SCHULTE & ASSOCIATES
Building Code Consultants
3655 East 25th Street
Lawrence, KS 66046
fpeschulte@aol.com
847/312-7617

FIRE PROTECTION HISTORY-PART 232: 1915 (SPRINKLER STANDARD REVISIONS)

By Richard Schulte

The nineteenth Annual Meeting of the National Fire Protection Association was held in New York in May 1915. Among the subjects which were discussed at this meeting were revisions to the sprinkler installation standard. The following is the transcript of the Report presented at the meeting by the Committee on Automatic Sprinklers:

"*The meeting was called to order at 10 o'clock, President Kohn in the chair.*

The President: *The first order of business will be, the only item uncompleted yesterday, the report of the Committee on Automatic Sprinklers, Mr. C. L. Scofield, of Montreal, Chairman.*

Mr. Scofield: *There have been three meetings of the Sprinkler Committee during the year, all of which have been quite well attended. The first meeting, held in October at Montreal, was quite a radical departure for the N. F. P. A., as it was the first time, so far as known, that any committee which has to do with the formulating of standards has met in Canada. The large attendance of committee members was much appreciated.*

I also want to make a further statement, and that is to say that this is not a one-man report. The Sprinkler Committee is the largest in the Association, having some twenty-six members, and all have contributed something to the report, either more or less. The final meeting of the Committee was held on Monday last, the 10th inst., to consider changes submitted since the report was in print. I think the practice has been to read only the headings. These can be read and any changes noted.

The President: *Will members who have comments to make on the various rules, kindly rise and make such comments when the rule is being noted?*

Mr. Scofield: *I might say that two sub-committees were appointed to consider special subjects, one, certain kinds of pipe and the other, proper connections to public water mains. The one on pipe has reported since this main report was in print. It has been further suggested that inasmuch as the pamphlet on electric car houses will not be re-issued, it will be well to incorporate in the sprinkler rules any references to automatic sprinklers in the car house pamphlet. To save time, the sub-committee's decision in this respect can, if agreeable, be referred to the Executive Committee for action. The same will apply with reference to the sub-committee on proper connections from public water mains including high pressure mains, if the Association later takes any action on that subject.*

REPORT OF COMMITTEE ON AUTOMATIC SPRINKLERS.

C. L. SCOFIELD, Chairman.

E. P. Boone, J. H. Brumbaugh, H. E. Burdette, E. S. Clayton, J. E. Curtis, Gorham Dana, L. W. Evans, C. H. Fischer, I. G. Hoagland, C. H. Jenkins, L. H. Kunhardt, F. J. McFadden, Lee McKenzie, F. C. Moore, I. Osgood, H. L. Phillips, Wm. Reed, J. C. Richters, G. M. Robertson, C. B. Roulet, F. A. Rye, W. G. Sanderson, P. D. C. Steward, J. R. Sullivan, R. Sweetland.

PROPOSED CHANGES IN RULES FOR THE INSTALLATION OF AUTOMATIC AND OPEN SPRINKLER EQUIPMENTS AND UNDERGROUND MAINS.

(For inside of cover.) The rules contained herein cover the general details of a sprinkler equipment only. Before an equipment is installed, or before a present equipment is remodelled, complete working plans should be submitted for approval to the Inspection Department having jurisdiction.

These plans should be drawn to an indicated scale; give correct address and points of compass; show sectional elevations of the buildings; and the essential features of the construction, viz., size, location and direction of joists, timbers or other structural members. They should also indicate the location and size of water supplies, connecting pipes, feed mains and risers, gate, check, alarm and dry-pipe valves, as well as the location, spacing, number and type of sprinklers.

Inspection Department having jurisdiction should be consulted as to approved makes of automatic and open sprinklers, gate, check, alarm and dry-pipe valves, indicator posts and hydrants.

For rules governing the construction and installation of Centrifugal, Rotary and Steam Fire Pumps, Gravity and Pressure Tanks, construction of Valves, Indicator Posts and Hydrants, see separate publications.

GENERAL PLAN.
GOVERNING THE ARRANGEMENT OF RULES.

SECTION A. GENERAL INFORMATION.

1. Preparation of Building. *Many buildings require preparation for sprinkler equipment. All needless ceiling sheathing, hollow siding, stops of high shelving, needless partitions or decks should be removed.*

Necessary "stops" to check draft, necessary new partitions, closets, decks, etc., should be put in place, or provided for, so that the equipment may conform to the same. The top flooring should be made thoroughly tight. Paper or similar light inflammable ceiling sheathing is objectionable and unnecessary. (See Section B, Rule 13.)

2. Accessory Construction. *Sprinkler equipments require accessory construction, dry-pipe valve closets, ladders, anti-freezing boxing for tank pipes, etc. This work should be promptly attended to if not let with sprinkler contract.*

3. Vertical or Horizontal Drafts . *Floor or wall openings tending to create vertical or horizontal drafts, or other structural defects that would prevent the prompt operation of automatic sprinklers by preventing the banking up of the heated air from the fire, should be properly " stopped" in order to permit specific control by the local sprinklers.*

Satisfactory curtain-boards and other draft-stops must be provided to overcome such structural defects.

Except in special cases the main feeders to sprinklers are only of sufficient size to supply the sprinklers on one floor, consequently it is absolutely essential that these requirements for protection of vertical shafts should be carried out in every detail, and where extraordinary conditions exist and there is likelihood of fire passing through unprotected openings, pipe sizes should be increased accordingly.

4. Clear Space Below Sprinklers. *Full effective action of sprinklers requires about 24 inches wholly clear space* ***below the sprinklers,*** *so they may form an unbroken spray blanket from sprinkler to sprinkler and sides of room. Any stock piles, racks or other obstructions interfering with such action are not permissible. Sprinkler piping not to be used for the support of stock, clothing, etc.*

5. Experienced Workmen Recommended. *Sprinkler installation is a trade in itself. Inspectors cannot be expected to act as working superintendents, or correct errors of beginners. Sprinkler work to be entrusted to none but fully experienced and responsible parties.*

Care must be taken that after pipes are cut they are properly reamed in order to remove all burrs and fins; also that threads are cut to standard so that joints will be properly made without obstructing waterway. In applying the joint compound, care to be taken to place it on the pipe and not the fitting.

All distributing pipes must be straightened before installation, in order to prevent pockets between hangers which would interfere with the proper drainage of the system.

6. All Portions of Buildings to be Protected. *No change.*

7. Degree of Protection. *No change.*

8. Necessary Cut-offs. *No change.*

9. Communications. *No change.*

10. Protection Against Exposures. *The danger of sprinkler protection being impaired by exposure fires should be reduced by providing at exposed openings one or more of the following: Shutters, wired glass or open sprinkler protection.*

SECTION B. LOCATION OF AUTOMATIC SPRINKLERS.

11. Position of Sprinkler. *No change.*

12. Position of Deflectors. *Sprinkler deflectors to be parallel to ceilings, roofs or the incline of stairs, but when installed in the peak of a pitched roof they should be horizontal. Distance of deflectors from ceilings of mill or other smooth construction, or bottom of joists of open joist construction, to be not less than 3 inches nor more than 10 inches; 6 to 8 inches is the best distance with average pressure and present types of sprinklers. Note particularly that the rule for distance refers to the deflector of the sprinkler.*

In the case of fireproof buildings, the distance between deflectors and ceilings may be increased where conditions warrant; I. e., under panel ceilings. In semi-mill or other unusual construction consult the Inspection Department having jurisdiction.

13. Detailed Locations. *Sprinklers to be placed throughout premises, including basement and lofts, under stairs, inside elevator wells, in belt, cable, pipe, gear and pulley boxes, inside small enclosures, such as drying and heating boxes, tenter and dry-room enclosures, chutes, conveyor trunks and all cupboards and closets unless they have tops entirely open, and are so located that sprinklers can properly spray therein. Sprinklers not to be omitted in any room merely because it is damp, wet or of fireproof construction.*

Special instructions to be obtained from Inspection Department having jurisdiction relative to placing sprinklers inside show windows, telephone booths, boxed machines, metal air ducts, ventilators and concealed spaces, and under large shelves, benches, tables, overhead storage racks, platforms and similar water sheds, and over electrical generating and transforming apparatus and switchboards.

14. Protection of Vertical Shafts. *In vertical shafts having inflammable sides, a sprinkler to be provided within shaft for each 200 square feet of the inflammable surface, in addition to sprinklers at tops of shafts. Such sprinklers to be installed at each floor when practicable, and always when shaft is trapped.*

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

SECTION C. SPACING OF AUTOMATIC SPRINKLERS.

15. Distance from Walls. *The distance from wall or partition to first sprinkler not to exceed one half the allowable distance between sprinklers in the same direction. Additional sprinklers may also be required in the narrow pockets formed by bay timbers or beams and wall.*

President Kohn: *Does the last sentence in Rule 15 intend to include the case of fire-resistive construction where the beams are steel beams, fireproofed with cement or terra cotta? Are sprinklers to be required in the pockets between those beams and fireproofed partitions?*

Mr. Scofield: *This says "may." It does not say "shall."*

President Kohn: *If different rules are made in different cities, it is hard to know what is required.*

Mr. Scofield: *If you turn forward to "21, Fireproof Construction," you will see that there has been no change from the previous rule.*

President Kohn: *My real question should have been: Does the Committee consider that there is need for a sprinkler placed between a fireproof structural beam and a partition which is also of fireproof construction?*

Isn't it the purpose of a sprinkler to put water on the floor or somewhere near the floor? Is it the purpose of the Committee to protect the surface of the fireproof ceiling and walls?

Mr. Scofield: *That is not my understanding, but we might get an expression from some of the other members of the Committee.*

Mr. Robinson: *I think there may be circumstances where, on account of interference with the beam, you would desire sprinklers in such localities as you mention. In some cases you might have interference with the distribution of water that would affect the distribution on the floor to such an extent that you might want to put the sprinkler in a pocket, and in such cases I think the rule as worded, "may," would be about as definite as you could make it.*

President Kohn: *My reason for asking the question was that it seemed to me that with wooden beams and ceilings, and an inflammable wooden partition, there is reason in asking for a sprinkler in such a small pocket to protect the ceiling overhead. But in certain cities they are now asking for that thing in steel-protected buildings where the ceiling and wall pockets are surfaced with cement and terra cotta and partitions are entirely fireproof. In New York City these partitions are used freely, but the extra sprinklers are not required. In Western cities they are demanding even in fireproof construction these extra sprinklers to a ridiculous extent. Referring to the matter of partitions, I had the point raised in regard to fireproof partitions which only extended to within 18 inches of the girders. The answer was; " Changes may be required, and some one may ask: 'Why didn't you put sprinklers in those narrow pockets?' " I was wondering whether the Committee would make it clear whether this was a specific rule only where there might be danger.*

Mr. Scofield: *The Committee will further consider the wording.*

16. Partitions. *No change.*

17. Mill Construction . *No change except in the last paragraph, which reads: Bay timbers spaced three feet or more on centers, but less than five feet on centers will require special ruling by the Inspection Department having jurisdiction.*

18. Joisted Construction. *Under open finish joisted construction, ceilings, floors, decks and roofs, the lines to be run at right angles to the joists, the sprinklers to be "staggered spaced," so that heads will be opposite a point half way between sprinklers on adjacent lines, the distance between sprinklers not to exceed 8 feet at right angles to the joists or 10 feet parallel with joists; the end heads on alternate lines to be not more than 2 feet from wall or partition.*

The rest of the rule to remain as formerly, except for renumbering the rules referred to.

19. Smooth Finish, Sheathed or Plastered Ceilings. *No change.*

20. Pitched Roofs. *Under a pitched roof sloping more steeply than 1 foot in 3, sprinklers to be located in peak of roof, and those on either side of peak to be spaced according to above requirements. Distance between sprinklers to be measured on a line parallel with roof. Where the roof meets the floor line, sprinklers to be placed not over 31/2 feet from where roof timbers meet floor.*

Sprinklers not more than 2½ feet distant each way from the peak of roof, measured on a line with the roof, may be used in lieu of sprinklers located in peak of roof as above. Also see Rule 22.

In sawtooth roof the end sprinklers on the branch line to be not over 2½ feet from the peak of the sawtooth.

21. Fireproof Construction. *No change.*

22. Unusual Construction. *Special instructions to be obtained from Inspection Department having jurisdiction relative to location of sprinklers under floors and roofs of semi-mill, panel or other unusual construction which may interfere with distribution of water, and for which provision is not hereinbefore made.*

These types of construction are so varied that no absolute rules can be given to cover all cases.

"Semi-mill" is the term here applied to plank and timber construction with narrow bays generally less than 5 feet in width.

"Panel" construction is where the ceiling is divided by the timbers into panels or pockets. Narrow bay panels come under the head of "semi-mill" construction, and may usually be protected in the same way.

Sprinkler lines should usually run at right angles to the timbers, with heads staggered under alternate timbers, in alternate bays, or alternately under the timbers and in the bays, the arrangement depending on the width of the bay, the size of the timbers and the distance between supporting girders, as well as upon the occupancy and water pressure.

Ordinarily, where the timbers are not larger than 6 x 10 inches, the best distribution is obtained by placing the heads under the timbers.

The distance between lines will depend somewhat upon the distance between the girders supporting the timbers, the number of lines in these transverse bays being governed largely by the distance between the heads on the lines.

Note.– Illustrations, Figures 2, 3 and 4 of present rules to be changed so as to omit any reference to slow-burning construction.

SECTION D. PIPE SIZES.

23 . General Schedule. *In the footnote after size of pipe, the last two sentences, "Care to be taken," etc., to be stricken out. The following paragraph to be added to the rule:–*

Where feed mains supply branch lines of only two sprinklers each, the conditions approach those of long single lines. Such feeds should usually be centrally supplied where there are over eight or ten branch lines. Lines up to fourteen in number may be fed from the end, provided 21/2-inch pipe supplies not more than sixteen sprinklers.

SECTION E. FEED MAINS AND RISERS.

24 . Location of Risers. *No change.*

25 . Supporting of Risers. *Risers to be properly supported. In buildings of heavy construction and where riser is not supported at the ground level, floor plates or clamps and pipe couplings to be provided at the first (ground) floor level, and also at every fourth floor above same, where a building is over five stories in height, except that in buildings nine to ten stories high no floor plate nor coupling would be needed above the fifth floor.*

This would call for such supports at the first (ground) and fifth floors in a building seven to ten stories high, and floor plates and couplings at the first (ground), fifth and ninth floors in buildings eleven to fourteen stories high, etc. In buildings of light construction, additional supports will be needed.

Where risers are supported at the ground level, provide such supports at every fourth floor above same.

Where sprinkler risers, or those from tanks, are in vertical shafts, to be supported equivalent to the above.

Where risers, drains, heating pipes, etc., pass through cinder concrete, a sleeve or other suitable means to be provided to prevent corrosion. Neat cement or seven per cent lime mortar around the pipe will protect same.

26 . Size of Risers. *No change.*

27 . Connections to Systems. *All main water supplies to connect with sprinkler system at foot of riser.*

Exception. Where a gravity or pressure tank, or both, constitute the only automatic source of water supply, special permission may be given to connect the tank or tanks with the sprinkler system at the top of the riser, provided lower level control to several fire sections is not required.

The connection between the wrought iron or steel and cast iron pipe from underground main should preferably be flange and spigot pipe properly strapped together.

Where bell and spigot pipe is used, the wrought iron or steel and cast iron pipes to be properly strapped together. A flanged connection to he used on the wrought iron or steel pipe and not simply clamps with set screws. For 8-inch pipes and smaller, the rod to be 5/8- inch, for larger pipe, 3/4 inch. Straps or rods, if to be buried, should be protected against corrosion by painting with tar, asphaltum, or by other suitable means. Where practicable, connections should run underground to the foot of the riser; but in any event, the cast-iron pipe to extend above ground, and no cinders nor other corrosive material to be placed against either pipe. See Rule 28.

[ILLUSTRATIONS OMITTED]

28. Protection Against Frost. *(See illustrations.) Where supply pipes or risers in low basements or low spaces under ground floor, are exposed to frost, they should be properly protected. An acceptable method, especially where the space is over 18 inches high, is by an enclosure properly heated or filled with heavy earth or other suitable material, such as mineral wool or sawdust. Enclosure to extend below bottom of pipe and through the top flooring of ground floor. In severe climates, where space is filled, the enclosure to be of sufficient size to permit of a filling not less than four (4) feet, all sides around the pipe. Enclosure to preferably be of brick, but may be of wood, and if the latter, to be at least double with tar paper between. Where the space is not more than 18 inches high, the flooring of ground floor may be cut away and the space around the pipe enclosed according to either of the above methods, but the area may be reduced so there will be not less than one (1) foot clear space all sides around the pipe, thus exposing pipe to the heated room above. Opening at floor level not to be covered except by a metal grid.*

In any case where wood is used, it should be of a kind that will endure underground, and in addition, should be treated with creosote or other acceptable preservative.

Care to be taken in laying the underground connection, to extend it sufficiently far into the building to give the required spaces called for above, the pipe to be offset if desired, at or above the floor level.

The laying of connections in raceways exposed to frost to be avoided, owing to the difficulty of protecting the pipe near the surface and in the space between the surface of the water and the floor of building. Such connections, if they cannot be avoided, to go through the wall of the race below the frost line, and enter the building through the solid ground, and far enough back from the side of the race to avoid frost.

SECTION F. VALVES AND FITTINGS.

29. Types of Valves to be Used. *Add after second paragraph a new paragraph, viz.: Drip and or Test Pipes to be of an approved type.*

30. Valves in Connection to Water Supply. *No change.*

31. Check or Gate Valve on Pump or Tank Discharge. *No change.*

32 . Valves in Supply Pipes to Sprinklers. *Each system to be provided with a gate valve so located as to control all sources of water supply except that from steamer connections. All gate valves controlling water supplies for sprinklers should be located where readily accessible.*

Inspection Department having jurisdiction to be consulted regarding floor equipment valves.

Where valves are not within easy access from ground or floor level, permanent ladders, clamped treads on risers, chains and wheels, or other means satisfactory to the Inspection Department having jurisdiction, to be provided.

33. Indicator Posts for Gate Valves. *No change.*

34 . Pit for Underground Check Valves. *No change.*

35 . Straps. *No change.*

36. Fittings. *Extra heavy fittings to be employed where the normal pressure in the pipe system exceeds one hundred and fifty pounds.*

All fittings and pipes to have threads cut to standard, and care to be taken that the pipe does not extend into fitting sufficiently to reduce the waterway.

Long turn fittings will be required for 2[-]*½ inches and larger risers and supply mains, the fittings to be flanged on at least one end.*

Couplings. Couplings not to be used except where it is practically unavoidable.

The use of any considerable number of couplings in an equipment is considered as prima facie evidence of poor workmanship.

Reducers. A one-piece reducing fitting of good design to be used wherever a change is made in the size of pipe. Bushings not to be used for reducing the size of the openings of fittings.

37 . Hangers. *Hangers to be of an approved type and either round wrought-iron "U" (factory made and bent hot); malleable cast-iron ring clip or other adjustable patterns.*

Wrought-iron hangers are preferable to cast iron, and "U" hangers are for this reason best where their use is possible.

Flat-iron "U" hangers may be accepted, provided the thickness of the metal be in no case less than 3/16- inch, and of sufficient width to allow plenty of metal each side of the screw holes.

(a) ***Screws and Rods.*** *Wood screws for adjustable clip hangers should not be smaller than No. 17, and must penetrate ceiling beam or joist at least 1*[-]*1/4 inches. For 2-inch pipes and smaller two screws should be used, and for larger pipes four screws should be used.*

The size of rod and screws for hangers should be as given in the following tables:

[TABLE OMITTED]

Drive screws to be used only in a horizontal position as in the side of a beam.

Screws in the side of a timber or joist to be not less than 2[-]*½ inches from the lower edge, when supporting branch lines. A greater distance is desirable for larger pipes.*

(b) Position of Hangers. Hangers should not be near enough to sprinklers to obstruct distribution of water. Ordinarily, they should not be nearer than 12 inches from sprinkler, except in the case of round iron hangers where a space of not less than 3 inches may be permitted under ceilings of " fire-proof" and "slow-burning" construction.

The 3/4-inch pipe at the end of all branch lines when over 6 feet in length to have two hangers.

(c) ***For Concrete Construction.*** *The cast-iron inserts should be installed during the construction of the building, or provision made for attaching the hangers to the beams. If in buildings already constructed expansion bolts are used, they should be of a type satisfactory to the Inspection Department having jurisdiction and if possible installed in a horizontal position.*

For new concrete buildings, the location of sprinkler pipes and hangers to be determined previous to building operations, in order that proper provision may be made during the construction for the installation.

Where pipes are run through concrete beams, the sleeves to be large enough to accommodate pipe at least two sizes larger than it is intended to install.

38. Drip Pipes. *Drip pipes to be provided to drain all parts of the system. Drip pipes at the main risers to be not smaller than two (2) inches, and when exposed to the weather to be fitted with hood or down-turned elbow to prevent stoppage with ice.*

Drip pipes to be so arranged as not to expose any part of the sprinkler system to frost, and to be so connected, either by check valves or other means, that they will not overflow domestic service or other connections there may be to the same sewer or drain.

Drips for small sections shut off in winter to be located in a warm room or below frost, so as to drain all portions of pipe where freezing can occur.

Drain, drip or draw-off pipes not to terminate in blind spaces under the buildings. The water from these washes the soil away, exposing the supply pipe and may undermine the structure protecting the pipe.

Cold air enters draw-off pipes and may cause freezing of the valves.

All drips to have at least 4 feet of pipe exposed in the warm room.

See also Section G, Alarm System.

39. Drainage. *All sprinkler pipe and fittings to be so installed that they can be thoroughly drained, and, where practicable, all piping to be arranged to drain at the main drips. On wet-pipe systems the horizontal branch pipes to be pitched not less than ¼ inch in 10 feet. (See also Section H, Rule 49.)*

In wet systems 3/4 inch composition plugs may be allowed where a few low heads are involved, as under stairways. Limit the extra drips to as small a number as possible.

40. Test Pipes. *Alarm. On wet systems a test pipe of not less than 3/4 inch in diameter to be connected directly with each riser in upper story, and arranged to discharge, through a 1/2-inch brass outlet, preferably to a point where it can readily be seen. With long runs or many angles, size of test pipe to be increased to 1 inch or larger.*

Water Flowing. It is very essential that either drains or test pipes be provided so that proper flowing tests may be made to determine if the water supplies and or the connections from yard mains to inside of buildings are in order. Any such drain or test pipe to be not less than 2 inches in size, and to be so installed that the controlling valves may be opened wide for a sufficient time to assure a proper test without overflowing any service connections there may be to the same drain, or cause any water damage. A pressure gauge to be installed in each case, connection for it to be not less than 1/4 inch in size, to be controlled by a valve with arrangements for draining, and to be located on the main pipe and not on the drain or test pipe. On a wet system, where the controlling valves and drains may be located in a detached pit or valve house, test pipes to be provided inside of the buildings on the various connections to the sprinkler system. The Inspection Department having jurisdiction to determine the method to be used in each case. See illustrations for various types of test pipes, and also Rule 41.

Dry-pipe Systems. See Section H, Rule 50.

Mr. Robertson: *I would like to suggest (referring back) that for the purpose of testing the alarm, a pipe should be taken off at top of system and brought down close to the alarm valve, so that all observations may be effected from one point. I would like to make that suggestion to the Committee, for this reason: Instead of having to send a man up somewhere to open up a valve on the roof or some such point, take the pipe right out of the sprinkler riser pipe and bring it down so that all tests may be made at the alarm valve.*

Mr. Scofield: *Do you mean that in a ten or fourteen story building, you would run the pipe right through?*

Mr. Robertson: *No, I would not do that. In any of those buildings, the test pipe at top is usually accessible. There are many buildings also where there are sprinklers in the roof, and it can be done there. But there are other places, like box factories and sawmills and loft buildings, where one cannot go up readily, and it is convenient to have a test or drip valve where everything can be done at one time. I have found it in practice to be a good thing, and if it is in the rules it could be required.*

The President: *The Committee will doubtless take it under advisement.*

41. Pressure Gauges. *A standard make, 5-inch dial, spring, pressure gauge to be connected with the discharge pipe from each water supply, including each connecting pipe from public waterworks, and also as follows:–*

In each sprinkler system above and below the alarm check or dry-pipe valve.

At the air pump supplying the pressure tank.

At the pressure tank.

In each independent pipe from air supply to dry-pipe systems.

At test pipes as above, Rule 40.

Gauges to have a maximum limit equivalent to twice the normal working pressure where installed, and to be also connected direct with riser, but with sufficient clearance to permit of easy removal, connection to be tapped into drain tee, preferably opposite the drainpipe; but not on drainpipe. Gauges to be located in a suitable place and where water will not freeze. Each to be controlled by a valve with arrangement to drain. A plugged outlet to be located between each valve and gauge, for the purpose of installing the inspector's gauge, size to be not less than as noted in Rule 40.

SECTION G. ALARM SYSTEM.

42. Gongs and Connections. *Every automatic sprinkler system to contain an alarm apparatus so constructed that a flow of water through same will operate an electric gong, a mechanical gong, or both, as the character of the property and circumstances may require. On wet-pipe systems, or partially so, this apparatus to consist of an alarm valve and attachments on dry-pipe systems, attachments to dry-pipe valve (see Section H), except that where there is an approved supervisory system to a central station, one of the local alarms may be omitted at the discretion of the Inspection Department having jurisdiction. In other places, especially in small towns, alarm valve or dry-pipe valve may he connected with public fire department house, or some other suitable place.*

The use of both electric and mechanical gongs is strongly recommended. The gong of the latter type can be located on the outside of building or any other desirable place on the premise. Wen located on the outside, all gongs to be protected from the weather. Electric bells to be of approved type.

Rotary gong to be located as near alarm valve or dry-pipe valve as possible. Attention is called to the necessity of avoiding long runs or many angles in pipe to rotary gong. The greatest run of pipe horizontally not to exceed 75 feet, and vertically 20 feet.

All pipe between alarm valve, and or dry-pipe valve, and rotary gong to be galvanized or brass, size to be not less than 3/4 inch, and larger for long runs and or low pressures; and arranged to drain properly through not larger than a 1/8 inch orifice brass bushed.

Water motor and gong to be properly aligned and so installed as not to be liable to get out of adjustment.

The drain from the water motor to be properly connected. See Rules 38, 40 and 47.

43. Alarm Apparatus. *To be so located that the passing of water through any of the automatic sources of supply to any of the sprinklers will cause its action.*

44 . Approval. *Alarm valve or other alarm apparatus to be approved by the Inspection Department having jurisdiction.*

45 . Wiring and Energy for Electric Alarms. To *be installed in accordance with the rules of the National Board of Fire Underwriters. (See Signaling Systems.)*

46. Alarm Valve Installation. *The alarm valve, retarding chamber and circuit closer to be so located that all parts will be readily accessible for inspection, repair or removal, and all to be substantially supported. Suitable valves to be provided in the connections to the retarding chamber to permit repairs or removal without shutting off sprinkler system. These valves to be arranged to be readily secured open.*

47. Drains. *A vent to be provided for circuit closer. Where used, to be properly piped to a drain.*

Drains at alarm valve and at the variable pressure chamber, circuit closer and rotary gong connected with valve, to be so arranged that there will be no danger of freezing, and also to be so protected, by checks or otherwise, that there will be no overflowing at the alarm apparatus or of domestic connections that may be on the same drain, with the sprinkler drains wide open. Where checks are used, to have the equivalent of at least a four foot head, and not to be installed in a vertical position "looking down."

Drains from retarding chamber and circuit closer to discharge either to open cones connected as above, or the drain from alarm valve to be run separate from the other drains to the sewer or ground drain, a union or plug to be inserted in each drain to permit of inspection.

Where drains are connected with a sewer, proper trap to be provided.

Cold air has been known to enter drainpipes from retarding chambers of alarm valves sufficiently to cause trouble by freezing in the alarm check valve. Where exposed to frost and it is necessary to drain alarm valves outside the wall, an open discharge cone to be provided inside to break the pipe line so cold will not be conducted directly into the retarding chamber. (See Section F, Rule 38.)

SECTION H. DRY-PIPE SYSTEM AND FITTINGS.

48. Where Necessary. *A dry-pipe system to be required* ***only*** *where a wet-pipe system is impracticable, as in rooms or buildings which cannot be properly heated by the exercise of reasonable precaution. The use of an approved dry-pipe system is, however, far preferable to entirely shutting off the water supply during cold weather.*

Where it is necessary to have but twenty-five (25) per cent or less of the total number of sprinklers on an air system, only such sprinklers to be thus piped; the remainder to be on wet system.

This rule requires small dry-pipe systems for show windows, blind attics or other minor portions exposed to freezing.

Air pressure to be maintained on dry-pipe systems throughout the year, unless changed by consent of the Inspection Department having jurisdiction. (See also Section K, Rule 77.)

49. Drainage. *Sprinklers to be located in an upright position. All sprinkler pipes and fittings to be so installed that they can be thoroughly drained and, where practicable, all pipes to be arranged to drain at the main drip, ordinarily located at the dry-pipe valve. The tops of branch lines should pitch at least ½ inch in 10 feet, and more where settling may occur. A pitch of 3/4 inch to 1 inch is usually not impracticable with short-branch lines, and should be provided where there is a chance of settling.*

Where settling may occur and deprive a dry-pipe system of its drainage, the ends of lines should not be raised to violate Section B, Rule 13. The drainage should be restored by shortening the vertical piping.

(a) Extra Drips . When conditions are such that additional drip valves are necessary, such as under stairs, low platforms, etc., these should be conveniently located, so that they may be accessible for inspection and test. Drip valves to have soft metal seats and composition plugs.

(b) Connections from Top of Pipe. Where the supply for these low sprinklers is taken from a large pipe, such as a trunk main, the connection should be made from or near the top of the large pipe, so as to prevent condensation in same entering the small pipe. This can be accomplished by looping back the connection.

Where feasible, the drains for these low portions should be carried back into warm rooms, and the drip valves located there.

*© **One-half Inch Test Pipe.** In cold climates, where there may be a considerable number of sprinklers or a low point in large pipe drained by a separate drip, requiring a drain valve 1*[-]*1/4 inches or more in size, it is advisable to provide either a condensation drip or a ½-inch drip valve back of and below the larger drain valve. This latter arrangement will permit the blowing out of these low pipes through the 1/2-inch valve, when there might be danger of upsetting the system by opening the larger drain.*

Care to be taken to support the piping in a secure manner, and to see that the sprinklers do not violate the rules for position. (See Section B, Rule 12.)

***50. Supply and Test** Pipe. All water supplies to sprinklers to enter the system below the dry-pipe valve, be properly protected from freezing, and be provided with a 2-inch test pipe placed directly under the dry pipe valve. Test pipe to be provided with an approved valve and be properly connected to a drain, so as to permit of the valve being opened wide for a water flowing test. Pressure gauges also to be provided as called for in Section F, Rule 41.*

***51. Size of Dry System.** The number of sprinklers dependent upon one dry-pipe valve should preferably not exceed 300, and 400 heads should be the maximum allowed, except in very special cases.*

***Mr. Scofield:** This paragraph under 51 is taken from the rules of the New England Factory Mutual Insurance Companies. For the sake of uniformity and for the improvement of the rules, the Committee desired to incorporate quite a number of other items out of the sprinkler rules and other pamphlets of the Factory Mutuals, and they gladly gave us permission to use anything that was wanted, including even some of their copyrighted matter.*

If there is a considerable length of pipe between the dry-pipe valve and the sprinklers, thus materially increasing the air capacity of the system, the number of heads equivalent to this additional capacity, based on one head per gallon contents of this pipe, should be considered when estimating the total number of sprinklers.

*(a) **Division Horizontally Preferred.** Where more than 400 sprinklers are necessary in buildings containing two or more floors, the system preferably to be divided horizontally by consecutive floors and supplied through two or more dry-pipe valves. It will be allowable, however, where this rule would necessitate increase in the number or size of the dry-pipe valves, or involve a complication of the piping to provide for vertical sub-division.*

(b) ***Sub-division by Check Valves.*** *A dry-pipe system may be still further sub-divided by the insertion of check valves in the different branches of the system, thus quickening the operation of the dry-pipe valve. Holes 1/8-inch in diameter to be bored in the clappers of the checks to equalize the air pressure under normal conditions, and a drain, properly connected, to be provided in front of each check valve.*

The dry-pipe valve to be located in an accessible place and as near as practicable to the sprinkler system it supplies.

(c) ***Pipe Underground from Dry-pipe Valve.*** *When it is necessary to place pipe which will be under air pressure underground, it is desirable that it be buried below frost, so as to prevent any trouble from the heaving action of frozen ground. This pipe to be wrought iron or steel, and to have at least two coats of some good rust-proof paint, such as asphaltum, tar, etc., one coat to be applied before the pipe is laid, and the other after all joints are made up, final turn.*

(d) ***Cast-iron , Lead-jointed Pipe Prohibited .*** *No lead-jointed, cast-iron pipe to be used under air pressure, and all pipe liable to corrosion, where underground or exposed to chemical fumes, for example, to be painted or otherwise so treated as to reduce to a minimum this deterioration, which, with the pipes unprotected, might soon cripple the system. To further safeguard the piping against corrosion, it is advised that after the joints are made up and before the second coat of paint is applied the pipe be wrapped tightly with burlap and burlap painted on outside; also that the pipe be laid in a box or split tile conduit for still additional protection.*

(e) ***Maximum Pressure to be Carried.*** *High air pressure in dry-pipe systems is undesirable, and 35 pounds has been found to be the maximum which it is necessary to carry in most cases. Under these conditions, to avoid pumping oftener than once a week, the system should not lose more than about 10 pounds air pressure per week, and an equipment which leaks more than this cannot be considered acceptable. (See also Section K, Rule 77.)*

52. Alarm Attachments. *Where a dry-pipe valve is not located on the system side of an alarm valve, it should be provided with both mechanical and electrical alarms, installed in accordance with the requirements for alarm valves (Section G). Dry-pipe valve to be fitted with an approved alarm testing device, this to be connected with water supply so that alarms can be tested without disturbing main gates or air system.*

Pressure gauges to be provided as called for in Section F, Rule 41.

53 . Protection of Dry-pipe Valve. *Dry-pipe valve in any location to be properly protected from mechanical injury.*

Where exposed to cold, the dry-pipe valve to be located in an approved underground pit, or in a valve room or closet. Room to be of sufficient size to give at least 2½-feet free space on all sides of, and above or below dry-pipe valve or valves, and this room, if feasible, not to be built until the valve is in position. Valve room to be well lighted, preferably by electric light, and properly heated by steam, electric heater (installation to comply with the National Electrical Code), gas or lard oil lantern. If fire heat is used, some ventilation will be necessary to supply the air for combustion.

Valve room preferably to be of fireproof construction, and in exposed locations, the walls to be double with 2-inch air space. If the valve room is of wood, to have double walled top, sides and bottom, with four-inch hollow space. Space may be filled with tan-bark, mineral wool, etc., as desired. Where lantern, or other fire heat is used in wooden valve rooms, all inside woodwork to be thoroughly tinned. The room also to be constructed so that it can be kept reasonably dry. This will call for a means of ventilation to prevent condensation where the climatic conditions are severe. One or more sprinklers, depending upon size of room, to be installed, wet pipe, and controlled by a valve.

54 . Independent Air Filling Connection. *The connection from the air pump to enter the system in the main riser above the dry-pipe valve, and on this supply at this point, a shut-off valve with soft metal seat to be placed, and immediately back of it a check valve.*

55. Air Compressor. *Pump to be of sufficient capacity to increase air pressure at an average rate of not less than one pound per two minutes pumping (preferably faster).*

A relief valve to be provided on every system.

A direct steam or electrically driven air pump is preferable to a power pump. The air supply to be taken from outside or from a room having dry air, in order to avoid carrying moisture into the system. The intake should be protected by a screen.

In extensive or large systems subject to extreme cold, the air supply to be taken from the room where the lowest temperature and driest air prevail, and drawn through a reservoir or tank of about thirty gallons' capacity, containing from ten to fifteen pounds of granulated calcium chloride.

56. Flanged Dummy. *A flanged section of pipe to take the place of dry-pipe valve, in case of repairs, to be provided for each type and size installed, and to be kept at the valve.*

57. Double Supply. *For a standard equipment two independent supplies are required. At least one of the supplies to be automatic and one to be capable of furnishing water under heavy pressure. The choice of water supplies for each equipment to be determined by the Inspection Department having jurisdiction.*

58 . Pubic Water *(except high pressure systems; also applicable to private reservoir and standpipe systems). One or more connections from a reliable public water system of good pressure and adequate capacity furnishes an ideal "primary supply." A high static water pressure should not, however, be a criterion by which the efficiency of the supply is determined. The supply should give not less than 25 pounds static pressure at all hours of the day at highest line of sprinklers, and also be satisfactory to the Inspection Department having jurisdiction in its ability to maintain 10 pounds pressure at highest sprinklers, with the water flowing through the number of sprinklers judged liable to be opened by a fire at any one time. Street mains to be of ample size, in no case smaller than 6 inches. Dead end mains to be avoided if possible by arranging main to be fed both ways. No pressure regulating valve to be used in water supply for sprinklers, except by special permission of Inspection Department having jurisdiction, and where meters are used, they should be of an approved type.*

Where connections are made from public waterworks systems, it is often desirable to have double check valves. Only check valves of special design and approved for this purpose to be used.

See also Section E, Rule 27.

Connections to public waterworks systems should where feasible be controlled by post indicator valves of an approved type and located not less than 40 feet from the buildings protected; or if this cannot be done, placed where they will be readily accessible in case of fire and not liable to injury. See Rules 27, 28, 30, 32, 33, 97 and 98. Where post indicator valves cannot readily be used, as in a city block, underground gates should conform to the above as far as possible and their locations and directions to open be plainly marked on the buildings.

Connections for domestic or standpipe use over 2 inches in size should conform to the above.

All post indicator valves to be plainly marked with the service they control.

For the construction and installation of the following devices, see special pamphlets issued by the National Board of Fire Underwriters:–

Steam Fire Pumps.
Rotary Fire Pumps.
Centrifugal Fire Pumps.
Gravity Tanks.
Pressure Tanks.

59. Pumps. *A well-located fire pump is, under most conditions, the most satisfactory source of the "secondary supply," as with ample water supply it is capable of maintaining a high pressure over a long period of time.*

The capacity of the pumping plant, the kind of pump and its source of water supply should be determined by conditions, and should be the subject of special consideration in each case by the Inspection Department having jurisdiction. The capacity of pump never to be less than 500 gallons per minute when it supplies sprinklers only, and not less than 750 gallons when it supplies hydrants also.

60. Tanks Gravity . *The capacity and elevation to be determined by the Inspection Department having jurisdiction; but where a tank is also drawn upon for hose streams, it should not be of less than 30,000 gallons capacity, and should preferably be installed with the bottom not less than 75 feet above the yard level. In any case the bottom of the tank to be at least 20 feet above the highest sprinklers.*

> ***Pressure.*** *Capacity of tank to be specified by the Inspection Department having jurisdiction, but to be not less than 4,500 gallons total capacity, except by special permission, and tank not to be located below the upper story of building, and to be used as a supply to automatic sprinklers and hand hose only. (See Section K, Rule 75.)*

61. ***Penstocks or Flumes.*** *Where connections are made from these, either as a direct supply to automatic sprinklers or as a suction for fire pumps, they should be arranged to avoid mud and sediment. Connection to be also provided with removable screens installed to the requirements of the Inspection Department having jurisdiction. Where connections are made from rivers or lakes, they should be provided with removable screens similar to those for pump suction.*

62. Size of Connection. *Connection from water supply or main pipe system to sprinkler riser to be equal to or larger in size than the riser. Connections for domestic use should not be taken from the fire system. See also Section E, Rule 27, and Underground pipes, Section M.*

Mr. Scofield: *You will note the Section on Public Water says, " Public Water (except High-pressure Systems)." At the meeting in October, it was felt that the Sprinkler Committee should not take any action on high-pressure systems until there was some report from the other committees that had this particular item under consideration; but since the matter is coming up in the general meeting, attention is called to the fact that while we make provision here for connections from public water mains, no provision is made as to how the valves should be arranged. A special committee having been appointed to take that up, and also to take action following whatever the Association may do with the question of high-pressure systems, such items can be referred to the Executive Committee.*

SECTION J. STEAMER CONNECTIONS.

63. Recommendations. *In addition to the above required double supply, it is recommended that a hose inlet pipe to sprinkler system be provided for connection from hose or steamer of public fire department.*

64. Pipe Size. *To be not less than four inches in size, except by special consent of the Inspection Department having jurisdiction, and fitted with a straightway check valve, but not with a gate valve. Siamese connections to be provided with check valves in the "Y."*

Connections to be so located as to provide for prompt and easy attachment of hose.

65. Drain and Dirt Pocket. *Each connection to be arranged to properly drain the piping between the check valve and the outside hose coupling, and also to prevent entry of foreign matter, by installing a refuse collector or dirt pocket, and a 3/4-inch ball type of drip.*

66. Where Attached. *To equipments having a single riser, attach on the system side of the gate valve in the riser if a wet system, but on the supply side of the dry valve if a dry system.*

To equipments having two or more risers, attach on the supply side of the gate valves, so that with any one riser shut off the supply will feed all the remaining sprinklers.

Any underground pipe used to attach steamer connections to system, to be cast iron, and the wrought and cast iron pipes to be properly strapped together.

All steamer connections to be so arranged that they will have proper support.

67. Threads. *Each hose connection to be made of good brass, having thread to fit coupling of public fire department. Approved malleable iron or brass caps properly secured, and arranged for easy removal by public fire department, to be provided for each connection.*

Each hose connection to be designated by raised letters at least 1 inch in size, cast in the fitting in a clear and prominent manner and reading: " Auto. spkr."

68. Number of Connections. *To be specified by the Inspection Department having jurisdiction in each case.*

SECTION K. MISCELLANEOUS RULES.

69. Circulation in Pipes. *Circulation of water in sprinkler pipes is very objectionable, owing to greatly increased corrosion, deposit of sediment and condensation drip from pipes; sprinkler pipes not to be used in any way for domestic service.*

70. Painting , Whitewashing or Bronzing. *Where pipes are painted, whitewashed or bronzed for appearance, the moving parts of sprinkler heads should not be so coated.*

71. Protection of Pipes and Sprinklers Against Corrosion. *In places where chemical fumes or much moisture is present, sprinkler pipes, hangers and heads, to be protected against corrosion, method to be determined by the Inspection Department having jurisdiction; but the following are recommended.*

(a) Protection of Pipes. Where subject to corrosive influences, sprinkler piping and fittings should be thoroughly protected.

In some places it will be satisfactory to paint annually with red lead and linseed oil paint, this usually giving sufficient protection when exposed to moisture only.

When chemical fumes are present, the piping should be coated with some good chemical-resistive paint which should be in itself chemically inert and at the same time form a good bond with the exterior of the pipe. Extra care should be used in applying such paint; it should not be applied on a damp day, nor upon damp or cold surfaces; the piping should be thoroughly cleaned of all scale and dirt (the use of a stiff wire bristle brush is good for this), grease and oil; the paint should be kept thoroughly stirred and well applied; and after drying thoroughly a second coat should be applied. Two coats are usually better than more.

In some extremely exposed cases the piping has been protected by painting it with graphite paint and wrapping it with rubberized tape (such as the trimmings from rubber and canvas belts), after which the whole is given another coating of graphite paint. Cases have been known of piping protected in this way showing absolutely no sign of corrosion after six years of extremely severe exposure.

The use of galvanized piping is not very satisfactory; the cutting of the threads on the pipe removes the protective coating near the fittings where the pipe is of course the weakest, and further, the zinc forming the protective coating furnishes little protection against a great many corrosive vapors found in commercial practice.

(b) ***Protection of Sprinklers.*** *The manufacturers of approved sprinklers can furnish heads specially protected against corrosion, and these should be used wherever sprinklers are exposed to corrosion. At the present time two types of sprinklers, are available, one being a sprinkler with a glass cover, hermetically sealed, and the other being a head coated with a corrosion-resisting compound. Care should be taken in screwing the sprinkler into the fitting not to injure this protection, otherwise its effectiveness is destroyed.*

72. Alterations. *It is not permitted to change, plug up or remove the fittings pertaining to dry-pipe valve, pressure tanks, pumps, gauges, etc. If such fittings leak or become deranged, they are to be put in order.*

73 . Extra Sprinklers. *There should be maintained on the premises a supply of extra sprinklers (never less than six), to promptly replace any fused or in any way injured.*

Sprinklers to be of the various degrees that may be used in the risk.

74. Use of High Degree or Hard Sprinklers. *The only change here from paragraph ten of Section S of the present rules, is the substitution of 225 degrees for 200 degrees in the third and fourth paragraphs.*

75. Hand Hose Connections. *Hand hose to be used for fire purposes only, may be attached to sprinkler pipes within a room under the following restrictions:–*

Pipe nipple and hose valve to be 1 inch.

Hose to be 1[-]*½ inch or 1*[-]*1/4 inch.*

Nozzle to be not larger than ½ inch.

Hose not to be connected to any sprinkler pipe smaller than 2[-]½ inches and never to be attached to a dry-pipe system.

76 . Concealed Pipe Systems. *No change from present Rule 12, Section S.*

77. Tests After Installation. *All systems to be tested at not less than 150 pounds pressure for 2 hours, and at 50 pounds in excess of the normal pressure when the normal pressure is in excess of 100 pounds. Emergency tests of dry-pipe systems under at least 60 pounds air pressure, to be made at seasons of the year which will not permit testing out under water pressure.*

Brine or other corrosive chemicals not to be used for testing systems.

To prevent the possibility of serious water damage in case of a break, pressure to be maintained by a small pump, the main controlling gate being mean while kept shut.

In the case of dry systems with a differential type of dry-pipe valve, the valve to be held off its seat during the test to prevent injuring the valve.

In dry systems an air pressure of 40 pounds to be pumped up, allowed to stand 24 hours, and all leaks stopped which allow a loss of pressure of over 2 pounds for the 24 hours.

A working test of dry-pipe valve to be made if possible before acceptance.

All tests to be made by contractor in presence of inspector of Inspection Department having jurisdiction.

78 . Relief Valves or Air Chambers. *Where connections are made from public mains, subject to severe water hammer (especially where pressure is in excess of 100 pounds), it is advisable to provide a relief valve, properly connected to a drain; or an air chamber in the connection. If an air chamber is used, it should be located close to where the pipe comes through wall, and back of all other valves, and at right angle to other valves, so as to take the full force of water hammer. Air chamber to be controlled by an approved O. S. & Y. gate valve, be provided with an air vent at the top, and a drain at the bottom, and to have a capacity of not less than 4 cubic feet.*

79. Preliminary Inspection of Sprinkler Equipments. *Before asking final approval of an automatic sprinkler equipment by the Inspection Department having jurisdiction, the installing company should furnish a written statement, countersigned by the assured, to the effect that the work has been completed in accordance with the approved specifications and plans. The object is to secure a reasonable amount of supervision of the equipment by the assured as the work progresses, a larger knowledge on their part of its function and proper maintenance, and also to prevent needless waste of the time of the Inspection Department. Inspection Department having jurisdiction to furnish the necessary blanks for the above purpose.*

Mr. Scofield: *Referring to the item of the protection of sprinkler pipes against corrosion, a special sub-committee was appointed to render a report on the subject of steel pipe with a small percentage of copper in it, and genuine wrought iron pipe. I have the report of that Committee, and it might be in order to read it now. Two members of the sub-committee, Mr. Phillips and Mr. McFadden, were in Pittsburgh two days and went into the matter thoroughly and rendered the following report:–*

The following report is submitted by Mr. McFadden and myself on behalf of the Special Committee appointed to consider the use of wrought iron and copper bearing steel pipe in places subject to corrosion:

Acting under the instructions received, the Special Sub-committee of the Sprinkler Committee of the N. F. P. A. took up for investigation the use of wrought iron pipe and the so-called copper bearing steel pipe in places where sprinkler piping is likely to be subject to corrosion and begs to submit the following report:

A visit was made to the plant of the National Tube Company, which manufactures the copper bearing steel pipe, also to the plant of the A. M. Byers Company, manufacturers of genuine wrought iron pipe, and the claims as put forward by representatives of each of these concerns were listened to very attentively by your Committee. The information which they put before us, however, was not based upon actual experience in locations where pipes were subject to external corrosion; in fact their investigations of that particular subject had been very limited indeed, as the main consideration of corrosion from their point of view has been the subject of inside corrosion rather than outward corrosion. Consequently your Committee is not in a position to make any definite recommendations in regard to this pipe for use in places where it is likely to become corroded. It is the belief of your Committee that samples of various makes of pipe should be submitted to test in the Laboratories and also in rooms where there are corrosive influences, and in this way it will be possible to determine within a reasonable length of time the relative value of the different kinds of pipe in the matter of resisting corrosion.

The wrought iron pipe people claim that their pipe, owing to the method of manufacture and the structure of the material, will withstand corrosive influences as well as any other pipe, while the manufacturers of the copper bearing steel pipe claim that that type of pipe will last probably two or three times as long as ordinary pipe where it is subject to corrosion, but, as stated before, no positive evidence was presented in connection with the use of the pipe in places of this character. To be sure the people who are interested in the copper bearing steel pipe have made quite extensive tests of this type of material in connection with roof covering, and the coverings which have had an admixture of copper seem to withstand the effect of the weather much more effectively than the ordinary iron covering. These tests are still in process and the conclusions have not been fully arrived at.

Your Committee is therefore of the opinion that it is not in order at the present time to make any specific recommendations other than to state that piping, where subject to corrosion, should be specially treated and examined and replaced when necessary. It is the hope of the Committee that the manufacturers of the different types of pipe can be persuaded to place their pipe in the Laboratories for examination, and furthermore, arrangements have already been made with the manufacturers of different types of pipe whereby they are willing to have it tested in the various types of risks where there is a tendency to corrosion.

(Signed) H.L. PHILLIPS,
Chairman.

SECTION L. OPEN SPRINKLERS.

(For Protection Against Exposure.)

Window Sprinklers.

80. Discharge Orifice. *No change from present rule.*

81. Pipe Sizes. *No change from present rule.*

82. Risers and Feed Mains. *Add to the present rules the following paragraphs:–*

At all dead ends a tee instead of an elbow to be used and a piece of pipe 6 inches long with brass plug in end to be screwed into tee to form a pocket for collecting dirt.

Where sprinklers run on two adjoining sides of a building with separate controlling valve for each side, the end lines to be connected together with check valves so located that one head around the corner will operate when valve is opened.

Strainers of an approved type to be installed at base of risers, or in connections to same. Strainers to be so located as to be easily accessible for cleaning.

83. Pipe. *Omit reference to fittings in this rule,–otherwise to be the same as present Rule 4, Section Q.*

84. Valves. *No change from present Rule 5, Section Q.*

85. Drainage . *No change from present Rule 6, Section Q.*

86. Location and Number of Sprinklers. *No change from present Rule 7, Section Q.*

87. Water Supply and Control. *Omit "as called for in Section L," otherwise no change from present Rule 8, Section Q.*

88. Sprinklers. *No change from present Rule 9, Section Q.*

89. Gauge Connections. *No change from present Rule 10, Section Q.*

CORNICE, SIDE WALL OR RIDGEPOLE SPRINKLERS.

(For Use in Protecting Frame Buildings, Mansard Roofs, etc.)

90. Location, Size of Orifice and Number. *No change from present Rule 11, Section Q.*

SECTION M. UNDERGROUND PIPES AND FITTINGS.

91. Weights. *No change from present Rule 1, Section R.*

92. Hydrant Main. *No change from present Rule 2, Section R.*

93. For Pipes Extending to a Dead End. *No change from present Rule 3, Section R.*

94. For Loop Systems. *No change from present Rule 4, Section R.*

95. Rules for Laying Cast-iron Mains. *Depth of Earth Cover. The depth of covering to be determined by the Inspection Department having jurisdiction, but will vary from 2*[-]*½ feet in the Southern States to 10 feet in the northern part of Canada. Depth of covering to be measured from top of pipe to ground level. In a loose, gravelly soil, or in rock, the depth should be greater than in compact, clayey soil. A safe rule to follow is to bury the top of the pipe not less than one foot below the lowest frost line for the locality. As there is normally no circulation of water in private fire mains, they require a greater covering than the public mains.*

Raceways. *Placing pipes over raceways or near embankment walls to be avoided as far as possible, and special attention to be given to protection against frost where necessary to so locate them.*

Where mains are laid in raceways or shallow streams, care to be taken that there will be a sufficient depth of running water between the pipe and the frost line during all seasons of frost, and a safer method is to bury the main under the bed of the waterway not less than one foot. Care also should be taken to keep the mains back from the banks a sufficient distance to avoid any danger of freezing through the side of the bank above the water line, and with low banks mains should be buried below the frost line where entering the water.

96. Care in Laying. *Pipes to be clean inside when put in trenches, and open ends to be plugged when work is stopped, to prevent stones roiling inside.*

Pipes to bear throughout their length, and not be supported by the bell ends only.

(a) ***Specials.*** *Specials to be used for making offsets and bends, and reducers for changing size of pipes, as thick lead joints, or joints with lead mostly on one side, are liable to leak.*

(b) ***Back Filling.*** *Back filling to be well tamped under and around pipes to prevent settlement or lateral movement, and to contain no ashes, cinders nor other corrosive materials.*

Rocks not to be rolled into trenches and allowed to drop on pipes.

© ***Strapping.*** *All plugs at blanked openings and all bends in soft ground either to be strapped or secured by masses of concrete against the ends or sides of trenches to avoid any possibility of joints blowing apart.*

(d) ***Mains in Rock, Quicksand, under Railway Tracks, through Buildings.*** *In trenches cut through rock, back filling preferably to be entirely of earth, but earth to be used under and around pipe, and for at least 2 feet above same. If soil is of quicksand it may be necessary to support piping on piers. Under railroad tracks, pipe to be provided with special supports and reinforcement at joints. Underground through buildings, flanged cast-iron pipe with metallic gaskets, or other approved pipe, to be used.*

Mains not to be laid under piles of coal or other material liable to make the ground settle and cause leaks.

(e) ***Steep Inclines.*** *Down steep hills, mains to be properly anchored. A general rule is to anchor the pipe at the bottom of the hill, at any turns, and otherwise on straight runs about every forty-eight feet. The anchoring to be done either to natural rock, or by means of brick or concrete piers. The piers to be built around the pipe, or an iron rod not less than 3/4-inch in diameter, to be placed around the pipe, and the ends anchored in the piers. Bell ends to be uphill.*

(f) ***Blow-off.*** *Where feasible, blow-off to be provided at low point of underground main, and it is also advisable where an underground main crosses water.*

(g) ***Clamps.*** *Clamp rods where used for strapping pipe should preferably run from the bell to the next bell or fitting, but may be run to clamps on pipe, provided clamps are not less than 1½ inches wide and not less than 3/8 inch thick. For 8-inch pipe and smaller, clamp rods to be not less than 5/8 inch in diameter; for larger pipe not less than 3/4 inch. Clamps, straps or rods to be protected against corrosion by painting with tar, asphaltum or by other suitable means.*

(h) ***Leaded Joints.*** *Joints to be carefully leaded, and packing to be in the smallest quantity necessary to stop the lead. Rings to be shrunk on ends of short length of pipe to form beads. These are very essential in order to prevent yarn and lead from passing into pipe, and also to make joint hold. Socket joints should not be located in, nor close to, foundations.*

97. Locating and Setting Hydrants. *Hydrants to be of an approved type (see special pamphlet on Valves, Indicator Posts and Hydrants), and wherever possible, to be placed about 50 feet from the buildings protected. Where it is impossible to place them at this distance, they may be put nearer, provided they are set in locations where the chance of injury by falling walls is small, and from which men are not likely to be driven by smoke or heat. Usually in crowded mill yards they can be placed beside low buildings, near brick stair towers, or at angles formed by substantial brick walls, which are not likely to fall. Hydrant to be set on flat stone, and about half a barrel of small stones to be placed about the bottom to insure quick drainage from the drip. They should not be placed near retaining walls where there is danger of frost through the wall.*

Hydrants to be fastened to pipe by straps from lugs cast on hydrant or other means acceptable to the Inspection Department having jurisdiction.

Where soil is of such a nature that the hydrants will not drain properly under the above arrangement, the hydrant drain to be connected to a sewer or ground drain by not less than a two-inch cast-iron pipe; or some other means acceptable to the Inspection Department having jurisdiction, to be provided to keep the hydrant barrels clear of water.

For hose house and equipment, see special pamphlet.

98. Valves. *Every connection from a yard main to a building to be provided with a post indicator valve of an approved type, and the name of the service controlled to be clearly stencilled on the valve.*

When surroundings are such that the indicator post will interfere with the passing of teams or cars, the best practice is to use a valve of the outside screw and yoke pattern placed in a pit built to the National Board of Fire Underwriters' Specifications. (See special pamphlet on Tanks.) A wrench or crow-foot with long handle to be provided for each valve, and kept in the pit where it can be reached from the yard level. The location of the valve to be clearly marked on neighboring buildings, and the cover of the pit to be kept at all times free from dirt and snow.

Large yard systems to have sectional controlling valves, and a valve to be provided on each bank where a main crosses water.

99. Testing. *All piping when completed, to be tested for not less than two hours at a pressure of not less than 150 pounds, and if the normal pressure exceeds 100 pounds, for not less than 50 pounds in excess of that pressure.*

Where feasible, test to be made with fire pumps running, and every hydrant to be opened and closed so as to test it, and at the same time produce some water hammer on the piping, as in the case of actual fire. The system also to be thoroughly flushed out by opening the various hydrants wide, thus drawing large quantities of water and cleaning out small stones, sand and other obstructions which will plug play pipes and sprinklers if allowed to remain until the time of fire.

Branches to the inside sprinkler equipment also to be flushed out before connecting the sprinkler riser.

If fire pumps are not available, underground piping may be tested out by means of a hand pump.

In any event, the system to be tested under water pressure to detect leaks which, even if small, when running continuously, cause large waste of water and if possible, pressure to be put on the pipes ***before the joints are covered,*** *in order that any leaks may be readily located. Tests to be made by contractor in presence of inspector of the Inspection Department having jurisdiction.*

Mr. Scofield: *It has been suggested that the rules be indexed under three headings, Automatic Sprinklers, Open Sprinklers and Underground Mains.*

The President: *You have heard the report of the Committee. Is there any further comment on it? If not, a motion would be in order that the report be accepted, and after further consideration of certain items by the Committee referred to the Executive Committee.*

Mr. Robinson: *I so move.*

Mr. Phillips: *In rising to second this motion I am going to take the time of the convention for a moment to speak about the work of the Chairman of this Committee. He has taken hold of a very complicated and difficult piece of work, and has carried it through to the most successful conclusion. He has called several meetings of the Committee, and has been most devoted in attending to the details of the work. I do not think that there has ever been a convention of the National Fire Protection Association when the Automatic Sprinkler Committee has brought in a report which has practically been accepted–or is about to be accepted, I think it is safe to assume–with almost no suggestions nor corrections. We are very fortunate in having had Mr. Scofield as the Chairman of this Committee during the year. (Applause.)*

I am also going to add that in connection with one of the meetings which was held in Montreal and which was attended by a large number of the members of the Committee, during which time they put in good, hard work for two days and one night, they were very hospitably entertained by the Canadian Fire Underwriters' Association, one of our active members. The Canadian Fire Underwriters' Association did a great deal to make the work of the Committee successful.

The President: *You have heard the motion and the appreciative remarks of Mr. Phillips with respect to the excellent work of the Chairman, Mr. Scofield.*

(The motion was carried.)

Although the report above was presented at the NFPA Annual Meeting in 1915, it is rather remarkable how similar this Report on automatic sprinkler installations is to more current editions of NFPA 13. Although much has changed with respect to the pipe schedule system installations, sprinkler spacing and minimum water supplies for sprinkler systems, the basics of the piping system installation from 1915 have remained the same for the last 100 years.

Of particular interest is the provisions for two water supplies for the sprinkler system, in addition to the fire department connection.

* * * * *

Source: "*Proceedings of the Nineteenth Annual* [NFPA] *Meeting*", New York, New York, 1915.