and one-quarter-inch heads for light and ordinary hazards.-Area per sprinkler not to exceed 560 square feet and distance between lines or sprinklers on lines not to exceed twenty-five feet.
 - d. For approved type spray sprinklers see section C26-1352.2.
- (15.18.5). F. Sprinkler spacing under sheathed or plastered ceilings.-
- a. With standard half-inch heads:
 1. With light hazard occupancy, if sheathing is the equivalent of plasterboard not less than half inch in thickness or is of metal, or of wood lath and plaster, the protection area allotted per sprinkler shall not exceed 168 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet. Sprinklers need not be staggered.

Where sheathing is combustible, such as matched boarding, the protection area allotted per sprinkler shall not exceed 120 square feet with the distance between lines and between sprinklers on lines not in excess of twelve feet. In basements with such combustible sheathing the distance between lines and between sprinklers on lines shall not exceed ten feet. With sheathing of light combustible material, the spacing shall be the same as for open joists.
 2. With ordinary hazard occupancy, under smooth sheathed ceilings, provided the sheathing is the equivalent of plasterboard, not less than half inch thick, or is of metal, or of wood lath and plaster, if tight and in good repair, with no openings to joist channels, the protection area allotted per sprinkler shall not exceed eighty square feet with the distance between lines and distance between sprinklers on lines not in excess of ten feet. Sprinklers need not be staggered.

Where wood or other sheathing of similar combustibility is used as a fire stop, the spacing of the sprinklers shall be the same as for open joist construction. A protection area of 100 square feet with a distance between lines and between sprinklers on lines not in excess of twelve feet may be allotted for sprinklers under suspended ceilings of combustible construction provided there is a full complement of sprinklers immediately above such ceilings and the attic space is unfloored and unoccupied. Under smooth sheathed ceilings with cement or gypsum plaster on metal lath or the equivalent, the protection area allotted per sprinkler shall not exceed 100 square feet with the distance between lines and between sprinklers on lines not in excess of twelve feet.
 3. With extra hazard occupancy, where sheathing is the equivalent of metal lath and cement plaster, the protection area allotted per sprinkler shall not exceed 80 square feet with the distance between lines and between sprinklers on lines not in excess of ten feet. The sprinklers need not be staggered. For other sheathing of lesser value as a fire stop, the spacing shall be the same as for open joist construction.
 - b. For approved type one-inch heads for light and ordinary hazards: One line of sprinklers shall be placed in the center of each bay twenty feet or less in width and the distance

between the heads on each sprinkler line shall be twenty feet or less. Bays in excess of twenty feet in width shall require at least two lines of sprinklers and in no case shall the distance between adjacent lines exceed twenty feet.

c. For one and one-quarter inch approved type heads for light and ordinary hazards-One line of sprinklers shall be placed in the center of each bay twenty-five feet or less in width and the distance between the heads on each line shall be twenty-five feet or less. At least two lines of sprinklers shall be, placed in each bay exceeding twenty-five feet in width and in no case shall the distance between adjacent lines exceed twenty-five feet.

d. For spray type sprinklers see section C26-1352.2.

e. Support of piping-Sprinkler piping shall be supported independently of the sheathing.

(15.18.6). G. Sprinkler spacing in class 1 fireproof construction-The requirement of subdivision B of this section shall apply as far as practicable in class 1 fireproof construction. The rule may be modified to arrange the spacing of heads to protect the contents rather than the ceilings.

The term “fire-resistive” refers to construction such as reinforced concrete on protected steel supports. “Incombustible” refers to construction such as precast concrete, gypsum or steel floor or roof deck on unprotected steel supports.

With these types of construction the location and arrangement of sprinklers shall be such that adequate protection will be given the building contents and keep any unprotected steel cool. Where the type of construction is “incombustible” the arrangement of sprinklers shall be as indicated for mill or semi-mill construction depending upon the spacing and arrangement of beams and girders. For spacing under bar joist construction see subdivision E of this section.

1. With light hazard occupancy, the protection area allotted per sprinkler shall not exceed 196 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet.

2.

a. With ordinary hazard occupancy, the protection area allotted per sprinkler shall not exceed 100 square feet with the distance between lines and between sprinklers on lines not in excess of twelve feet, except as covered by paragraph d of this subdivision.

b. Under smooth ceilings or under flat-slab concrete construction branch lines may be run in either direction.

c. Under so-called joisted type of concrete construction sprinklers shall be staggered across the joist.

d. In unobstructed bays and under flat slab reinforced concrete construction where lines are six feet to seven and one-half feet apart; sprinklers may be spaced one hundred square feet per sprinkler with sprinklers staggered on alternate lines.

3. With extra hazard occupancy, fire protection area allotted per sprinkler shall not exceed ninety square feet with the distance between lines and between sprinklers.

a. For standard one-half inch heads:

on lines not in excess of ten feet.

b. For approved one-inch heads for light and ordinary hazards, distance between sprinklers on a line and between lines shall not exceed twenty feet.

c. For approved one and one-quarter inch heads for light and ordinary hazards, distance between sprinklers on a line and between lines shall not exceed twenty-five feet.

d. For spray type sprinklers see section C26-1352.2.

(15.18.7). H. Distance of sprinklers from walls.-The maximum distance from a wall or partition to the first head on a sprinkler line shall be one-half the allowable distance between the heads on such line. Additional heads may be required in the narrow pockets formed by bay timbers or beams and wall if such pockets are more than six inches wide in non-fireproof structures, or more than twelve inches wide in fireproof structures. Where beams, girders, columns, walls, partitions or other obstructions prevent the effective discharge of water, additional heads shall be installed to protect the entire area effectively.

(15.18.8). I. Sprinklers in vertical shafts.

1. In vertical shafts having combustible sides, heads shall be provided within such shafts in addition to the head or heads at the tops of shafts as follows:

a. One standard, spray or sidewall one-half inch head for each two hundred square feet of combustible surface.

b. One approved type one-inch head for each four hundred square feet of combustible surface.

c. One approved type one and one-quarter-inch head for each five hundred square feet of combustible surface.

2. Such sprinklers shall be installed at each floor where practicable, and always when the shaft is trapped.

3. Where practicable, sprinklers shall be staggered at the alternate floor levels, particularly when only one sprinkler is installed at each floor level.

4. In shafts constructed of incombustible material sprinklers shall be located at top of shaft with control valve accessibly located outside of shaft.

5. In incombustible elevator shafts:

a. The sprinkler supply riser and all sprinkler branch lines not directly supplying the shaft sprinklers, shall be located outside the shaft.

b. Sprinkler branch lines in shafts shall supply sprinklers at not more than one floor level.

c. Shut-off valves for sprinklers shall be provided and located outside the shaft so as to be readily accessible.

d. Sprinklers shall be provided at top and bottom of shaft and shall be placed to avoid damage from elevator car.

(15.18.9). J. Sprinkler spacing under pitched or curved roofs or Quonset type buildings.

1. Under non-fireproof construction pitched roofs sloping more steeply than one foot in three, sprinkler heads shall be located in the peak of the roof, and those on either side of the peak shall be spaced according to the foregoing requirements. The distance between heads shall be measured on a line parallel with the roof. Where the roof meets the side wall or the floor line, the heads shall be placed distant from such intersection not more than the distances as follows:

(a) For standard one-half-inch heads, three and one-half feet.

(b) For approved type one-inch heads, seven feet.

(c) For approved type one and one-quarter-inch heads, eight and one-half feet.

(d) For spray type sprinklers, see section C26-1352.2.

2. In lieu of heads located in the peak of the roof, heads may be spaced at distances from the peak of the roof measured on a line parallel with the roof not exceeding the following:
 - (a) For standard one-half-inch heads, two and one-half feet.
 - (b) For approved type one-inch heads, five feet.
 - (c) For approved type one and one-quarter-inch heads, six and one-quarter feet.
 - (d) For spray type sprinklers, see section C26-1352.2.
3. In sawtooth roof construction the distance of the end heads on the branch line from the peak of the sawtooth shall not exceed the following:
 - (a) For standard one-half-inch heads, two and one-half feet.
 - (b) For approved type one-inch heads, five feet.
 - (c) For approved type one and one-quarter-inch heads, six and one-quarter feet.
 - (d) For spray type sprinklers, see section C26-1352.2.
4. Under roofs of fireproof construction the sprinklers shall be spaced in accordance with the rules applying to fireproof construction.
5.
 - a. Under curved roofs, sprinklers shall be spaced in accordance with the foregoing requirements for the closest comparable type of ceiling construction. For other than fire-resistive construction the spacing shall be based on ceiling coverage. Where roofs are curved down to the floor line the horizontal distance measured at the floor level from the side wall or roof construction to the nearest sprinklers shall not be greater than one-half the allowable distance between sprinklers in the same direction.
 - b. Under curved roofs of steel with ribs six inches deep, four feet apart, the spacing for ordinary hazard occupancy shall not exceed 90 square feet of ceiling area per sprinkler, with the sprinklers preferably staggered.

Where complete wetting of the ceiling surfaces is desired to avoid damage to the light steel members, sprinklers may need to be spaced somewhat more closely.
 - c. Where extra hazard occupancy spacing of sprinklers is used under pitched or curved ceilings of other than fire-resistive construction, as in aircraft storage or servicing areas, the spacing as projected on the floor shall be not wider than required for extra hazard occupancies, but in no case shall the spacing of the sprinklers at the roof or ceiling be wider than required for ordinary hazard occupancies.

(15.18.10). K. Sprinkler spacing in motion picture film storage vaults:

Vaults used for the storage of inflammable motion picture films shall have one one-half inch head for each sixty-two and one-half cubic feet of available storage space.

(15.18.11). L. Sprinkler spacing in special locations and permissible variations:

1. In high pressure boiler rooms, or over electric generating, power and transforming apparatus, or over their controlling devices and switchboards, and similar special locations where water from the fire extinguishing equipment might be detrimental, the sprinkler lines and heads may be omitted where approved by superintendent.
2. Sprinklers shall be placed throughout premises, including basements and lofts, under stairs, inside elevator wells, in belt, cable, pipe, gear and pulley boxes, inside such small enclosures as drying and heating boxes, tenter and dry-room enclosures, chutes, conveyor trunks, and all cupboards and closets, unless such enclosures have tops entirely open or covered with one-sixteenth inch glass having a number 16 steel wire gauge one-third inch mesh wire screen under the glass or covered with cheesecloth or paper, and are so located that sprinklers can properly spray into them. It shall be unlawful to omit sprinklers in any

room merely because it is damp, wet or of fire resistive construction, except by written permission of the superintendent. Where the application of water to the contents of an area would produce or increase a fire hazard, the installation of sprinklers may be omitted with the written permission of the superintendent.

a. Sprinklers shall be installed in all blind spaces enclosed by combustible construction, as in walls, floors and ceilings where it is practicable to install sprinklers, except as modified by paragraph b below. In spaces formed by studs or joists, sprinkler protection shall be provided where there is six inches or more clearance between the inside or near edges of the studs or joists which form the opposite sides of the space. In bar joist construction, sprinklers shall also be installed whenever the total depth of the space exceeds fourteen inches.

b. Permission may be given to omit sprinklers from combustible blind spaces where the following conditions prevail:

1. Where the ceiling is attached directly to the underside of the supporting beams of a combustible roof or floor or otherwise installed to make the installation of sprinklers impracticable.

2. Where a concealed space exceeds six inches between structural members but is very limited in area and does not extend to another fire area provided fire or draft stops are installed to subdivide the areas. Such fire or draft stops shall be provided at each floor level for vertical and at approximately fifty feet intervals for horizontal divisions or at closer intervals if required by the superintendent.

4. Decks. Sprinklers shall be installed under decks and galleries unless they do not exceed four feet in width.

5. Ducts. Sprinklers shall be installed under ducts which arc over four feet wide, and under ducts of less width if distribution from ceiling sprinklers is obstructed.

6. Sprinklers may be omitted from portable metal lockers or cabinets unless such lockers or cabinets contain highly inflammable material, and at the discretion of the superintendent sprinklers may be omitted from ornamental entrance lobbies where such omission will introduce no unusual hazard.

(15.18.12). §C26-1352.1 Sidewall Sprinklers.-Sidewall sprinklers are special purpose sprinklers and ordinarily shall not be substituted for regular automatic sprinklers.

a. Sidewall sprinklers shall be located not more than 10 feet apart on walls for ordinary hazard occupancies and not more than 14 feet apart for light hazard occupancies. Deflectors shall be at a distance from walls and ceiling not exceeding six inches and never less than four inches. In no case shall the protected area per sprinkler exceed that for an ordinary sprinkler under the same occupancy classification.

b. Rooms having widths in excess of 15 feet up to 30 feet shall have sprinklers on two opposite walls with spacing as above required and sprinklers regularly staggered. Where rooms are over 20 feet in width special consideration shall be given to additional sprinkler protection required to supplement the protection given by the sprinklers along the sidewalls. The installation of sidewall sprinklers other than beneath smooth ceilings may be done only with the approval of the superintendent.

c. Special consideration shall be given to placing sidewall sprinklers so that they will be favored to the greatest possible extent in receiving the heat from a fire and at the same time most effectively distribute the water discharged by them.

(15.18.13) §C26-1352.2 Automatic Spray Sprinkler Systems.-For ordinary hazard occupancies:

(15.18.13.1) A.

1. Approved makes and types: Spray sprinklers shall be of approved makes and types with nominal 1/2 inch discharge orifice.

2. Application:

a. The installation of automatic spray sprinklers shall comply with all other rules except as modified by this section.

b. Spray sprinklers may be installed to protect any building construction and ordinary hazard occupancy capable of being protected by regular sprinklers. Automatic spray sprinklers may be substituted for regular automatic sprinklers in existing installations.

c. Where spray sprinklers are used with light hazard occupancies, spacing and area per sprinkler shall not exceed the limits set forth in the following table:

Type of construction	Incombustible		Combustible	
	Maximum square feet per sprinkler	Maximum spacing of sprinklers	Maximum square feet per sprinkler	Maximum spacing of sprinklers
Smooth ceiling, sub-section B	200	15	200	15
Beam and girder, sub-section C	200	15	200	15
Bar joist, sub-section D	168	15	168	15
Joisted, sub-section E	Same as ordinary hazard			
Sheathed ceiling, sub-section F	200	15	168	14

d. Where spray sprinklers are used with extra hazard occupancies, spacing and area per sprinkler shall not exceed the limits set forth in the following table:

Type of construction	Incombustible		Combustible	
	Maximum square feet per sprinkler	Maximum spacing of sprinklers	Maximum square feet per sprinkler	Maximum spacing of sprinklers
Smooth ceiling, sub-section B	90	12	80	12
Beam and girder, sub-section C	90	12	80	12
Bar joist, sub-section D	90	12	80	12
Joist with draft or fire stop, sub-section E			80	10
Joist without draft or fire stop sub-section E			70	10
Sheathed ceiling, sub-section F	90	12	80	12

3. Baffles: Baffles shall be installed wherever spray sprinklers are less than six, feet apart. Baffles shall be located midway between sprinklers and arranged to baffle their actuating elements. Baffles may be of sheet metal, about eight inches wide and six inches high. When placed on branch line piping, the top of baffles shall extend two to three inches above the deflectors.

4. Clear space between sprinklers and stored materials: Stored materials shall be kept at least eighteen inches below sprinkler deflectors so as not to interfere with the distribution of water from spray sprinklers.

(15.18.13.2). B. Smooth ceiling construction.

1. The term “smooth ceiling” construction as used in this section includes:
 - a. Flat slab reinforced concrete construction.
 - b. Continuous smooth bays formed by wood or steel beams spaced more than 7 1/2 feet on centers with beams supported by columns, girders or trusses.
 - c. Smooth ceiling supported directly on girders or trusses spaced more than 7 1/2 feet on centers.
 - d. Smooth monolithic ceilings 3/4-inch thick of cement plaster, fibered gypsum plaster or vermiculite plaster on metal lath or equivalent.
 - In b, c and d the roof and floor decks may be incombustible or combustible.
 - Item b would include standard mill construction.
2. Spacing of spray sprinklers under smooth ceiling construction: Ordinary hazard occupancy.
 - a. Under smooth ceiling construction as described in 1a, 1b and 1c of this subsection at least one spray sprinkler shall be provided for each 130 square feet of incombustible ceiling and at least one spray sprinkler for each 120 square feet of combustible ceiling. Under metal lath and plastered ceiling item 1d of this subsection at least one spray sprinkler shall be provided for each 130 square feet of ceiling attached to bar joists supporting an incombustible roof or floor deck and at least one spray sprinkler for each 120 square feet of ceiling attached to wood joists or to bar joists supporting a combustible roof or floor deck.
 - b. Under smooth ceiling construction the maximum allowable distance between lines and between sprinklers on lines is fifteen feet. Sprinklers on alternate lines shall be staggered if the distance between lines or the distance between sprinklers on lines exceeds twelve feet.
 - c. Under flat slab reinforced concrete construction Item 1a of this subsection branch lines may be run in either direction.
 - d. In continuous smooth bays formed by wood or steel beams spaced more than 7 1/2 feet apart and supported by columns item 1b of this subsection branch lines shall be placed between the beams in each bay. Branch lines may be placed across the beams and sprinklers may be spaced without regard to the location of beams provided the maximum beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and provided the location of sprinkler deflectors, if above the bottom of beams, will be at sufficient distance from the beams to avoid obstructions to distribution, as specified in item I 3c of this section.
 - e. In continuous smooth bays formed by wood or steel beams spaced more than 7 1/2 feet on centers and supported on girders or trusses, 1c of this subsection, branch lines may be placed across the beams and sprinklers may be spaced without regard to the location of beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and provided the location of sprinkler deflectors, if above the bottoms of beams, will be at sufficient distance from the beams to avoid obstructions to distribution, as specified in item 3c of this section.
 - f. The branch line piping may be run in the continuous smooth bays but sprinklers shall be at least three feet, nine inches from girders or trusses.

g. Under smooth ceilings supported directly on girders or trusses, item 1c of this subsection, branch lines shall be placed between the girders or trusses of each bay. The branch line piping may also be run through the trusses.

h. The distance from a wall, or other obstruction to the closest sprinkler shall not exceed one-half the allowable distance between sprinklers.

i. Beams or trusses forming narrow pockets of combustible construction along walls when of a depth which will obstruct the spray discharge pattern may require additional spray sprinklers. See table in item I 3c of this section showing maximum allowable distance deflector shall be permitted above the bottom of beam.

(15.18.13.3). C. Beam and girder construction.

1. The term “beam and girder construction” as used in this section includes incombustible and combustible roof and floor decks supported by:

a. Wood beams of four inches or greater nominal thickness or steel beams spaced three to seven and one-half feet on centers and either supported on or framed into girders. When supporting a plank deck this would include semi-mill and panel construction and when supporting, with steel framing, gypsum plank, steel deck, concrete tile or similar material would include much of the so-called “incombustible” construction.

b. Bar joists or light steel trusses spaced three to seven and one-half feet on centers.

2. Spacing of spray sprinklers under beam and girder construction: Ordinary hazard occupancies.

a. Under beam and girder construction at least one spray sprinkler shall be provided for each 130 square feet of incombustible ceiling and at least one spray sprinkler for each 120 square feet of combustible ceiling. The maximum allowable distance between lines, and between sprinklers on lines is fifteen feet. Sprinklers on alternate lines shall be staggered.

b. When beams are spaced less than five feet on centers and either framed into or supported on girders, sprinklers may be spaced without regard to location of beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and provided the location of deflectors if above the bottom of beams, will be at sufficient distance from the beams to avoid obstructions to distribution, as specified in item I 3c of this section.

c. When beams are spaced five to seven and one-half feet on centers and supported on girders, sprinklers may be staggered under alternate beams provided the maximum allowable distance from ceiling to deflector will not be exceeded. With this framing, sprinklers may also be spaced without regard to the location of beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and provided the location of sprinkler deflectors, if above the bottoms of beams, will be at sufficient distances from the beams to avoid obstruction to distribution, as specified in item I 3c of this section.

d. When beams are spaced five to seven and one half feet on centers and are framed into girders forming panels not over three hundred square feet, sprinklers may be located under the beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and in the bays provided the maximum allowable distance from the ceiling to the deflector in the bays will not be exceeded and the location of sprinkler deflectors, if above the bottom of the beams section. The

deflectors of sprinklers in bays shall be located not lower than the bottom of the girders. For the purpose of this paragraph, bays in panel construction may be wider than seven and one half feet, if the panel does not exceed three hundred square feet in area.

e. The distance from a wall or other obstruction to the closest sprinkler shall not exceed one-half the allowable distance between sprinklers.

f. Additional spray sprinklers shall be required when the girders or trusses form narrow pockets of combustible construction along walls if there is a depth which will obstruct the spray discharge pattern.

(15.18.13.4). D. Bar joist construction.

1. This subsection includes incombustible and combustible roof and floor decks supported on bar joists or light steel trusses spaced less than three feet on centers.

2. Spacing of spray sprinklers under bar joist construction: Ordinary hazard occupancies.

a. Under bar joist construction with bar joists spaced less than three feet on centers, at least one spray sprinkler shall be provided for each 120 square feet of incombustible ceiling and at least one spray sprinkler for each 110 square feet of combustible ceiling. The maximum allowable distance between lines and between sprinklers on lines shall be fifteen feet.

b. Spray sprinklers may be located without reference to the bar joists but shall be staggered on alternate lines.

c. The distance from a wall or other obstruction to the closest sprinkler shall not exceed one-half the allowable distance between sprinklers.

(15.18.13.5). E. Joisted construction.

1. Joisted construction consists of boards or planks on wooden beams spaced less than three feet on centers. Wooden beams less than four inches nominal thickness spaced more than three feet on centers are also considered to be joisted construction.

2. Spacing of spray sprinklers under joisted construction: Ordinary hazard occupancies.

a. Under joisted construction without draft or fire stops, at least one spray sprinkler shall be provided for each ninety square feet of ceiling area, and if joist channels are draft or fire stopped at not over forty feet intervals, at least one spray sprinkler shall be provided for each 100 square feet of ceiling area. The maximum allowable distance between lines and between sprinklers on lines shall be twelve feet. Sprinklers shall be staggered across the joist if the distance between sprinklers across the joist exceeds eight feet; otherwise, sprinklers need not be staggered.

b. Bays twelve feet one inch to fourteen feet six inches in width shall have two lines of sprinklers except where numerous bays of this width prevail, in which case two and one lines may be installed in adjoining bays with two lines in bays next to side or end walls. With this arrangement neither the maximum allowable distance between sprinklers on lines nor the maximum allowable protection area per sprinkler, within each bay, shall be exceeded. In the bays containing two branch lines, the sprinklers shall be located not closer than three feet to the girders.

c. Where the joists are framed into supporting girders, the girders may be disregarded in the spacing of the branch lines providing sprinkler deflectors are at such elevation that the girders offer no obstruction to the spray discharge pattern. See table in item I 3c of this section.

d. The distance from a wall or other obstruction to the closest sprinkler shall not exceed one-half the allowable distance between sprinklers.

(15.18.13.6). F. Joist construction with sheathed ceiling:

1. Joist construction with sheathed ceilings as defined in this subsection consists of joist construction sheathed with plasterboard, metal, wood lath and plaster, wood, fiberboard or other combustible sheathing.

2. Spacing of spray sprinklers under joist construction with sheathed ceilings: Ordinary hazard occupancy.

a. Where joisted construction is sheathed:

1. With plaster board, metal, wood lath and plaster-the protected area allotted per sprinkler shall not exceed 100 square feet. The distance between lines and between sprinklers on lines shall not exceed twelve feet.

2. With wood, fiber-board or other combustible sheathing, the protected area allotted per sprinkler shall not exceed 90 square feet. The distance between lines and between sprinklers on lines shall not exceed 12 feet. Sprinklers on alternate lines shall be staggered if the distance between sprinklers on lines exceeds 8 feet.

b. A protection area of 120 square feet per spray sprinkler with a distance between lines and between sprinklers on the lines not in excess of 15 feet may be allotted for sprinklers under suspended ceilings of combustible construction provided there is a full complement of sprinklers immediately above such ceilings, also under top-story ceilings of combustible construction provided there is a full complement of sprinklers immediately above such ceilings and the attic space is unfloored and unoccupied.

(15.18.13.7). G. Pitched roofs.

1. Pitched roofs are those in which the slope exceeds one foot in three feet.

2. Spacing of sprinklers under pitched roofs. Ordinary hazard occupancy:

a. Under pitched roofs where branch lines are run parallel to the peak, one line of spray sprinklers shall be located in the peak of the roof or a line of spray sprinklers shall be located on each side down from the peak a distance not greater than one-half the allowable distance between branch lines. Where branch lines are run up the slopes, the end sprinklers on branch lines on one slope shall be located in the peak or end sprinklers on branch lines on both slopes shall be located down from the peak a distance not greater than one-half the allowable distance between sprinklers on the branch lines. In any case the deflectors of the highest sprinklers shall not be more than two feet vertically below the peak.

b. The spacing of sprinklers shall be in accordance with the type of construction as outlined in subsections B, C, D, E and F of this section. The distances between sprinklers on branch lines shall be measured on a line parallel with the roof.

c. In sawtooth roofs the end spray sprinklers on the branch lines shall be not over two and one-half feet from the peak of the sawtooth.

(15.18.13.8). H. Position of sprinklers: Upright or pendent.

1. Spray sprinklers shall be used only in the position for which they have been approved.

2. Upright spray sprinklers shall be installed except in special cases.

(15.18.13.9). I. Position of deflectors.

1. Deflectors of spray sprinklers shall be parallel to ceilings, roofs, or the incline of stairs, but when installed in the peak of a pitched roof they shall be horizontal.

2. Under smooth ceiling construction: as defined in subsection B of this section.

- a. Upright spray sprinklers shall be located with deflectors three to ten inches below smooth combustible ceilings or three to twelve inches below smooth incombustible ceilings. Where branch lines run across the beams, the deflectors of any sprinklers under beams shall be one inch to not more than four inches below the beams and not more than ten inches below the ceiling.
 - b. When spray sprinklers approved for pendent use are installed in the pendent position under smooth ceilings the deflectors shall be not less than two and one-half inches from ceiling. Special approved type pendent spray sprinkler, flush type, ceiling type, may have deflectors nearer ceiling.
3. Under beam and girder construction: as defined in subsection C of this section.
- a. Where sprinklers are placed under beams, the deflectors shall be one inch to not more than four inches below the beams, but not more than sixteen inches below a combustible ceiling and not more than eighteen inches below an incombustible ceiling, except where beams are framed into girders forming panels not over two hundred square feet, the deflectors under beams may be a maximum of twenty-two inches below the ceiling. Where beams are framed into girders forming panels of between two and three hundred square feet, the deflectors under beams may be a maximum of twenty inches below the ceiling.
 - b. Where sprinklers are placed in the bays the distance between the deflectors and the ceiling shall be not less than three inches nor more than sixteen inches in bays less than five feet wide. When placed in bays five to seven and one half feet wide, the distance between the deflectors and the ceiling shall be not less than three inches nor more than twelve inches under combustible or fourteen inches under incombustible ceilings, except where beams are framed into girders forming panels not over two hundred square feet, deflectors may be a maximum of sixteen inches below combustible or twenty inches below incombustible ceilings.
 - c. Where deflectors of spray sprinklers in bays are above the bottom of the beams, they shall be located as shown in the following table:

Distance of sprinklers to side of beam	Maximum allowable distance of deflector above bottom of beam
0 to 1 foot	0 inches
1 to 2 feet	1 "
2 feet to 2 feet 6 inches	2 "
2 feet 6 inches to 3 feet	3 "
3 feet to 3 feet 6 inches	4 "
3 feet 6 inches to 4 feet	6 inches
4 feet to 4 feet 6 inches	7 inches
4 feet 6 inches to 5 feet	9 inches
5 feet to 5 feet 6 inches	11 inches
5 feet 6 inches to 6 feet	14 inches

- 4.
- a. Under bar joist or light steel trusses, spray sprinklers shall be located with deflectors three to ten inches below a combustible or three to twelve inches below an incombustible roof or floor deck.
5. Under joisted construction: As defined in subsection E of this section.

- a. Under open joist construction spray sprinklers shall be located with deflectors one inch to not more than six inches below the bottom of joists.
 - b. Under joist construction with sheathed ceilings: Subsection F of this section, spray sprinklers shall be located with deflectors three to ten inches below the smooth ceiling.
6. Under bar joist construction as defined in subsections C and D of this section.
- a. Under bar joist construction spray sprinklers shall be located with deflectors six to ten inches below the roof or floor deck except where required for drainage of long lines the minimum distance may be reduced to four inches.

(15.18.13.10). J. Schedule of pipe sizes: the standard schedule of pipe sizes for one-half inch heads given in section C26-1355.0 shall be used except as modified below. When the distance between spray sprinklers on branch lines exceeds twelve feet or the distance between branch lines exceeds twelve feet; the number of spray sprinklers on 20-inch pipe shall be limited to 15, 3-inch pipe to 30, and on 30-inch pipe to 60.

(15.18.13.11). K. Hangers: location of hangers. All rules in section C26-1355.1 shall apply except where-

1. Lengths of pipe up to and including 1 1/4 inch are over 12 feet long, hangers along these pipes shall be spaced not over 12 feet apart.
2. On larger size pipe where lengths are over 12 feet, hangers along these pipes may be spaced up to 15 feet apart.

(15.19) §C26-1353.0 Sprinkler Position.-

- a. Sprinkler heads shall be located wherever possible, in an upright position on top of the pipes, except that when the construction or occupancy of a room or enclosure makes it preferable, on automatic systems sprinkler heads may be pendant on concealed piping. When installing pendant sprinklers on a dry system, approved dry pendant sprinklers shall be installed.
- b. Where standard one-half inch heads are installed, sprinkler deflectors shall be parallel to ceilings, roofs or the incline of stairs, but when installed in the peak of a pitched roof, such deflectors shall be horizontal. The distance of deflectors from ceilings of mill or other smooth construction, or the bottom of joists of open joists construction, shall be between three and ten inches. The decking supported by bar joists shall be considered the ceiling.
- c. Where approved type one inch or one and one-quarter inch heads are installed, the top of each head shall be located the same distance below joists or ceiling as prescribed for deflectors of one-half inch standard heads; except that when such heads are located under pitched roofs or piers or similar structures, they shall in general be installed in the upright position and three feet vertically below the under side of the roof. When the superintendent deems a variation of this provision advisable in order to obtain a more efficient distribution of water, the heads shall be located with respect to joists or ceiling, as he may direct.
- d. In Class 1 Fireproof structures, the maximum permissible distances between deflectors and panel ceilings shall be sixteen inches.
- e. Where sprinklers are placed under the beams of semi-mill, panel, fire-resistive or incombustible construction, deflectors of end sprinklers shall be three inches below the beams; and other sprinklers, whether in bays or under beams, shall be only enough lower to provide drainage in the piping. The distance between sprinkler deflectors and floor or roof deck may be increased where conditions warrant, but the distance shall not exceed sixteen inches.

f. Where regular sprinklers are placed less than five feet apart, baffles, or the equivalent, shall be installed to prevent the first sprinkler opening from wetting adjoining sprinklers. Baffles shall be so designed and located as not to interfere with the distribution of water from sprinklers.

g. When standard sprinklers approved for pendent use are installed in pendent position under smooth ceilings the deflectors shall be not less than 2 1/2 inches from ceiling. Special approved type pendant sprinklers, flush type, ceiling, recessed, may have deflectors nearer ceilings.

h. For position of spray type sprinklers see section C26-1352.2 Sub-section 1.

(15.20). §C26-1354.0 Spray Clearance.-

a. At least eighteen inches effective clear space shall be left below the sprinkler heads, so that they may discharge an unbroken spray blanket from sprinkler to sprinkler, and to the sides of the room, when in operation. It shall be unlawful to place any stock piles, racks or other obstructions so that they interfere with such action. It shall be unlawful to use sprinkler system piping for the support of stock, clothing and similar material.

b. In premises wherein the content are not deemed extra hazardous plastic light diffusers complying with section C26-461.1 and suspended below sprinkler heads shall not be construed as an obstruction or affecting the spray clearance required by sub-division a. of this section, provided, that plastic sheets used in plastic light diffusers shall be not less than 24 inches and not more than 48 inches in width, and shall be supported by but not fastened to metal “tee” or channel members not exceeding 1 inch in width per edge of plastic, and that the use of such plastic sheets shall be limited in area to the requirements of the board of standards and appeals.

(15.21). §C26-1355.0 Pipe Sizes and Permissible Number of Heads for Sprinkler Systems.-

a. The maximum permissible number of heads on a given size pipe in one fire area in any story shall be as follows:

A. For one-half inch heads.-

1. Schedule for light hazard occupancies.

a. Branch lines shall not exceed eight sprinklers on either side of a cross main except as provided in subdivision E of this section.

Pipe sizes shall be as follows:

1-inch pipe	2 sprinklers	2 1/2-inch pipe	30 sprinklers
1 1/4-inch pipe	3 sprinklers	3-inch pipe	60 sprinklers
1 1/2-inch pipe	5 sprinklers	3 1/2-inch pipe	100 sprinklers
2-inch pipe	10 sprinklers	4-inch pipe	No limit, see note

Each large area requiring more than 100 sprinklers and without subdividing partitions shall be supplied by feed mains or risers sized for ordinary hazard occupancies.

b. Where sprinklers are installed in a space above a ceiling and such sprinklers are supplied from the same piping which supplies sprinklers under the ceiling, pipe sizes up to and including 2 1/2 inches shall be as follows:

1-inch pipe	2 sprinklers	2-inch pipe	15 sprinklers
1 1/4-inch pipe	4 sprinklers	2 1/2-inch pipe	50 sprinklers
1 1/2-inch pipe	7 sprinklers		

Where the total number of sprinklers above and below the ceiling exceeds 50 the pipe supplying more than 50 sprinklers shall be sized by the pipe schedule of

subdivision a for the number of sprinklers above or below the ceiling whichever is larger.

c. Connections to such systems from underground mains shall be not less than four inches in size.

2. Schedule for ordinary hazard occupancies.

a. Branch lines shall not exceed eight sprinklers on either side of a cross main. Pipe sizes shall be as follows:

1-inch pipe	2 sprinklers	3 1/2-inch pipe	65 sprinklers
1 1/4-inch pipe	3 sprinklers	4-inch pipe	100 sprinklers
1 1/2-inch pipe	5 sprinklers	5-inch pipe	160 sprinklers
2-inch pipe	10 sprinklers	6-inch pipe	275 sprinklers
2 1/2-inch pipe	20 sprinklers	8-inch pipe	400 sprinklers
3-inch pipe	40 sprinklers		

Except in special cases as determined by the superintendent or in areas classified as extra hazard no pipe larger than eight inches will be required. However, except in combined dry pipe and pre-action systems there shall be at least one alarm valve or dry pipe valve with controlling gate valve for each 400 sprinklers in a fire area.

b. Where sprinklers are installed in a space above a ceiling and such sprinklers are supplied from the same piping which supplies sprinklers under the ceiling, pipe sizes up to and including three inches shall be as follows:

1-inch pipe	2 sprinklers	2-inch pipe	15 sprinklers
1 1/4-inch pipe	4 sprinklers	2 1/2-inch pipe	30 sprinklers
1 1/2-inch pipe	7 sprinklers	3-inch pipe	60 sprinklers

Where the total number of sprinklers above and below the ceiling exceeds 60 the pipe supplying more than 60 sprinklers shall be sized by the pipe schedule of subdivision a for the number of sprinklers above or below the ceiling whichever is larger.

3. Schedule for extra hazard occupancies. a. Branch lines shall not exceed six sprinklers on either side of a cross main. Pipe sizes shall be as follows:

1-inch pipe	1 sprinklers	3-inch pipe	27 sprinklers
1 1/4-inch pipe	2 sprinklers	3 1/2-inch pipe	40 sprinklers
1 1/2-inch pipe	5 sprinklers	4-inch pipe	55 sprinklers
2-inch pipe	8 sprinklers	5-inch pipe	90 sprinklers
2 1/2-inch pipe	15 sprinklers	6-inch pipe	150 sprinklers

4. Deluge systems.

a. The maximum number of open head sprinklers controlled by anyone deluge valve shall be as follows:

1 1/2-inch pipe	5 sprinklers	3-inch pipe	40 sprinklers
2-inch pipe	10 sprinklers	4-inch pipe	75 sprinklers
2 1/2-inch pipe	27 sprinklers	6-inch pipe	150 sprinklers

Where there are over 20 sprinklers or where required by the superintendent, the heat-responsive devices or systems shall be automatically supervised.

b. Pipe schedule for deluge systems. The piping for deluge systems shall conform to the extra hazard schedule, except that where necessary to provide uniform sprinkler discharge, the pipe sizes shall be adjusted according to detailed friction

loss calculation. These calculations should show the relation between the water supply and demand. These calculations shall be submitted to the superintendent.

c. In designing the piping system the water supply for deluge systems shall be based on not less than an average discharge of 15 gallons per minute per sprinkler. Adjustment in pipe sizes to provide uniform sprinkler discharge shall be based on a maximum variation of 15 percent from the assumed average discharge per sprinkler. Where practical to obtain the required degree of uniformity of discharge by sizing of piping this shall be done rather than by using sprinklers having orifices smaller than 1/2 inch.

d. Friction loss in steel pipe of deluge systems shall be calculated using Hazen & Williams coefficient C equals 120 and obstruction losses due to change of direction of water through fittings shall be figured on terms of equivalent feet of pipe.

e. Where change is made in pipe sizes this shall not be effected by means of reducing flanges.

f. Where 8-inch piping is employed to reduce friction losses in a system operated by heat-responsive devices a six-inch pre-action or deluge valve and six-inch gate valve between taper reducers may be used.

B. For approved type one-inch heads:

Size of pipe in inches	Maximum number of heads allowed	Size of pipe in inches	Maximum number of heads allowed
1	1	4	18
1 1/4	2	5	34
1 1/2	3	6	51
2	4	7	75
2 1/2	6	8	105
3	9		

C. For approved type one and one-quarter-inch heads:

Size of pipe in inches	Maximum number of heads allowed	Size of pipe in inches	Maximum number of heads allowed
1 1/4	1	4	12
1 1/2	2	5	21
2	3	6	40
2 1/2	4	7	60
3	6	8	84

D. Not more than 14 branch lines shall be allowed on either side of the riser or feed main.

E. Where more than 8 sprinklers on a branch line are necessary, lines may be increased to 9 sprinklers by making the two end lengths 1-inch and 1 1/4-inch, respectively, and the sizes thereafter standard.

b. When it is desired to use pipe over eight inches in diameter, a special ruling will be required from the superintendent as to such use and the number of heads that may be fed thereby.

c. Where practicable, piping shall be so arranged that the maximum number of heads on a branch line shall be eight.

- d. When the piping is arranged on the “gridiron” plan, the permissible number of heads may be doubled, provided the feed main is of the size indicated in the schedule for the total number of heads.
- e. The permissible number of heads fed by six and eight inch pipe may be increased ten percent more than the numbers allowed where strict compliance with the pipe sizes listed in this section would require another source of water supply or a larger feed main or riser.
- f. Where feed mains supply branch lines having only two heads each, and the conditions approach those of long single lines, such feed mains shall usually be centrally supplied where there are over ten branch lines. Branch lines up to fourteen in number may be fed from the end, provided a two and one-half inch pipe does not supply more than sixteen standard one-half inch heads.
- g. Structures having slatted floors, or large unprotected floor openings without approved stops, shall be treated as one room with reference to the pipe sizes, and the feed main shall be of sufficient size to accommodate the number of heads called for. Larger pipe sizes than are allowed in the schedule for a given number of heads may be required wherever the construction or conditions introduce unusually long runs of feed mains or many angles. Structures with blind attics, with small, unprotected openings to the floor below, may be piped from the system on the ceiling of the floor below, provided the pipe size schedule is not overloaded on sizes three inches or under.

(15.21.1). §C26-1355.1 Hangers for Sprinkler Systems.-

- 1.
 - a. Sprinkler piping shall be substantially supported from the building structure. In all cases, sprinkler piping shall be supported independently of suspended ceiling construction.
 - b. Hangers shall be of approved types.
 - c. Sprinkler piping shall be supported by round wrought-iron U-type or approved adjustable hangers.
 - d. Approved C-type hangers shall be acceptable for use on steel beams when provided with a safety strap, or when cup-pointed set screws with lock nuts are provided for these hangers by the manufacturer.
 - e. If hangers or parts of hangers are made of flat iron or steel, the thickness of the metal must be at least 3/16 inch, unless protected by a suitable corrosion-resistant material. Unprotected steel 1/8-inch in thickness is acceptable for retaining straps used with “C” clamps.
 - f. Pipe rings hung from coach screw hooks shall not be used.
 - g. Hangers which permit wide lateral motion of the pipe, particularly on branch lines, shall not be acceptable.
 - h. Toggle hangers shall be used only for the support of branch lines and under ceilings of hollow tile or metal lath and plaster in buildings of fire-resistive or incombustible construction.
- 2. Hangers in concrete.-
 - a. In concrete construction approved incombustible inserts set in the concrete may be installed for the support of hangers. The use of wood plugs shall not be permitted.
 - b. Hangers shall be installed without regard to the support of the sleeves where pipes are run through concrete beams. Such sleeves shall not normally be used for the support of pipes.

c. Expansion shields for supporting pipes under concrete construction shall be used in a horizontal position in the sides of beams, except that in good, sound concrete having gravel or crushed stone aggregate, they may be used in the vertical position to support pipes four inches or less in diameter.

d. For the support of pipes four inches and larger, expansion shields if used in the vertical position shall alternate with hangers connected directly to the structural members such as trusses and girders, or to the sides of concrete beams. In the absence of available structural members, in flat slab reinforced concrete construction pipes four inches and larger may be supported entirely by expansion shields in the vertical position, but spaced not over ten feet apart.

e. Expansion shields shall not be used in ceilings of gypsum or similar soft material. In cinder concrete, expansion shields shall likewise not be used except on branch lines and then shall alternate with through bolts or hangers attached to beams.

f. Depth of the hole for expansion shields shall in no case be less than specified for the type of shields used.

g. Holes for shields in the side of concrete beams shall be at least 4 inches above the bottom of the beam.

h. Where pipes are run through concrete beams, sleeves at least two sizes larger than the piping shall be used.

3. Location of hangers.-

a. On branch lines there shall be at least one hanger for each length of pipe with one hanger within 30 inches of the end sprinkler and with hangers not over 12 feet apart, except that where one hanger for each length of pipe would require hangers closer than five feet apart, hangers may be spaced not to exceed 10 feet apart. Where starter lengths are less than 6 feet in length hangers may be omitted, except at end branch lines.

b. Provision to take care of the thrust of branch lines in a steeply pitched roof, shall be made.

c. On cross mains there shall be one hanger between each two branch lines. On feed mains there shall be at least one hanger for each 12 feet of pipe. Where cross mains are located between purlins and where construction is such that piping must be supported from roof or floor framing members, those hangers needed for cross main piping between branch lines coming within the truss or girder bays, shall be attached to steel angels bolted between purlins. In lieu thereof additional branch line hangers attached to the purlins and located thereon as close to the cross main as purlin location permits, together with a hanger on the end length of the cross main attached to steel angles, shall be acceptable.

d. Where sprinkler piping must be supported from roof framing members, as in the case of gypsum or steel deck roofing, and the unsupported length between the end sprinkler and beam hanger would be greater than 36 inches, the pipe shall be extended beyond the end sprinkler to the next beam for support. If 1 1/4-inch pipe is used for the end piece, the unsupported length may be up to 48 inches.

e. Hangers shall not be near enough to sprinklers to obstruct distribution of water. They shall not be nearer than 12 inches, except in the case of round iron hangers, where a space of not less than three inches may be permitted.

f. Under "semi-mill" construction where sprinklers are located under the center line of beams, hangers may be used on the side of these beams provided the beams are of such

width that hangers may not be closer than three inches to the sprinkler. Where beams are less than six inches in width, offset hangers may be used or the hangers located twelve to eighteen inches from sprinklers.

4. Support of Risers.-

- a. Risers shall be adequately supported by attachments direct to the riser or by hangers located on the horizontal connections close to the riser.
- b. Risers shall be supported at every second floor.
- c. Sprinkler and tank risers in vertical shafts shall be supported at every second floor.

5. Ceiling flanges, rods and “U” hooks.-

a. Ceiling flanges.-For pipe sizes up to 2-inch ceiling flanges shall have at least two supporting screw holes; for sizes 2 1/2-inch to 8-inch, not less than three holes, and in wood construction so located that no two holes are in the same line as the grain in the planking.

b. Rods.-The size of rods for hangers shall be not less than that given in the following table:

Pipe size	Diameter of rod
Up to 2-inch	3/8-inch
2 1/2-inch, 3-inch, 3 1/2-inch	1/2-inch
4-inch, 5-inch	5/8-inch
6-inch	3/4-inch
8-inch	7/8-inch

c. “U” hooks.-The size of the rod material of “U” hooks shall be not less than that given in the following table:

Pipe size	Hook material diameter
Up to 2-inch	5/16-inch
2 1/2-inch, 3-inch	3/8-inch
3 1/2-inch, 4-inch	7/16-inch
5-inch	1/2-inch
6-inch	5/8-inch
8-inch	3/4-inch

d. Screws.-For the ceiling flanges and “U” hooks screw dimensions shall be not less than those given in the following table:

Pipe size	2 screw flanges
Up to 2-inch	Wood screw no. 18 × 1 1/2 inch
Pipe size	3 screw flanges
Up to 2-inch	Wood screw no. 18 × 1 1/2 inch
2 1/2-inch, 3-inch, 3 1/2-inch	Lag screw 3/8 inch × 2 inch
4-inch, 5-inch, 6-inch	Lag screw 1/2 inch × 2 inch
8-inch	Lag screw 5/8 inch × 2 inch
Up to 2-inch	Wood screw no. 18 × 1 1/2 inch
2 1/2-inch, 3-inch, 3 1/2-inch	Lag screws 3/8 inch × 1 1/2 inch
4-inch, 5-inch, 6-inch	Lag screw 1/2 inch × 2 inch
Pipe size	4 screw flanges
8-inch	Lag screw 5/8 inch × 2 inch
Pipe size	“U” hooks
Up to 2-inch	Drive screw no. 16 × 2 inch
2 1/2-inch, 3-inch, 3 1/2-inch	Lag screw 3/8 inch × 2 1/2 inch
4-inch, 5-inch, 6-inch	Lag screw 1/2 inch × 2 inch
8-inch	Lag screw 5/8 inch × 3 inch

e. Drive screws shall be used only in a horizontal position as in the side of a beam. Wood screws shall not be driven.

f. Nails are not acceptable for fastening hangers.

g. Screws in the side of timber or joist shall be not less than 2 1/2 inch from the lower edge when supporting main lines. This shall not apply to 2 inch or thicker nailing strips resting on top of steel beams.

h. The minimum thickness of plank and the minimum width of lower face of beams or joists in which lag screw rods are used shall be as given in the following table:

Diameter of rod	Nominal plank thickness	Nominal width of beam face
Up to 3/8 inch	3 inch	2 inch
1/2 inch	4 inch	2 inch
5/8 inch	4 inch	3 inch
3/4 inch	4 inch	4 inch

Lag screw rods shall not be used for support of pipes larger than 6 inches. All holes for lag screw rods shall be pre-drilled 1/8 inch less in diameter than the root diameter of the lag screw thread.

i. When the thickness of planking and thickness of flanges does not permit the use of screws 2 inches long, screws 1 3/4 inches long may be permitted.

(15.22). §C26-1356.0 Supply Mains for Sprinkler Systems.-

a. The supply mains for sprinkler systems shall be at least the size of the riser and shall be arranged to run as directly as possible from the source of water supply to the riser.

b. Supply mains for stair or other towers without approved stops between floors when piped on independent risers, shall be of sufficient size to accommodate the total number of sprinklers in such towers but shall not be required to exceed two and one-half inches.

(15.23). §C26-1357.0 Risers for Sprinkler Systems.-

a. There shall be one or more separate risers in each structure and in each section of the structure divided by fire walls continuous for the height of the structure. Risers shall be arranged to provide “Center Central” or “Side Central” supply to feed mains. Each riser shall

be of sufficient size to supply all the heads on that riser in one story according to section C26-1355.0.

b. If the conditions warrant, special permission will be granted to allow the heads in a fire section to be fed from the risers in another section.

c. It shall be unlawful to locate risers close to windows. Risers shall be properly protected from mechanical injury and freezing and shall be properly supported by wrought iron clamps, couplings or approved hangers.

d. Wet pipe sprinklers for stairs or other towers without approved stops between floors shall be supplied by independent risers, if more than two stories in height, with control valves at lower level and be large enough to supply the total number of heads in such tower, but shall not be required to exceed two and one-half inches. Soffits of stairs shall be protected except when stair and enclosure are fireproof in such case only the floor landings shall be protected.

(15.24). §C26-1358.0 Prohibited Connections to Sprinkler Systems.-It shall be unlawful to make connections, such as for sill cocks, house service or hose outlets, to any part of a sprinkler system riser, except as provided in section C26-1346.0.

(15.25). §C26-1359.0 Air Lock Adjustment.-Where gravity and pressure tanks for sprinkler systems feed through a common discharge pipe or “dead riser” to the foot of a riser and an air lock is likely to develop, the discharge pipe of the gravity tank shall connect with the common discharge pipe forty-five feet below the bottom of the gravity tank and the gravity tank check valve shall be placed at the level of this connection.

(15.26). §C26-1360.0 Pipes and Fittings for Sprinkler Systems.-

a. Pipe for sprinkler systems shall be full-weight wrought iron or steel threaded pipe, well reamed and screwed up tight into fittings without reducing the waterway.

b. Wrought iron pipe shall comply with the standard specifications for welded wrought iron pipe of the A.S.T.M., D., A. 72-33.

c. Steel pipe shall comply with the standard specifications for welded and seamless steel pipe of the A. S. T. M., D., A. 120-34 T.

d. Fittings shall be standard cast iron fittings or malleable fillings of a type specifically approved for use in sprinkler systems.

e. Cast iron fittings shall be designed and guaranteed for a working pressure of one hundred seventy-five pounds per square inch and malleable fittings shall be designed and guaranteed for a working pressure of three hundred pounds per square inch.

f. Pipes shall be secured to the ceiling, walls and other parts of the building with standard steel, wrought or malleable iron hangers.

g. Extra heavy fittings shall be employed where the normal pressure in the pipe system exceeds the allowable working pressure limits as specified in “a.” and shall be designed for a working pressure of two hundred fifty pounds per square inch.

h. Underground pipes shall comply with the regulations of the Department of Water Supply, Gas and Electricity for the working pressure required.

i. Welding of joints may be allowed in special cases but permission must be secured in writing from superintendent. When welding is permitted it shall be in accordance with the American Standard Code for Pressure Piping B31.1-1951 and shall conform to the requirements of title C26-211.0.

(15.27). §C26-1361.0 Protection of Pipes and Sprinklers.-

- a. When exposed to moisture, sprinkler pipes and hangers, shall be protected against corrosion whenever necessary by thoroughly cleaning the pipe of all scale and grease and painting with a coat of red lead and linseed oil paint or other acceptable moisture resistive paint. When exposed to chemical fumes, the pipe and fittings shall be coated with approved chemical resistive paint. It shall be unlawful to paint sprinkler heads.
- b. Supply pipes of risers in low basements, or low spaces under ground floors, exposed to frost, shall be properly protected by concrete, brick or wood enclosures, properly heated, or by two-inch creosoted plank boxing, extending twenty-four inches on all sides of the pipe and filled with mineral wool, sawdust or tar mixed with granulated cork, extending below the bottom of the pipe and through the top flooring of the ground floor, or by other approved methods.
- c. Where risers, drains, heating pipes, and similar installations, pass through cinder concrete floors or partitions, they shall be protected with a substantial metal sleeve, and the space between the floor and sleeve shall be grouted with cement mortar.
- d. Wherever sprinklers are exposed to corrosion, the heads shall be protected with an approved coating.

(15.28). §C26-1362.0 Drainage of Sprinkler Pipes and Fittings.-

- a. Sprinkler pipes and fittings shall be so installed that they can be thoroughly drained, and where practicable, piping shall be arranged to drain at the main drain valves.
- b. Drains shall be so arranged as not to expose any part of the sprinkler system to frost and shall be connected to a roof or house drain or through the wall of the structure. Systems not supplied from public water mains may have drain connections to sewer lines provided with brass swing check valves and standard traps. Drains for systems supplied from public water mains must be arranged with air break to prevent contamination of water supplies. Discharge from such drains may be made to open trapped receptacles, or on floor where no damage can result, to open connections into roof leaders on house side of leader trap, to open trapped connection to sanitary sewer, or discharge to outside of building. Connections into house drain must be trapped and vented.
- c. Drains, pitched at least one-quarter of an inch in ten feet, shall be installed at: the base of the main riser, each alarm valve, each dry-pipe valve, each gravity tank, each pressure tank, each fire department connection, on each floor if independent floor control valves are used; and at each supply main when the water in such a main cannot be removed through any of the above drains. Such drains shall be installed with controlling valves so that flowing tests may be made to determine if the water supplies or connections from yard mains to the inside of the structure are in order without causing water damage or overflowing service connections to the same house drain. Any such drain shall be at least two inches in size, except that drains at independent floor valves shall be at least one inch in size where floor valves are two and one-half inches or less in size and one and one-quarter inches where floor valves are larger and connected to a main drain riser at least one and one-half inches in size. The drain at the main riser shall discharge into a cone or sight drain, or if carried through the wall and exposed to the weather, it shall be fitted with an elbow turned down.
- d. A drain may be omitted at an alarm valve at the top of a riser on a down-fed system.
- e. On automatic wet-pipe systems, the horizontal branch pipes shall be pitched at least one-quarter of an inch in ten feet to drain towards the sources of supply with drain valves at the low points.

f. On automatic dry-pipe systems, branch pipes shall be pitched at least one-half of an inch in ten feet.

(15.29). §C26-1363.0 Test Pipes for Sprinkler Systems.-

a. In wet-pipe automatic sprinkler systems a test pipe at least one inch in diameter shall be connected directly with each system, and shall be connected to a pipe at least one and one-quarter inches in diameter in the upper story and arranged to discharge through a one-half inch brass outlet, preferably to a point where it can readily be seen. Controlling valves shall be located at a sufficient distance from the point where the test pipe passes through the wall of the structure, so as to avoid freezing.

b. In dry-pipe automatic sprinkler systems a one-inch inspector's test pipe shall be installed at the end of the most distant branch line and tilted with a one-inch shut-off valve, plugged with a brass plug.

(15.30). §C26-1364.0 Pressure Gauge for Sprinkler Systems.-

a. A double spring Bourdon pressure gauge, three and one-half inches or larger, shall be provided in automatic sprinkler systems: above dry pipe valves, below dry pipe valves, at the pressure tank, at the air compressor, above the alarm valve, below the alarm valve, valve and the dry pipe valve with only one gage at each valve.

b. Provision may be made for taking the pressure both above and below the alarm and at the suction and discharge of fire pump or pumps.

c. A gage may be omitted at an alarm valve located at the top of a riser in a down-fed system.

d. Gage connections shall be taken only from the supply main or riser.

e. Gages shall be installed in a suitable place protected from freezing and be controlled by a valve with arrangements for draining. An outlet, at least one-quarter of an inch in size, plugged for the installation of the inspector's gage, shall be located between each valve and gage.

(15.31.1). §C26-1365.0 Valves for Sprinkler Systems.-

a. Gate Valves for Sprinkler Systems.-

1. Gate valves two inches and under shall be of cast valve bronze or other approved non-corrosive material. Gate valves two and one-half inches and larger shall have cast iron or cast steel bodies, flanged bronze mounted, bronze stem and ample size hand wheel.

2. Gate valves controlling any number of sprinklers shall be of the outside screw and yoke pattern.

(15.31.2). b. Drain Valves for Sprinkler Systems.-Drain valves for sprinkler systems shall be of valve bronze, angle globe pattern, with renewable discs and ample size hand wheels.

(15.31.3). c. Check Valve for Sprinkler Systems.-

1. Check valves two inches and under shall be of the swing regrinding pattern; bodies and working parts shall be of cast valve bronze, or other approved non-corrosive material.

2. Check valves two and one-half inches and larger shall be of the swing flanged pattern, having cast iron or cast steel bodies, bronze clappers and bronze seat rings.

3. Check valve clappers and their attachments shall be designed so they can be readily removed from the body of the valve for repairs when necessary.

4. Check valves where used to hold a differential in pressure may be provided with rubber or composition discs or washers. Where same require replacement the new part must be of a type approved for that valve.

5. Where an alarm check valve is installed, on a system only requiring one alarm valve, an additional check valve need not be installed in water supply to system. Alarm check valves may be installed in either vertical or horizontal position.

(15.31.4). d. Water Supply Gate Valves for Sprinkler Systems.-The piping connecting each source of water supply with the sprinkler system shall be provided with a gate valve of the outside screw and yoke type, or an approved post indicator valve, sealed open and tagged to designate its purpose so located as to control each source of water supply except the water supply from fire department hose connections. Such gate valves shall be so located as to be easily visible and readily accessible and shall be as close as possible to the supply inlet.

(15.31.5). e. Water Supply Check Valves for Sprinkler Systems.-

1. The piping connecting each source of water supply with the sprinkler system, including fire department connections, shall be provided with a horizontal swing check valve except when written permission is granted by the superintendent to use check valves in other than horizontal position.

2. On two-source systems, check valves on each supply shall have a gate valve on each side to permit repair of the check valve without shutting off both supplies.

(15.31.6). f. System Control Valves for Sprinkler Systems.-

1. Automatic sprinkler risers shall be provided with a main shut-off valve, which will control the water supplies to the sprinklers fed by such riser, except single down feed risers equipped with floor control valves.

2. Valves controlling water supplies to automatic sprinklers shall be readily accessible at all times. Standard signs, indicating the purpose of the valve, shall be attached to the yoke in a substantial manner. Valves shall be lubricated and sealed open.

(15.31.7). g. Precautions Against Freezing of Sprinkler Systems.-

1. When ten or less standard one-half inch sprinkler heads in any automatic wet-pipe system are exposed to cold and subject to freezing, shut-off valves may be provided to discontinue the water supply to such heads between November first and April first.

2. When thirty-six or less one-half inch sprinkler heads are exposed to freezing, the sprinkler piping may be filled with a non-freezing solution. This solution shall be thoroughly mixed and introduced into sprinkler piping through approved filling connection. Such filling connection shall be provided with a metal filling cup, shut-off valve and with an outside screw and yoke gate valve between the solution and the water supply, and with a three-quarter inch plugged drain valve at the bottom. A check valve with 1/32 inch hole drilled in clapper shall be installed when sprinklers on non-freezing system are above water supply.

Note-Where sprinkler systems are supplied by public water connections the use of non-freezing solutions must be in conformity with any state or local health regulations which may apply.

3. A greater number of heads than specified above, located in unheated areas, shall be controlled by an approved automatic dry-pipe valve.

(15.31.8). h: Dry Pipe Valves for Sprinkler Systems.-

1. The term "dry pipe" valve shall mean a valve automatically controlling the water supply of a sprinkler system in such a manner that under normal conditions the piping system beyond the valve is maintained dry, but that in the event of fire, the valve automatically releases the water into the sprinkler system for fire extinguishing purposes.

2. Dry pipe valves shall, for the purpose of this title, be classified as follows:

- (a) Type A, in which the valve is actuated by the release of compressed air in the sprinkler piping system, due to the opening of a sprinkler head;
 - (b) Type B, pre-action in which the valve is actuated automatically in an approved manner by an approved system of control.
3. Dry pipe valves shall be located as near as practicable to the sprinkler system, in an enclosed and accessible place protected from mechanical injury and freezing.
 4. When type A dry valves are installed, the air pressure in sprinkler systems under such dry pipe valve control shall be as specified by manufacturer.
 5. The compressed air supply shall be from a reliable source available at all times and having a capacity of restoring normal air pressure in the system within a period of thirty minutes. The air supply for the compressor shall be taken, if possible, from a room containing dry air, or it shall be passed through a drying chamber containing calcium chloride, in order to avoid the introduction of moisture into the system. Air compressors shall be provided with an approved bronze relief valve, set to open as specified by dry valve manufacturer.
 6. The air pressure on such dry system shall be maintained throughout the year.
 7. The maximum number of heads controlled by one type A dry pipe valve shall be as follows:
 - a. One-half inch heads, 400;
 - b. Approved type one-inch heads, 100;
 - c. Approved type one and one-quarter inch heads, 64; except when the system is equipped with an approved type quick opening device, the maximum number of heads controlled by one type A dry pipe valve may be increased fifty percent above the numbers herein prescribed.
 8. When type B dry valves are installed, the actuating system shall be designed to operate at a temperature lower than that required to open the sprinkler heads, and all connections between the system and the dry pipe valve shall be adequately protected against injury. The maximum number of heads controlled by one type B dry pipe valve shall be as follows:
 - a. One-half inch heads, 1,000;
 - b. Approved type one-inch heads, 150;
 - c. Approved type one and one-quarter inch heads, 96.

(15.31.9). 1. Alarm Devices for Sprinkler Systems.-

1. Automatic wet-pipe sprinkler systems shall be equipped with an alarm device or devices so constructed that a flow of water through a one-half inch orifice will operate an electric or mechanical gong.
2. Dry pipe valves shall be equipped with an approved water flow alarm device.
3. When an electrical alarm is installed in connection with an alarm valve or dry pipe valve, the installation shall be made in conformity with section C26-1366.0.

(15.31.10) §C26-1365.1 Automatic Dry Pipe Sprinkler Systems Combined with Rate-Or-Rise Actuating Systems.-

- a. An automatic dry pipe sprinkler system combined with rate-of-rise actuating system is one employing automatic sprinklers attached to a piping system containing air under pressure, with a rate-or-rise heat responsive actuating system of more sensitive characteristics than the automatic sprinklers themselves, installed in the same areas as the sprinklers; actuation of the heat responsive system, as by a fire, opens dry pipe valves which permit water to flow into

the sprinkler piping system and to be discharged from any sprinklers which may be open. A rate-of-rise actuating system is one that is operated automatically by a rise in temperature occurring within a fixed period of time.

This combined automatic dry pipe and pre-action system of sprinklers shall be so constructed that failure of the rate-of-rise actuating system shall not prevent the system from properly functioning as a conventional automatic dry pipe system, namely, fusing of one or more automatic sprinklers reduces air pressure in piping system thereby operating dry pipe valves which permit water to flow into sprinkler piping system and to be discharged from any of the sprinklers which may be open.

Further, this combined automatic dry pipe and pre-action system of sprinklers shall be so constructed that failure of the dry pipe system of automatic sprinklers shall not prevent the rate-of-rise actuating system from properly functioning as an automatic fire alarm system.

b. This system shall comply with the following requirements:

1. The sprinklers shall be supplied through two differential type dry pipe valves arranged in parallel with their system sides joined as a unit to a common feed main.
2. Rate-of-rise heat responsive devices shall be properly spaced in the area of each sub-division of the sprinkler system in such a manner as to trip automatically the dry pipe valves described in sub-division b. 1 of this section. Such devices and their locations shall be approved by the board.
3. Common feed mains shall be provided, making connection between two dry pipe valves required under subdivision b. 1 of this section and the several sub-divisions of the sprinkler system.
4. Each branch from the feed mains shall be provided with a check valve to retard back flow of air to the feed main. Total number of sprinklers on the system side of each check valve shall not exceed 600.
5. At least one air exhaust valve directly controlled by the rate-of-rise actuating system shall be placed at the most distant end of each main. At least one air exhaust valve actuated by a rapid drop in air pressure shall be placed at each end of each feed main.
6. The sprinkler system shall be so constructed, and the number of sprinkler heads controlled by the two dry pipe valves shall be so limited, that water shall reach the furthest sprinkler within a period of time not exceeding one minute for each 400 feet of feed main, from the time the rate-of-rise system is actuated. The total number of sprinklers controlled by the two dry pipe valves shall otherwise be unlimited.
7. The sprinkler and actuating systems shall be maintained in operating condition at all times.
8. An approved automatic fire alarm or rate-of-rise actuating system shall be provided, and a watchman shall be employed in the structure for twenty-four hours of each day to send an alarm to the fire department whenever an alarm is sounded by the automatic fire alarm system or the system alarms shall be directly connected to the central station of an operating fire alarm company whose sole business is fire protective service and which is directly connected to fire department headquarters. The fire alarm system shall be operated by both the rate-of-rise actuating system and the operation of the dry pipe valves.
9. When the ceiling height or bottom of beam across the structure exceeds 20 feet, the sprinklered area shall be sub-divided into sections separated from each other by fire curtains or other approved fire stops constructed of incombustible material having a

height of least one-sixth of the distance from the floor to the ceiling or bottom of beams or to the roof if there is no ceiling. Where the ceiling, beam or roof height is twenty-four feet or less, the fire curtain need not extend below an elevation that would allow twenty feet in the clear from the bottom of such curtain to the floor. Not more than 275 heads shall be permitted in any sub-divided area.

10. Provision shall be made for manual operation of the system at locations requiring not more than two hundred feet of travel.

c. In the dry pipe automatic sprinkler system combined with rate-of-rise actuating systems, sizes of pipe supplying the specified number of one-half inch sprinklers in a fire area on a floor shall not be less than those given in the following schedule:

Minimum size of pipe inches	No. of 1/2-inch sprinklers	Minimum of pipe inches	No. of 1/2-inch sprinklers
1	2	3	40
1 1/4	3	3 1/2	65
1 1/2	5	4	100
2	10	5	160
2 1/2	20	6	275

d. Except as provided otherwise in this section, this system of sprinklers shall in addition comply with all other pertinent provisions of the code.

(15.32). §C26-1366.0 Local Sprinkler Supervisory Alarm Systems.-

a. Each gravity tank, pressure tank and Type A dry pipe valve shall be provided with an approved device, connected to an approved closed circuit panel, located in the headquarters of the engineer or person in charge of the sprinkler system, or in the pump room, to indicate when the water in any tank is too high or too low, when the air pressure in any pressure tank is too high or too low, and when the compressed air in a Type A dry system is too low.

b. The wiring circuits used in connection with this supervisory alarm system shall be at least No. 16, single braid, rubber covered, copper, National Electric Code wire, provided the circuit carries two amperes or less; run in National Electric Code rigid metal conduit, except that approved flexible metal ducts may be used between rigid conduits and devices from which alarms originate, provided three feet or less of flexible duct is used.

c. High and low alarm signals shall be indicated by at least a four inch approved conduit type gong and by visible indication.

d. Waterflow signals from alarm and dry pipe valves shall be indicated by at least a six inch approved conduit type gong and by visible indication.

e. The following sources of energy may be employed:

1. Electricity supplied by a public utility.
2. A private electric generating plant, supplemented by a storage battery floating on the line. Direct current supply lines shall be protected by reverse current circuit breakers.
3. An approved rectifier may be used to transform alternating current to direct current as a source of energy for an alarm system.

f. When the system is connected to a one hundred ten volt lighting service a suitable cut out is to be provided. Such cut-out shall be enclosed in a locked or sealed metal cabinet. The connection to the system shall be the first connection on the house side of, and as near as practicable to, the meter. When batteries are used to operate the system, they shall be placed in an approved cabinet provided with a lock and key.

g. In addition to the above requirements for local supervisory alarm systems, additional approved electrical supervisory devices for either local or central station indication may be installed in any system.

(15.33). §C26-1367.0 Concealed Pipe Systems for Sprinkler Systems.-Pipe in concealed pipe systems shall be of standard full-weight wrought iron or steel and shall be inspected prior to concealment. Pipe installed in ducts or encased in cement mortar shall be inspected prior to concealment. When installed in the concealed space between floor arches and ceiling, such pipe shall be supported by hangers. Where piping is to be concealed before completion of installation the superintendent and the fire commissioner shall be notified so that proper inspection can be made.

(15.34). §C26-1368.0 Preparation of Structure.-

a. Floor or wall openings and other structural conditions which prevent the banking up of heated air and retard the automatic action of sprinkler heads shall be provided with the necessary curtain boards and draft stops to permit control of the fire by the sprinklers.

b. Curtain boards shall project at least six inches below the lowest sprinkler and shall be at least twelve inches deep.

c. When curtain boards are provided to subdivide large areas such curtain boards shall be at least twenty-four inches deep. For peaked roofs curtain boards shall follow slope of roof and be not less than twenty-four inches deep with a minimum of forty-eight inches deep at the peak when the slope is one foot in three feet, or more, except as provided in C26-1365.1. Where required to baffle opening through floors they shall be not less than 12 inches deep.

(15.35). §C26-1369.0 Approval of Sprinkler Systems.-

a. Before acceptance automatic sprinkler systems, excluding water supply tanks, shall be subjected after installation to a hydrostatic pressure test, of the whole system, of at least one hour duration at a pressure at least fifty pounds per square inch in excess of that which will be normally carried and observed in the sprinkler system. Such test pressure shall be at least two hundred pounds per square inch in every part of the system. Pressure tanks shall be tested after erection to test pressure of one and one-half times the working pressure. To prevent the possibility of serious water damage in case of a break, the pressure shall be maintained by a small pump, the main controlling gate being meanwhile kept shut. It shall be unlawful to use brine or other corrosive chemicals for testing systems.

b. In automatic dry pipe systems with type A valve control, an air pressure of forty pounds per square inch shall be pumped up, and shall be held for twenty-four hours. All leaks shall be stopped which allow a loss of pressure of over one and one-half pounds per square inch during the twenty-four hours.

c. In the case of automatic dry pipe systems with differential Type A valves, the valve shall be held off its seat during the test to prevent injuring the valve.

d. Non-automatic systems shall be tested after installation at a pressure at least fifty pounds per square inch in excess of the pressure necessary to reach the highest line of sprinklers.

e. Tests of installed systems shall be made by the contractor in the presence of a representative of the fire department. The fire commissioner shall notify the commissioner of buildings in writing of the results of the test.

f. It shall be unlawful to cover up or permanently conceal piping, devices or any portion of newly constructed sprinkler system until such system, or portion of system, has been tested in the presence of a representative of the fire department and inspected by a representative of the department of housing and buildings and approved in writing, except piping passing

through floors, walls, partitions, or beams, for distances equal to the thickness of such floor, wall, partitions or beams.

(15.36). §C26-1370.0 Sprinkler Systems in Non-fireproof Business Structures.-In business structures requiring a sprinkler system to comply with section C26-254.0 the sprinkler system shall have at least one automatic source of water supply and one auxiliary source.

(15.37). §C26-1371.0 Sprinkler Systems in Department Stores.-Wet sprinkler systems shall be required in department stores where the floor area in any story or cellar exceeds ten thousand square feet. When the floor area is less than twenty thousand square feet, at least one of the automatic sources specified in section C26-1341.0, shall be provided and, when the floor area is twenty thousand square feet or more, at least two such automatic sources shall be provided of which one source shall conform to requirements of a one source system and the secondary source may be either a 7,500 gallon pressure tank, a 10,000 gallon gravity tank elevated 20 feet above the highest line of sprinklers under the main roof, a six inch connection to a city main fed two ways and in accordance with section C26-1346.0 or a supervised automatic fire pump of 750 gallons per minute.

(15.38). §C26-1372.0 Sprinkler Systems in Factories and Other Structures.-

a. Where the labor law or any other law requires automatic sprinkler systems, or where any of the requirements of the labor law or any other law are waived because of the installation of an automatic sprinkler system, each such sprinkler system, unless specifically otherwise required by law or by the fire commissioner, shall have at least the following sources of supply installed in accordance with this article:

1. A gravity tank and Siamese hose connection, or
2. A pressure tank and Siamese hose connection, or
3. A direct connection to a city water main fed two ways with control valves at intersections capable of maintaining a pressure of at least fifteen pounds per square inch at the top of the highest sprinkler riser, which main shall have five hundred gallons of water flowing per minute at a two and one-half inch hydrant butt at the street level within two hundred fifty feet of the building. The diameter of such connection shall be at least the diameter required in piping supplying the heads as provided in section C26-1355.0. Siamese hose connection shall be installed in conjunction with such system as provided in section C26-1350.0. The pressure test, with hydrant flow as provided in this section, shall be made between the hours of eight ante meridian and five post meridian on a working day.

b. Cellars and sub-cellars requiring sprinkler protection under chapter 19-161 administrative code, because of combustible storage, inadequate ventilation and in-accessibility of fire department hose streams shall be provided with a one source automatic sprinkler system. If cellar or sub-cellar is unheated a non-automatic sprinkler system with thermostatic alarm as defined in section C26-1339.0 may be provided in lieu of an automatic sprinkler system. Where less than ten heads are required the heads may be supplied from the domestic water line if the tap and main are of adequate size and the connection for the sprinkler system is made before the house line at the outlet side of the meter or service pipe and an O.S. & Y, valve and drain is provided in an accessible location. In all cases the water supply line need only be sufficient to supply the number of heads required except where the distance from the water supply to the sprinklered area exceeds 100 feet the main feed pipe to the sprinklered area shall be increased one pipe size above the size otherwise required for the number of sprinklers involved. Where less than ten heads are required a fire department connection need

not be provided. If more than ten and not more than thirty-six heads are required a single fire department pumper connection may be installed. When more than thirty-six heads are installed at least one Siamese connection and a water flow alarm shall be provided.

c. Sprinklers in multiple dwelling, garages.-Sprinklers in garages where more than thirty-six heads are required shall comply with these rules in all respects, except as herein noted. Where not more than thirty-six heads are required the water main shall be large enough to supply all heads. If in a small garage not more than ten heads are required same may be supplied from the domestic water main if the tap and main size are as large or larger than required for the number of sprinklers involved and the connection is so made that repairs to the domestic lines in the building will not affect the supply to the sprinklers in the garage area except where the distance from the water supply to the sprinklered area exceeds 100 feet the main feed pipe to the sprinklered area shall be increased one pipe size above the size otherwise required for the number of sprinklers involved. Water flow alarm or Siamese connection need not be provided where not more than thirty-six heads are required. Siamese connections shall only be required at the fronts of the building where a garage entrance is located. If the Siamese connection cannot be installed at the entrance to the garage a metal sign securely fastened to the wall at the garage entrance indicating the location of the Siamese connection shall be provided.

(15.39). §C26-1373.0 Sprinkler Systems in Theatre Structures.-An automatic sprinkler system, where required under the provisions of article thirteen of this title, shall be at least a one-source automatic system.

(15.40). §C26-1374.0 Sprinkler Systems in Fireworks Storage.-Each automatic sprinkler system required in a structure in which fireworks are stored or sold under the provisions of sections C19-41.0 of the code, shall consist of a system supplied from any two of the automatic sources as required in section C26-1351.0 provided that the minimum working pressure is at least twenty-five pounds per square inch at the highest sprinkler line.

(15.41). §C26-1375.0 Sprinkler Systems for Nitro-cellulose Products.-An automatic sprinkler system required in a structure in which nitro-cellulose products are manufactured, stored, or kept, under provisions of section C19-110.0, shall be a two source system having the following water supplies:

a. A primary supply consisting of one of the automatic sources named in section C26-1341.0 b, but this source shall have a static pressure of not less than twenty-five pounds per square inch on the highest line of sprinklers in the area where the nitro-cellulose is located. Tank and pump capacities shall be determined according to sections C26-1342.0, C26-1345.0 and C26-1347.0 but in determining these capacities each sprinkler in the area where the nitro-cellulose is located shall be counted as two sprinklers, except that if there are more than four vaults all sprinklers in the vaults in excess of four shall be omitted from the count.

b. A secondary supply consisting of a gravity tank, or tanks as specified in sections C26-1342.0 through C26-1344.0 inclusive but such tank shall be of at least 10,000 gallons capacity and shall contain an amount of water sufficient to supply fifty percent of the sprinklers in the area where the nitro-cellulose is located for a period of twenty minutes. Only sprinklers in this area are to be counted and sprinklers in not more than four vaults shall be included in this count.

c. An auxiliary source consisting of a Siamese fire department connection or connections as specified in section C26-1350.0.

(15.42). §C26-1376.0 Sprinkler Systems for Inflammable Motion Picture Films.-An automatic sprinkler system required in a structure in which inflammable motion picture films are stored or kept, under the provision of section C19-115.0 and C19-116.0 of the code shall be a two source system having the following water supplies:

a. A primary supply consisting of one of the automatic sources named in section C26-1341.0 but this source shall have a static pressure of not less than twenty-five pounds per square inch on the highest line of sprinklers in the area where the inflammable motion picture film is located. Tank and pump capacities shall be determined according to section C26-1342.0, C26-1345.0 and C26-1347 but in determining these capacities each sprinkler in the area where inflammable motion picture film is located shall be counted as two sprinklers except that if there are more than four vaults all sprinklers in the vaults in excess of four shall be omitted from the count.

b. A secondary supply consisting of a gravity tank, or tanks, as specified in sections C26-1342.0 through C26-1344.0, inclusive, but such tank shall be of at least 10,000-gallon capacity and shall contain an amount of water sufficient to supply fifty percent of the sprinklers in the area where the inflammable motion picture film is located for a period of twenty minutes. Only sprinklers in this area are to be counted and sprinklers in not more than four vaults shall be included in this count.

c. An auxiliary source consisting of a Siamese fire department connection or connections as specified in section C26-1350.0.

(15.43). §C26-1377.0 Sprinkler Protection for Special Hazards in Non-sprinklered Structures Unprovided for by Law.-

a. Sprinkler heads and piping may be provided on ceilings of enclosed rooms, closets, shafts, or other spaces which are used as carpenter shops, upholstering rooms, paint shops, waste paper rooms, old record storerooms, trunk and general storage rooms in hotels, office buildings or other structures, and in stores and showrooms or where nitro-cellulose products or inflammable photographic or x-ray film is stored or used, or in cold storage plants.

b. In such structures, the number and type of sprinkler heads, spacing and size of pipe, location and number of valves, method of draining lines, water flow or other alarms, shall be as required by the superintendent.

c. The source of water supply where required may be the house supply tank or other sources of water supply, except that connections taken from the standpipe system or from the feed line to boilers shall be unlawful. In all cases there shall be sufficient water to provide ten gallons of water per head for each sprinkler in the largest protected fire area for fifteen minutes, and the pressure on any sprinkler line shall be at least fifteen pounds static pressure.

d. Sprinklers installed under section C26-289.0 may be supplied from the domestic water main if the tap and main size are sufficient and the connection is made at the outlet side of the water meter before the house connection. Independent connection to the street main, water flow alarm and Siamese connection shall be provided if more than thirty-six heads are required.

e. Sprinklers permitted by the superintendent in lieu of other protection may be supplied from the domestic water lines if the tap and main size is adequate and water pressure is at least fifteen pounds per square inch at the highest sprinkler.

f. Sprinklers in spray booths in unsprinklered buildings may be supplied from the domestic water line if the tap and pipe sizes are adequate and water pressure is at least fifteen pounds per square inch at the highest sprinkler.

- g. Where the distance from the water supply to the sprinklered area exceeds 100 feet the main feed pipe to the sprinklered area shall be increased one pipe size above the size otherwise required for the number of sprinklers involved. In all cases an O.S. & Y. control valve must be provided in an accessible location and a test connection installed at the end of the line so that system may be properly tested. Where more than five heads are supplied or where damage may be caused by draining, a three-quarter inch drain valve shall be provided.
- h. Outside sprinklers.-When used in lieu of iron shutters or fireproof windows a system of approved window type sprinklers shall be installed with a fire department Siamese connection as a water supply. Piping shall be galvanized and fittings shall be of malleable type.
- i. Special protection for hazards not covered by this code shall be determined by the fire commissioner. Special protection as covered by this classification may include, but not limited to:

Carbon dioxide, foam, spray or fog nozzles installations for transformers, dip tanks, propane tanks and similar special hazards.

(15.44). §C26-1378.0 Existing Sprinkler System Installations and Approvals.-

- a. Automatic sprinkler systems and devices installed before January first, nineteen hundred thirty-eight, shall be required to conform to this title only where the fire hazard due to construction and occupancy of the structure is increased. Where substantial additions or extensions in height or area are made to the structure, this title shall apply if deemed advisable or necessary by the superintendent.
- b. In cases where sprinkler systems are voluntarily installed by the owner or his representative, and where such sprinkler systems are not required by law, or by any violations standing against the structure, it shall be unnecessary for such sprinkler systems to be designed or installed in conformity with this title, except that where such systems are provided with Siamese hose connections the entire system shall be maintained in a manner satisfactory to the superintendent and to the fire commissioner or the Siamese connection shall be removed. All materials shall be of approved type. Plans and application shall be filed as per section C26-1337.0.
- c. When a new system is installed and the water supply is received from an existing system in an adjoining building, the new system must be complete in all respects and arranged so that a shut down in either building will not prevent the effective operation of the fire department Siamese connections. This shall not apply where groups of buildings are used by the same firm or factory and there is no possibility of confusion in operating the system.

(15.45). §C26-1379.0 Communicating Openings.-When a structure fully equipped with sprinklers communicates with another not so equipped, the openings between such structures shall be protected by approved automatic fire doors on both sides of the wall.

(15.46). §C26-1380.0 Maintenance Inspection.-

- a. Automatic sprinkler systems shall be inspected at least once a month by a competent person holding a certificate of fitness, employed by the owner, to see that all parts of the system are in perfect working order, and that the fire department connection or connections, if any, are ready for immediate use by the fire department. A detailed record of each inspection shall be kept for examination by a representative of the fire department.
- b. There shall be kept available at all times in the premises a supply of at least six extra sprinklers, to replace promptly any fused or damaged sprinklers. There shall be one or more employees instructed in the maintenance of sprinkler systems.