

NFPA 13E

Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems

1984



NOTICE

All questions or other communications relating to this document should be sent only to NFPA Headquarters, addressed to the attention of the Committee responsible for the document.

For information on obtaining Formal Interpretations of the document, proposing Tentative Interim Amendments, proposing amendments for Committee consideration, and appeals on matters relating to the content of the document, write to the Secretary, Standards Council, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

A statement, written or oral, that is not processed in accordance with Section 16 of the Regulations Governing Committee Projects shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Users of this document should consult applicable Federal, State and local laws and regulations. NFPA does not, by the publication of this document, intend to urge action which is not in compliance with applicable laws and this document may not be construed as doing so.

Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

Licensing Provision

This document is copyrighted by the National Fire Protection Association (NFPA). Public authorities and others are urged to reference this document in laws, ordinances, regulations and administrative orders or similar instruments. Any deletions, additions, and changes desired by the adopting authority must be noted separately. Those using this method ("adoption by reference") are requested to notify the NFPA (Attention: Vice President and Chief Engineer) in writing of such use.

The term "adoption by reference" means the citing of the title and publishing information only.

(For further explanation, see the Policy Concerning the Adoption, Printing and Publication of NFPA Documents which is available upon request from the NFPA.)

Statement on NFPA Procedures

This material has been developed under the published procedures of the National Fire Protection Association, which are designed to assure the appointment of technically competent Committees having balanced representation. While these procedures assure the highest degree of care, neither the National Fire Protection Association, its members, nor those participating in its activities accepts any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

NFPA has no power or authority to police or enforce compliance with the contents of this document and any certification of products stating compliance with requirements of this document is made at the peril of the certifier.

MORGAN TECHNICAL LIBRARY
NATIONAL FIRE PROTECTION ASSN.
BATTERYMARCH PARK
QUINCY, MA 02269

© 1984 NFPA, All Rights Reserved

**Recommendations for
Fire Department Operations in Properties Protected by
Sprinkler and Standpipe Systems**

NFPA 13E-1984

1984 Edition of NFPA 13E

This edition of NFPA 13E, *Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems*, was prepared by the Technical Committee on Fire Service Training, and acted on by the National Fire Protection Association, Inc. at its Fall Meeting held November 14-17, 1983 in Orlando, Florida. It was issued by the Standards Council on December 8, 1983, with an effective date of December 28, 1983, and supersedes all previous editions.

The 1984 edition of this standard has been submitted to the American National Standards Institute for approval as an American National Standard.

Origin and Development of NFPA 13E

The NFPA adopted in 1933 an informative brochure, prepared by the Committee on Field Practice, *Use of Automatic Sprinklers by Fire Departments*. This was published as a separate pamphlet and reprinted in 1936. The work formerly carried on by the Committee on Field Practice was distributed to a number of new committees in 1983 and at that time the Committee on Standpipes and Outside Protection was given responsibility for this brochure. A subcommittee of the Committees on Standpipes and Outside Protection, Automatic Sprinklers, Fire Department Equipment and Fire Service Training prepared a revision, *Fire Department Operations in Protected Properties*, which, on recommendation of the four committees, was adopted as an informative report at the NFPA Annual Meeting, Detroit, May 16, 1961. The informative report was published and circulated as a separate pamphlet No. SPI — 1961, but was not included in the annual volumes of the *National Fire Codes*®.

Recommendations for Fire Department Operations in Properties Protected by Sprinklers and Standpipe Systems, NFPA 13E, was adopted with minor revisions by the NFPA at its 1966 Annual Meeting on recommendation of the Committee on Standpipes and Outside Protection. It was amended in 1973, 1978, and 1983.

Technical Committee on Fire Service Training

John Hoglund, Chairman
University of Maryland

Edward W. Bent, Vice Chairman
CA Fire Marshal's Office

Anthony P. Caputo, Boston Edison Co.
Vincent K. Elmore, Palm Beach Fire Dept., FL
Donald D. Flinn, Int'l Assn. of Fire Chiefs
David C. Grupp, Kemper Corp.
Rep. Alliance of American Insurers
James Geoff Kellam Jr., Virginia Beach Fire Dept.
Rep. Int'l Society of Fire Service Instructors
William A. Koen, Exxon Co. USA
Robert A. Lincoln Jr., Nassau Cnty Fire Service Academy

John B. Lockwood, IAFF
Rep. Int'l Assn. of Fire Fighters
Charles L. Page, Texas A & M University
Peter O. Pederson, Salt Lake City Fire Dept., UT
William Peterson, Plano Fire Dept., TX
Rep. Fire Marshals Assn. of N. America
William J. Vandevort, Oklahoma State University
Rep. Int'l Fire Service Training Assn.
Edward W. Whalen, New York Board of Fire Underwriters

Alternates

Gene P. Carlson, Oklahoma State University
(Alternate to W. J. Vandevort)

Joseph Pellegrino, Patterson Fire Dept., NJ
(Alternate to NFPA Fire Service Section)

Henry D. Smith, Texas A & M University
(Alternate to C. L. Page)

Nonvoting

Walter Brocar, New Haven Fire Dept., CT

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

Contents

Chapter 1 Properties Protected by Automatic Sprinkler Systems	13E- 4
1-1 General	13E- 4
1-2 Inspection and Pre-fire Planning	13E- 4
1-3 Fireground Operations in Sprinklered Properties	13E- 5
1-4 Post-Fire Operations	13E- 6
1-5 Reports	13E- 6
1-6 Storage Occupancies	13E- 7
Chapter 2 Properties Protected by Outside Sprinklers for Protection Against Exposure Fires	13E- 7
2-1 General	13E- 7
2-2 Pre-Fire Planning	13E- 7
2-3 Water Supply for Fire Fighting	13E- 7
2-4 Fireground Operations Involving Outside Sprinklers	13E- 7
Chapter 3 Properties Protected by Standpipe Systems	13E- 8
3-1 General	13E- 8
3-2 Inspection and Pre-Fire Planning	13E- 8
3-3 Water Supply for Fire Fighting	13E- 8
3-4 Fireground Operations Involving Properties Protected by Standpipe Systems	13E- 8

Recommendations for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems

NFPA 13E-1984

Chapter 1 Properties Protected by Automatic Sprinkler Systems

1-1 General.

Records of the National Fire Protection Association clearly indicate the highly effective performance of automatic sprinkler systems. The actual performance is likely even better than the 95 percent plus statistics available, since many small fires involving only one or two sprinklers are probably not reported.

There are two principal causes of unsatisfactory sprinkler performance: closed valve in the water supply line and inadequate water delivered to the sprinkler system. Both of these items can be reduced by effective fire department prefire planning and appropriate actions at the time the fire department is called. A change in contents combustibility and/or configuration can also affect sprinkler performance. Knowledge of sprinklered buildings within the response area will enable companies to be alert for this change.

Wherever automatic sprinklers are installed, the fire department training program should include a course on the fundamentals of automatic sprinkler systems. Where automatic sprinklers are in use, the fire department should recognize that:

- where properly designed, installed and maintained, the sprinkler system can put water directly on the fire in a more effective manner than the fire department can do using manual methods.
- not all sprinkler systems are equally effective in their performance. Systems installed many years ago may not have been properly maintained or may not be fully effective for the occupancy now in the building.
- changing water supply conditions may have reduced the water supply for sprinklers initially contemplated by the system designer.
- newer occupancies and commodity storage methods may rely heavily on fire department support for the sprinkler system as compared to past sprinkler system performance and conventional storage methods.

1-2 Inspection and Pre-fire Planning. (See Figure 1-2.)

1-2.1 In properties protected by automatic sprinklers, fire officers, including the chief of the battalion and/or district and officers assigned to first due companies, should know:

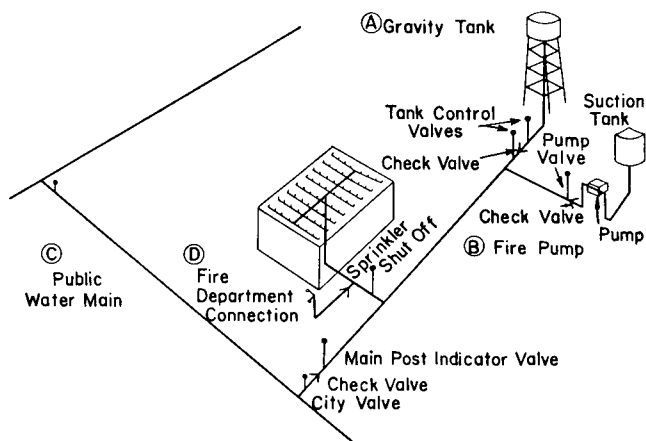


Figure 1-2

(a) The buildings and nature of occupancies protected by automatic sprinklers, the extent of this protection, and the type of sprinkler systems.

(b) The water supply to the sprinklers, including the source and type of supply, the volume and pressure normally available.

(c) The location of all sprinkler control valves, what each valve controls, and the consequence of shutting off any valve.

(d) The location of fire department connections to sprinkler systems, the specific area each connection serves, and the water supply, hose and pumper layout that will be used to feed the sprinkler connections. [See Figure 1-2.1(d)].

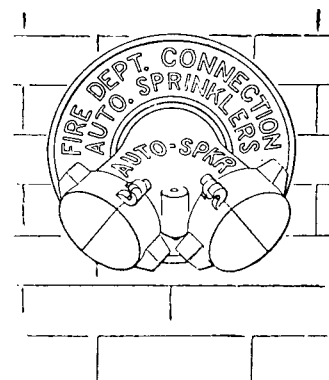


Figure 1-2.1(d)

(e) The specific company assignment having the primary responsibility for charging the sprinkler connection.

(f) The location of water supplies for hand lines without jeopardizing the water supply to operating sprinklers.

(g) An alternate means for supplying water to the system in case of damage to the fire department connection.

(h) The location of spare or replacement sprinkler heads.

(i) Names of building owner or tenant for contact in emergency.

1-2.2 During the periodic inspections by fire code officials, the location and accessibility of fire department connections and connections to the water source as well as the availability of an adequate water supply should be ascertained.

1-2.3 Arrangements should be made with the property owner for entering the building as quickly as possible when the building is unattended. If such arrangements are made, the necessity for using forcible entry equipment may be reduced and damage from the use of such equipment avoided.

1-3 Fireground Operations in Sprinklered Properties.

1-3.1 It is most important that each fire department responding to properties protected by automatic sprinkler systems have standard operating procedures developed for handling fires in sprinklered buildings. It is the duty of the officer in charge at the fire to see that these procedures are carried out as promptly and efficiently as possible.

1-3.2 When responding to a fire in properties protected by automatic sprinkler systems it is important that fire fighting operations be based upon a thorough knowledge of the property resulting from prior inspection and "pre-fire planning."

1-3.3 Accurate size-up may be hindered by low visibility from smoke resulting from downward air currents due to operating sprinkler heads.

NOTE: Experience shows that shutting down a sprinkler system to improve visibility could prove disastrous.

1-3.4 A fire fighter familiar with the building and the system, and preferably with a portable radio, should be sent immediately to see that control valves are fully opened and so advise the officer in charge. Where ample personnel are available and communications can be maintained, it is desirable to remain at the control valve area to ensure that no one closes the valve(s) until so ordered by the officer in charge.

If the valve is found to be closed, the officer in charge should be promptly notified and the valve should be fully opened at his direction unless valve is tagged "Closed for Repairs." Valves found closed for no apparent reason should be reported to the fire investigator as soon as possible.

NOTE: If the system is supplied or augmented by a fire pump, a fire fighter should also be assigned to verify that the pump is in operation.

1-3.5 When arriving at a property protected by an automatic sprinkler system, prompt action should be taken to supply the system. [See Figures 1-3.5(a) and 1-3.5(b).]

A minimum of one pumper supply line should be connected to the fire department connection and should be supplemented according to fire conditions. The supply line should be charged to a pressure of 150 psi (10.3 bars). Where fire conditions dictate multiple lines into the system, a somewhat higher pressure may be needed.

Additional hose lines should be stretched to the fire area as directed by the officer in charge. [See Figure 1-3.5(c).]

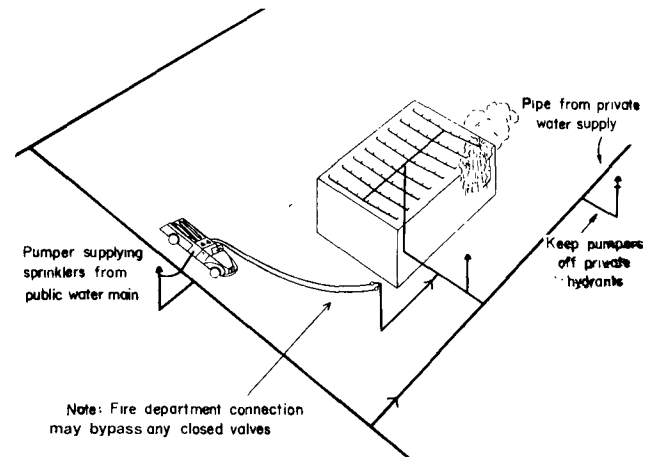


Figure 1-3.5(a)

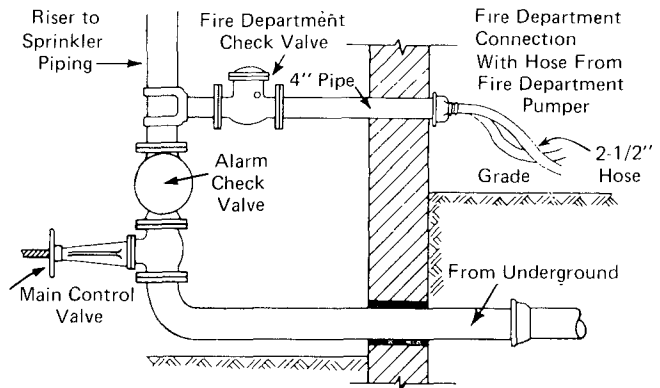


Figure 1-3.5(b)

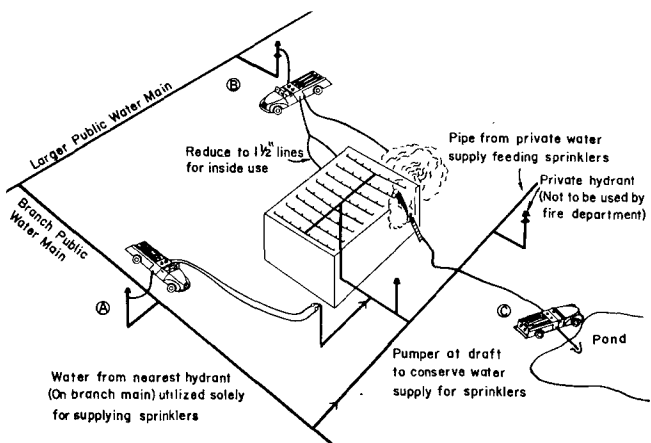


Figure 1-3.5(c) Where hose streams must be used, water must be taken from sources that do not reduce the sprinklered protection. Pumps should be supplied by either:

(A) Connecting to large mains which flow tests have indicated may be adequate to supply both sprinklers and the required hose streams; (B) Connecting to water mains not needed for sprinkler supply; (C) Drafting from static sources.

1-3.6 The unit performing "truck" duties should provide ventilation and salvage as needed in order that there be no delay in advancing hose lines to complete extinguishment. Refer to Section 1-6 for exceptions to ventilation procedures.

Salvage covers should be spread over those items/areas likely to be affected by operating sprinklers and/or hose lines. Special attention should be given to those areas on levels below the area of sprinkler operation.

1-4 Post-Fire Operations.

1-4.1 Automatic sprinklers should not be shut off until after the fire has been extinguished. If there is a sectional or floor valve, this should be closed in lieu of the main valve. Assign a fire fighter, preferably with a portable radio to remain at the valve until overhaul is completed. Orders should also be given to the pump operator to shut down the lines connected to the fire department connection as these by-pass the main valve, and in the absence of a floor valve, water will flow until the pump discharge gates are closed.

Where a combined sprinkler-standpipe system is installed it may be necessary to maintain the hose lines charged until overhaul is completed.

NOTE: Where only a few sprinkler heads are operating, sprinkler tongs, tapered wooden wedges or dowels can be used to immediately stop the flow from the opened heads without shutting off the entire system. (See Figure 1-4.1.)

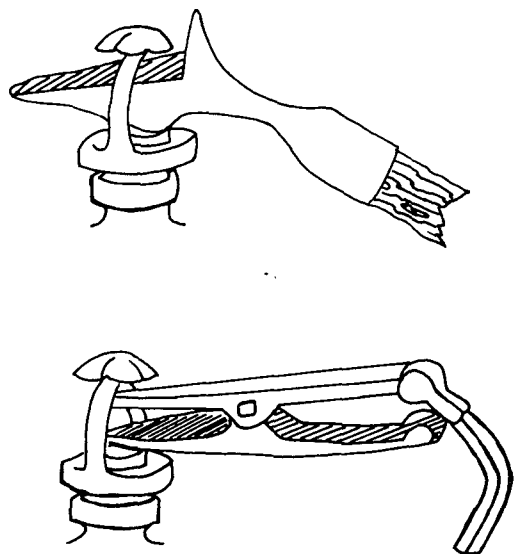


Figure 1-4.1 Pole shutoffs, tongs and even wooden wedges are used to quickly shut off sprinklers until valves supplying them are located.

1-4.2 Provide routine overhaul and initiate cause and origin investigation.

1-4.3 When overhauling is completed the lines from the pumper to the sprinkler system fire department connection may be ordered disconnected.

1-4.4 Where appropriate, the fire department may assist in restoring the sprinkler system. This may include

replacing fused heads surrounding the operating sprinkler, resetting dry valves, turning on water, etc. Unfused heads surrounding the operating sprinkler heads subjected to elevated temperatures should be replaced to avoid potential fusing under non-fire conditions.

NOTE: Work on restoring a sprinkler system may present potential consequences for improper or negligent actions. Each fire department should review their position on this matter.

1-4.5 Notify code enforcement authority where the automatic sprinklers are part of a "code" required system. If the sprinkler system has been installed to comply with a legal code or as a code alternative to certain requirements, where the sprinkler system cannot be restored to operating condition at the time the fire department leaves the premise, it is imperative that the code enforcement agency be notified promptly of the noncompliance status of the structure. This information should also be given to a responsible representative of the owner or occupant.

1-4.6 Notify the Fire Prevention Bureau of any fire involving a building with automatic sprinklers.

1-5 Reports.

1-5.1 It is very important that the officer in charge include with the fire report essential data regarding the operation of the sprinkler system.

1-5.2 A fire department report of fire in a property protected by an automatic sprinkler system should include pertinent additional information regarding automatic sprinkler operation such as:

- Location of heads operating.
- Number of sprinkler heads operating.
- Result of sprinkler operation.
- Reason for any unsatisfactory operation.
- What member of department was assigned to check control valve?
- Did fire department connect to sprinkler system?
- If not, why not?
- Company connected to sprinkler system: Engine number.
- Number of hose lines used.
- Was water pumper into system?
- Was valve closed after fire? Who ordered valve closed?
- Number of sprinkler heads replaced by fire department.
- Type of heads installed.
- Is sprinkler protection fully restored?
- By whom?
- Did the private water supply to sprinklers operate satisfactorily?
- Was representative of management notified? Who?

1-5.3 A thorough critique of the fire department operations and the performance of the automatic sprinkler system should be completed to improve future operations at sprinklered properties.

1-6 Storage Occupancies.

1-6.1 Occupancies with a wide variety of configuration and a wide range of storage commodities may need special procedures particularly where storage heights are in excess of 15 ft (4.57 m). In some cases, routine ventilation procedures in the early stages of a fire may hinder effective sprinkler operations. It is desirable for the fire department to discuss its prefire plan for warehouse occupancies with the occupant, sprinkler designer and insurance carrier to determine if a modification in procedures is appropriate.

1-6.2 For those cases where search and rescue operations have been completed prior to ventilation work being performed by the fire department, it may be appropriate to allow the automatic sprinklers to continue to operate without further ventilation to enable them to achieve full control of the fire. This may take 20-30 minutes or more.

Chapter 2 Properties Protected by Outside Sprinklers for Protection Against Exposure Fires

2-1 General.

2-1.1 Many buildings or properties having a severe exposure problem are equipped with outside or external sprinkler systems designed to provide a water curtain capable of shielding the property from fires in other buildings or in storage areas. Most of these systems are designed for manual operation. Some are thermostatically operated, open-head systems. Some are specially designed sprinkler heads on pipes extending from a wet- or dry-pipe sprinkler system inside the building and so placed as to protect window openings.

2-1.2 Sprinkler heads for outside protection are specially designed for water curtain effect and when properly used should prevent an exposure fire from entering the building.

2-2 Pre-Fire Planning. In properties having outside sprinkler protection, fire officers, including the chief of the battalion and/or district and officers assigned to first due companies, should know:

(a) The building and nature of the occupancy protected by the outside sprinkler, the extent of the protection, and the type and operation (automatic or manual) of the system.

(b) The water supply to the sprinklers, including the source and type of supply, the volume and pressure normally available.

(c) The location of all sprinkler control valves, what each valve controls, and the consequence of shutting off any valve.

(d) The location of fire department connections to the system, the specific area each connection serves, and the water supply, hose and pumper layout that will be used to feed the sprinkler connections.

(e) The specific company assignment having the prim-

ary responsibility for charging the sprinkler connection.

(f) The location of water supplies for hand lines without jeopardizing the water supply to operating sprinklers.

(g) An alternate means for supplying water to the system in case of damage to the fire department connection.

(h) The location of spare or replacement heads.

(i) Names of building owner or tenant for contact in case of emergency.

2-3 Water Supply for Fire Fighting. A sketch should be prepared showing the location of the control valves, the fire department supply connections, and the hydrants to be used for pumping into the system. Where there is an exposure fire problem it must be assumed that there may be a major fire which will also require a number of hose streams for manual fire fighting. There may also be standard automatic sprinkler systems in the fire area which must also be supplied with lines from pumps.

2-4 Fireground Operations Involving Outside Sprinklers.

2-4.1 The purpose of outside sprinkler systems is to prevent extension of fires to exposed properties. It is the duty of the officer in charge of the fire to see that these systems are used to fulfill their intended purpose. To do this it is necessary that the officer in charge know of the existence of the system and how it is supplied with water.

2-4.2 The officer in charge should ascertain as quickly as possible whether outside sprinklers are operating. If the system is manually operated, a fire fighter preferably with a portable radio should be sent to the valve to open the valve immediately in the event the outside sprinklers are needed. In some cases there will be several valves controlling different exposed parts of the protected building and it is important to open the correct valve. Care must be taken to conserve water supply and minimize potential water damage by shutting off the outside sprinklers when they are no longer needed.

2-4.3 Where a fire department connection is provided, an engine company should pump into the fire department connection supplying the outside sprinklers.

2-4.4 The officer in charge should:

(a) Order fire fighters into the exposed buildings on each side to see that all windows are closed and that fire has not extended into the buildings concerned.

(b) If the exposure is severe, set up fire department lines in the exposed buildings using standpipe facilities if available.

(c) Send fire fighters to the roof to make certain that no part of the roof structure has ignited.

(d) Order the start of salvage operations in exposed buildings.

(e) Order outside sprinklers shut off and drained when no longer needed.

(f) Order the system restored (*refer to 1-4.4*).

Chapter 3 Properties Protected by Standpipe Systems

3-1 General.

3-1.1 Many properties have standpipe systems serving fire hose outlets in various parts of one or more buildings. Standpipe systems of various types may be used by the fire department to place streams in service quickly in areas that cannot be reached conveniently with hose lines directly connected to pumpers or hydrants outside of buildings.

3-2 Inspection and Pre-Fire Planning.

3-2.1 The procedure for fire department pre-fire planning for properties protected by standpipe systems is in many ways similar to that for automatic sprinkler systems. The inspector must determine the source and reliability of water supply and follow the piping, noting the control valves.

3-2.2 Where the fire department is required to supply hose outlets several hundred feet from the fire department connection, plans must be made in advance to provide the required pressure and fire flow based upon the size, length of pipe, the maximum height of standpipe outlets and the number of streams that are to be supplied.

3-3 Water Supply for Fire Fighting.

3-3.1 Standpipe systems will likely have water supplied by city water mains. They may also be connected to fire pumps, gravity tanks, pressure tanks, fire department connections or combinations of these to provide water at adequate pressure and quantity at the outlets.

3-3.2 The fire department should determine the available pressure and quantity of water at the highest outlets, and develop procedures to provide appropriate amounts of water for fire fighting when using the system.

3-3.3 Alternate means of supplying water to the fire area should be identified in case the system is unusable at the time of a fire.

3-4 Fireground Operations Involving Properties Protected By Standpipe Systems.

3-4.1 Fire department operations in properties protected by standpipe systems designed to supply fire department hose streams require carefully planned operating procedures as do operations in buildings protected by automatic sprinklers. Many buildings will have both sprinkler systems, standpipe systems or a combination.

3-4.2 Where fires occur on floors above the reach of ground or aerial ladders and where valuable time will be lost in stretching lines up stairways, standpipes should be utilized, and careful planning is necessary for successful operations.

3-4.3 Where standpipe systems are provided having fire department connections, it is important that lines from a

pumper supplied by a public main be connected and charged to the pressure required to give the desired working pressure on the standpipe outlets to be used. Where there are several independent standpipes for fire department use in the fire area, each standpipe should be charged. (See Figure 3-4.3.)

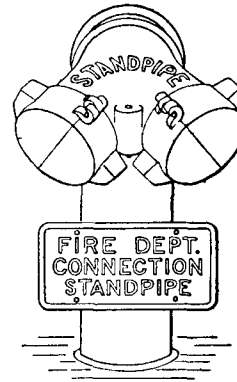


Figure 3-4.3

3-4.4 Entrance pressure at the standpipe fire department connection should start at approximately 100 psi (6.9 bars) to supply solid stream nozzles at elevations up to 100 ft (30.4 m) and 150 psi (10.3 bars) to supply fire department spray nozzles requiring 100 psi (6.9 bars) nozzle pressure. For elevations above 100 ft (30.4 m), 5 psi (0.3 bars) should be added for each additional floor. The water head to be overcome in pumping vertically, termed "back pressure" is 43.4 psi per 100 ft (3 bars/30.4 m).

Fire department standpipe outlets are usually located in stair towers so that fire fighters can work from the stairway into the fire area. However, in some cases the standpipe may be located on the exterior of the building, frequently adjacent to outside stairs or fire escapes. Accepted practice in standpipe operations is to connect the fire department hose to an outlet a floor below the fire and advance the line up one flight of stairs. This is done so that an intense fire on the "fire floor" will not drive fire fighters away from the standpipe connection. Where additional lines are needed, connections can be made to other outlets.

3-4.5 Private hose on "house lines" attached to standpipe outlets should not be used except in the case of extreme emergency. The fire department should provide its own hose and nozzle of appropriate size and length for the fire condition involved.

3-4.6 The ability to maintain communications between the incident command post and officers on the upper floors is essential. In many cases portable radios can be used effectively. However, their limitations must be identified during pre-fire planning.

3-4.7 Where private water supplies serve the standpipe system, make certain that supply valves are open and private fire pumps, if any, are operating properly.

3-4.8 Fire fighters proceeding up stairs should observe all hose outlet valves on lower floors to see that these are closed so that pressure will not be diverted from the fire area.