NFPA

13E

FIRE DEPARTMENT OPERATIONS IN PROPERTIES PROTECTED BY SPRINKLER AND STANDPIPE SYSTEMS 1978

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NATIONAL FIRE PROTECTION ASSOCIATION

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MGR-AM-78

Recommendations for

Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems

NFPA 13E — 1978

1978 Edition of NFPA 13E

This document was prepared by the Technical Committee on Standpipes and Outside Protection and this present edition was adopted by the Association on May 18, 1978 at its Annual Meeting in Anaheim, California. It was released by the Standards Council on June 6, 1978. It supersedes the 1973 edition and all previous editions. Changes other than editorial are denoted by a vertical line in the margin of the pages in which they appear.

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 1938 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. SP1 — 1961, but was not included in the annual volumes of the National Fire Codes. It was amended in 1966, 1973 and 1978.

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.

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Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems

NFPA 13E-1978

Introduction

0-1 Many properties have private fire protection equipment provided both to protect lives and preserve property values. Such protection includes sprinkler systems and standpipe systems. Each year fire departments respond to thousands of alarms in properties having such protection. These properties are located not only in areas protected by paid departments but also in areas protected by call and volunteer departments. If the private protection equipment is to do the job for which it is designed, it is essential that fire departments:

(a) Make plans for operations in properties so protected. This calls for inspection by responsible fire department personnel and what is termed in the fire service, "prefire planning," including consultation and cooperation with the property emergency fire organization.

(b) Develop standard procedures for operating at fires in protected properties so that the private fire protection facilities will be used to maximum efficiency.

The purpose of this text is to cover three types of private fire protection equipment as follows:

Chapter 1 suggests procedures for fire department operations in properties protected by automatic sprinklers;

Chapter 2 suggests procedures for fire department operations at properties having outside sprinkler systems for exposure protection; and

Chapter 3 suggests procedures for fire department operations in buildings having standpipe systems.

0-2 Units. Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI). Two units (litre and bar), outside of but recognized by SI, are commonly used in international fire protection. These units are listed in Table 0-2 with conversion factors.

0-2.1 If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated is to be regarded as the requirement. A given equivalent value may be approximate.

Table 0-2

Name of Unit	Unit Symbol	Conversion Factor
litre	l	1 gal. = 3.785 l
cubic decimetre	dm^3	1 gal. = 3.785 dm^3
pascal	Pa	1 psi = 6894.757 Pa
bar	bar	1 psi = 0.0689 bar
bar	bar	1 bar = 10^5 Pa

For additional conversions and information, see ASTM E 380-76, *Standard for Metric Practice (See Appendix A)*

Chapter 1 Automatic Sprinkler Systems

1-1 General.

1-1.1 Complete details on the installation of all approved types of sprinkler systems and the care and maintenance of sprinkler systems are covered by the following: NFPA 13, *Standard for Installation of Sprinkler Systems,* and NFPA 13A, *Care and Maintenance of Sprinkler Systems (see Appendix A).*

1-1.2 The National Fire Protection Association records of more than 100,000 fires over an 80-year period show that automatic sprinkler protection is over 95 percent effective. The actual percentage of successful performance is probably higher, since many small fires extinguished by one or two sprinklers go unreported. The small percentage of fires in which operation of automatic sprinklers is unsatisfactory is responsible for a large percentage of the losses in sprinklered properties.

1-1.3 There are two principal causes of unsatisfactory sprinkler performance: closed valve in water supply line and inadequate water delivered to the sprinkler system. Unsatisfactory sprinkler performance from these causes can be reduced by intelligent fire department planning and operations, if the fire department is called soon enough. Every fire department training program should include a course on the fundamentals of sprinkler systems.

1-1.4 Automatic sprinkler protection is designed to put water on a fire automatically without waiting for human operation. If the automatic sprinkler system should not completely extinguish the fire, it can ordinarily be depended upon to hold a fire in check at the point of origin and give an alarm so that proper measures may be taken to complete extinguishment.

1-2 Inspection and Prefire Planning.

1-2.1 Success of fire department operations at fires in properties protected by automatic sprinklers will generally reflect the adequacy of the fire department inspections and plans made in advance of an emergency. Unless the fire department officers, who will be in direct charge of operations at a particular property, are fully familiar with plant layout, general occupancy hazards and processes, and the nature and operation of private fire protection equipment, unnecessarily large losses may be expected.

1-2.2 In properties protected by automatic sprinklers, fire officers. including the chief of the district and officers assigned to first due companies, should know:

(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.

1-2.3 In prefire planning of operations in sprinklered buildings, perhaps the most important step is preparation of a sketch of the sprinkler water supply system. This should be prepared by the fire department officers who will be concerned with operations at actual fires. In order to be fully familiar with the sprinkler system, it is very important that the officers making these sketches for fire department operations study the actual water supply piping to the sprinklers from the source to the sprinkler risers, noting on the sketch all controlling valves with indication as to the type of valve and what each controls. Water supply may be from city mains, plant fire pump, gravity tank or pressure tank, or a combination of these.

1-2.4 Where supply is from a fire pump it is important to note the source of suction, the type of power for the pump and arrangement for starting the pump.

NOTE: See NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps (see Appendix A)*

1-2.5 For all types of water supplies, it is important that the fire flow and pressure available be determined by appropriate flow tests. Where the water supplying the sprinklers is limited, it should be obvious that diversion of water to large hose streams [approximately 250 gpm (946 *l*/min) each] may make the sprinklers ineffective. By studying the water supply connections and piping, fire department personnel will realize that the sprinkler system automatically delivers the water directly to every potential fire area with the maximum efficiency.

1-2.6 In many cases the organization carrying fire insurance on a sprinklered property has the information needed to prepare the fire department sketches. Such information may be available through the property owner. In some instances the fire department inspectors may find that the plant engineer or other plant official has available detailed plans or information on the sprinkler layout; however, experience has shown that often such plans are not up to

date and may be inaccurate. By making their own sketches, the fire department will not only have up-to-date information but will be familiar with the layout of the plant's fire protection. Also, on many occasions inspectors have found closed valves or otherwise impaired protection that could only be located by regular inspections.

NOTE: Figure 1-2.6(a) is a suggested form which may be useful to fire departments inspecting sprinklered properties.

1-2.7 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.

Figure 1-2.6(a). Suggested Inspection Form for Sprinklered Properties.

Name of Plant . . . . . Fire Inspection District No. . . . . .
Location . . . . . Fire Alarm Code No. . . . . .
Description of Property . . . . . .
Plant Official Responsible for Sprinklers . . . . . .
Phone . . . . . .
Type of Automatic Sprinkler System (Wet, Dry, Deluge, etc.) . . . . . .
. . . . . .
No. Sprinkler Heads . . . . . Size of Connection to Main . . . . . .
Spare Sprinkler Heads Available . . . . . Stored . . . . . .
Automatic Sprinkler Valves:
Location . . . . . Type . . . . . Controlling . . . . . .
Cold Weather Valve . . . . . .
Water Supplies to Sprinklers:
Public Main . . . . . Gravity Tank . . . . . Pressure Tank . . . . . .
Private Fire Pump . . . . . Volume in Storage . . . . . .
Static Pressure . . . . . psi . . . . . gpm Available at . . . . Residual Pressure
Post Indicator Valve Location . . . . . .
Fire Department Connections:
Location . . . . . .
Company Assigned to Pump Into Sprinkler on First Alarm . . . . . .
Hydrant to be Used (normal procedure) . . . . . .
Supplemental Pumper Supply Available . . . . . .
Sprinkler Alarm Devices:
Local Waterflow . . . . . Master Alarm Box . . . . . .
Central Station . . . . . Other . . . . . .
Supervised by . . . . . .
Guard Service·
Remarks: Include any pertinent special information that may affect fire department operations . . . . . .
. . . . . .
. . . . . .
Inspected by . . . . . Approved by . . . . . Date . . . . . .

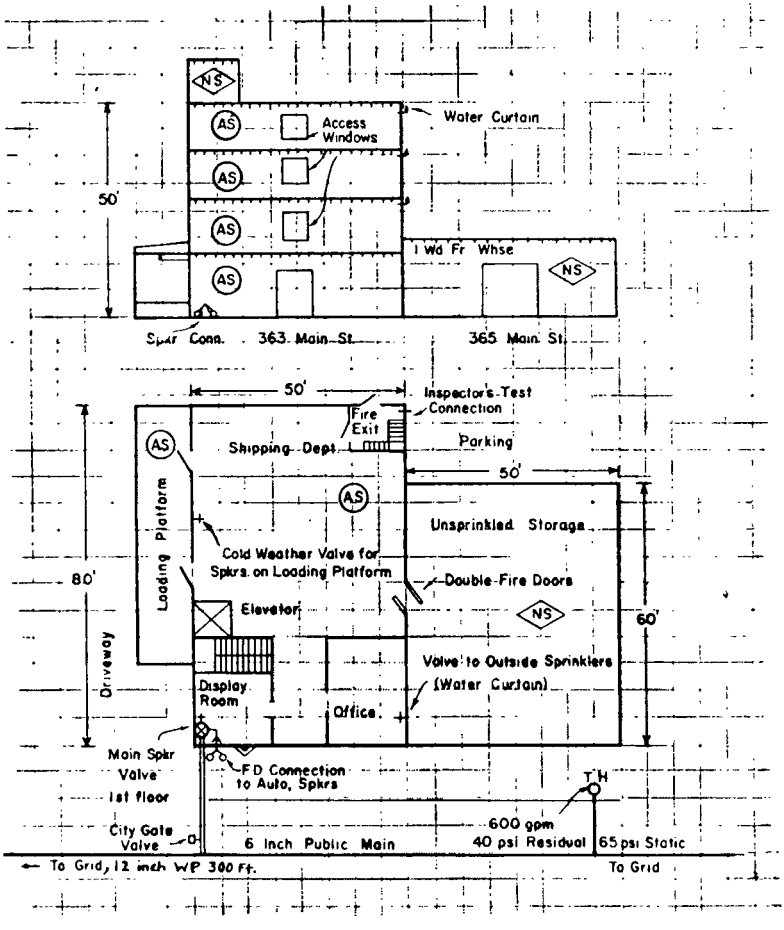

Figure 1-2.6(b). Typical quick sketch by a fire inspector of an industrial property. Notes which he might make concerning water supply, prefire planning and fireground operations are shown on the following page.

Notes:

363 Main St., 4 story, brick-joist, protected by wet pipe sprinkler system supplied by 6-inch public water main. FD connection on front of building. Main control valve in display room front end of 1st floor (left side). Valve for manual operation of water curtain in office on 1st floor (right side of entrance). Cold weather valve for sprinklers on loading platform in shipping room between doors. Inspector's test connection at right hand rear of shipping room on 1st floor. In event of fire in unsprinklered section: Make certain fire doors are closed. Operate water curtain. Place charged hose line to cover fire door opening. Pump into fire department connection.

Prefire Planning:

Notes on FD operation at 363 Main St. Main Building—4 story brick; 50 x 80; wood-joisted floors; protected by wet pipe automatic sprinkler system supplied by 6-inch public water main. FD sprinkler connection at left side of front wall. Nearest hydrant 70 feet from front door and 90 feet from sprinkler connection. (Note: In the event the fire is in unsprinklered wood-frame warehouse, it might not be possible to connect pumper directly to this hydrant. Main sprinkler control valve is in display room at right of main entrance on 1st floor. Inspector's test connection is in rear fire exit tower. Automatic sprinklers on loading platform are controlled by cold weather valve between doors on left-hand side of shipping department. Valve controlling outside (manually operated) water curtain is located in office at right-hand side of main entrance.

For SI Units

1 in. = 25.4 mm
1 ft. = 0.3048 m
1 gpm = 3.785 *l*/min
1 psi = 0.0689 bars

Special procedure in event of fire in unsprinklered warehouse at 365 Main St.

1. Operate valve controlling water curtain on main building.
2. Check to see that fire doors are closed between buildings.
3. Pump into fire department sprinkler connection in main building. (Do not use hydrant in front of fire for this purpose.)
4. Run charged line to guard fire door openings into main building.
5. Make certain that all windows are closed through which smoke or fire could enter main plant.

1-3 Water Supply for Fire Fighting.

1-3.1 The effectiveness of automatic sprinkler protection, like most other fire fighting operations, depends in large measure upon the adequacy of the water supply. Sprinklers put water on fires faster and with greater effect than manually applied hose streams and thus are generally the most effective means of getting water on a fire. From the fire department's point of view it is like having lines laid and spray nozzles placed in advance, always ready in case of fire.

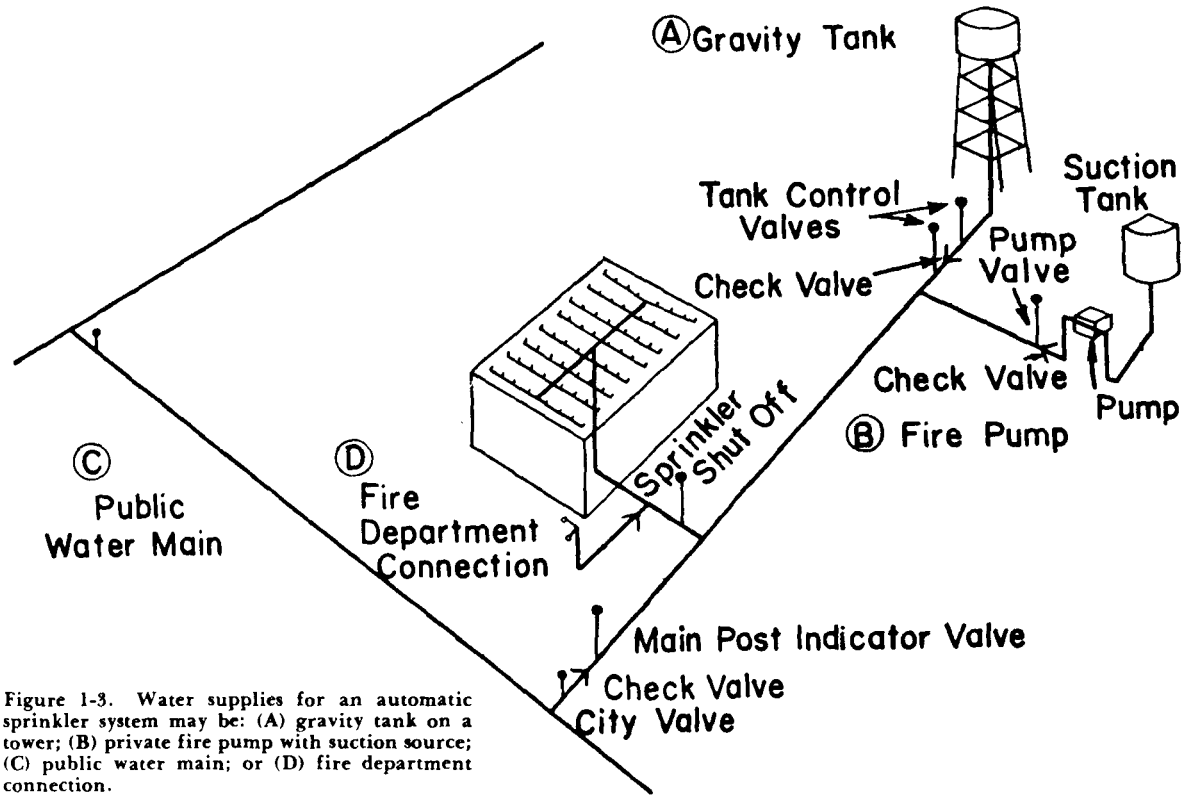

Figure 1-3. Water supplies for an automatic sprinkler system may be: (A) gravity tank on a tower; (B) private fire pump with suction source; (C) public water main; or (D) fire department connection.

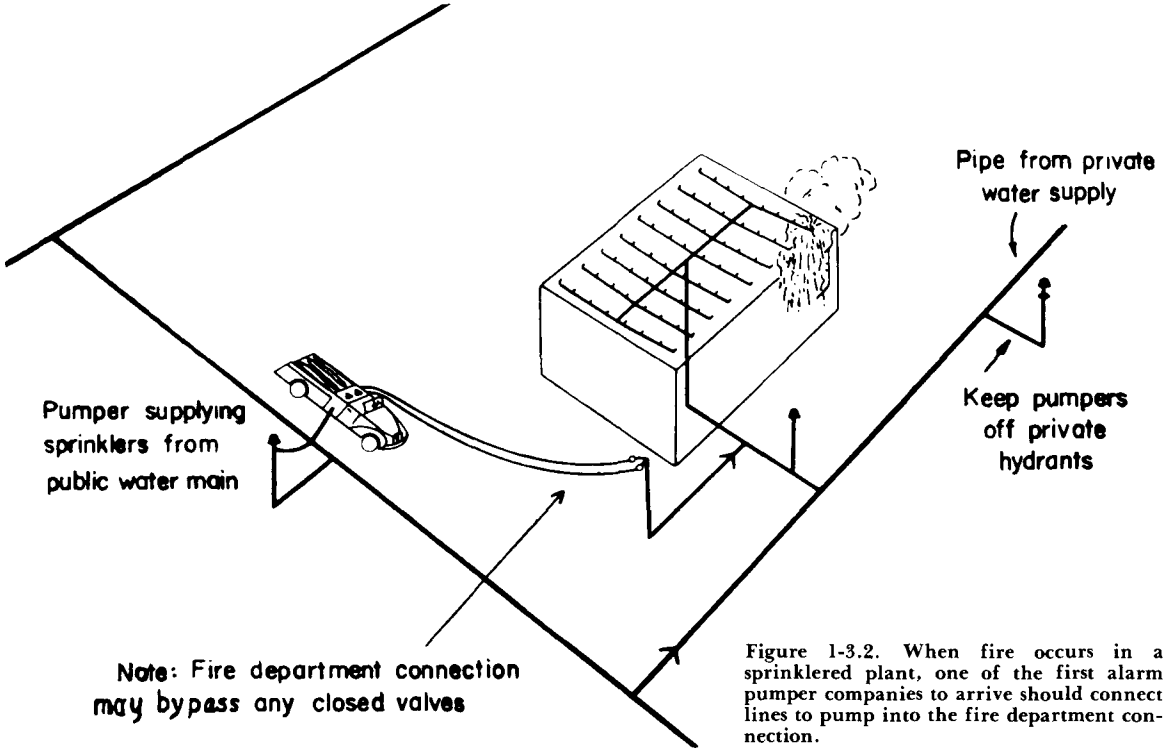

Figure 1-3.2. When fire occurs in a sprinklered plant, one of the first alarm pumper companies to arrive should connect lines to pump into the fire department connection.

1-3.2 In fighting fires in sprinklered buildings, it is important to make certain the sprinklers get plenty of water at good pressure. This means that the prefire planning must be concerned with sources of water supply and where pumpers will be located. Each situation must be worked out on its own merits. However, the fire department should avoid competing with the sprinklers for water supply for hose streams. The water for hose streams should not come from mains supplying sprinklers unless the mains are known to have sufficient capacity and pressure for both sprinklers and hose streams. Otherwise, as shown in Figure 1-3.2, water for hose streams should come from another water main or from a pumper at draft. It is generally considered poor practice to attach pumpers to hydrants on private water systems.

1-3.3 Contrariwise, it is generally good practice to pump promptly into private water mains supplying sprinklers to boost the flow normally available. Some private water systems have fire department connections at the property line near public hydrants. In some instances, instead of a standard fire department connection a "reverse hydrant" is installed so that lines from a pumper at the city hydrant can pump into the private hydrant. The reverse hydrant has swivel connections on the 2½-inch hose connections rather than the usual male outlets. A regular private hydrant may be used for the same purpose by attaching double female connections to several outlets. Where fire protection equipment has different threads from the local fire department hose thread, this fact should be determined by the inspector and suitable adapters provided. The prefire planning and routine inspection should make certain that access to the private fire protection supply connections is not blocked by yard storage, security fences, railroad sidings or other obstructions that could delay connection of fire department supply lines. In some cases it has been found necessary to obtain the cooperation of plant management in relocating or extending the fire department connections to a more convenient location. Periodic inspections of piping between the fire department connection and the check valve are recommended, using a hydrostatic test where necessary.

1-4 Fireground Operations in Sprinklered Properties.

1-4.1 It is most important that each fire department responding to properties having automatic sprinkler protection 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. For the best results the standard operating procedures should be in the nature of guidelines or general good practice and not hard and fast rules which rob the fireground commander of responsibility and initiative.

1-4.2 When responding to a fire in a sprinklered property it is important that fire fighting operations be based upon a thorough knowledge of the property resulting from prior inspection and "prefire planning" (*see 1-2*).

1-4.3 On arrival of the first officer, size-up of the fire situation is the first prerequisite of good operation. A fire fighter should be sent immediately to see that control valves are fully opened. Pumper lines should always be connected to the fire department connection as quickly as possible to supply adequate volume and pressure to the sprinkler system in the fire area. Additional lines should be stretched to the fire area.

1-4.4 If no fire or smoke is visible, it is likely that the fire is very small and either one or two sprinklers have extinguished the fire or the sprinklers have not yet operated. If an outside water motor gong is operating or the alarm was received as a central or remote station sprinkler waterflow signal, it is evident that water is or has been flowing from sprinklers (or in the case of dry pipe sprinkler systems, has entered the system if the dry pipe valve has tripped prematurely or accidentally). Where water vapor is visible it is evident that the sprinklers have operated and probably have the fire under control or in check. Prompt action should be taken to complete extinguishment to reduce damage. If black smoke and flame are visible, it may be that sprinklers are not operating or that the supply valve is closed.

1-4.5 The following are good practice suggestions for the guidance of chiefs or officers in charge of fire department operations in sprinklered buildings:

(a) Immediately send a fire fighter to the proper control valve to:

1. Determine that the valve is fully open. (Valves are designed to show open or closed positions.)

2. Open the valve if it has been closed. (One possible exception would be where valve is "tagged for repairs.")

3. Shut the valve only when ordered to do so by the officer in charge.

4. Remain at the valve so that in the event of rekindling or any detected extension of fire, the valve can be reopened immediately.

NOTE: The man assigned to the valve should take a light and portable radio so that no time will be lost in transmitting orders to open or close the valve. He should remain at the valve until orders are given for the companies to make up and return to quarters.

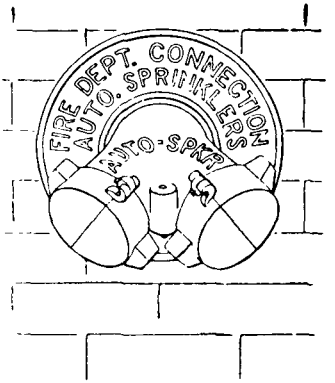

Figure 1-4.5(a). Typical fire department connection to automatic sprinkler systems mounted on building wall showing 2½-inch intakes which would be supplied by lines from one of the first responding pumpers.

(b) Immediately send a fire fighter to verify that water supplies (fire pumps, booster pumps, etc.) are in full service with all discharge and suction valves open.

(c) One of the first alarm pumper companies on arriving at the fire should immediately connect two lines to the proper sprinkler fire department connection and start pumping at about 150 pounds per square inch (10.3 bars) [*see Figure 1-4.5(a)*]. If there is more than one sprinkler system in the fire area, pumpers should be connected to provide adequate pressure and volume to each sprinkler system that may be in operation.

NOTE: Pumpers should not be connected to hydrants on private water systems unless such systems are designed to maintain the flow needed by fire department pumpers in addition to that required by sprinklers or other private fire protection facilities. Use of pumpers on private hydrants has on a number of occasions deprived private fire protection facilities, including sprinklers, of their water supply resulting in heavy damage or total losses.

Two 2½-inch pumper lines can effectively supply 20 to 25 sprinkler heads. If 3-inch or other large hose is available, this should be used to take advantage of the available pumper capacity. If it is obvious that a serious fire is in progress, as much water as possible should be pumped into the sprinkler connection. This can be done by attaching a siamese hose fitting to one inlet of the automatic sprinkler fire department connection to permit the use of a third hose line or by increasing pressure at the pump to 175 or 200 pounds per square inch (12.1 to 13.8 bars) if the hydrant flow and pumper capacity make this possible.

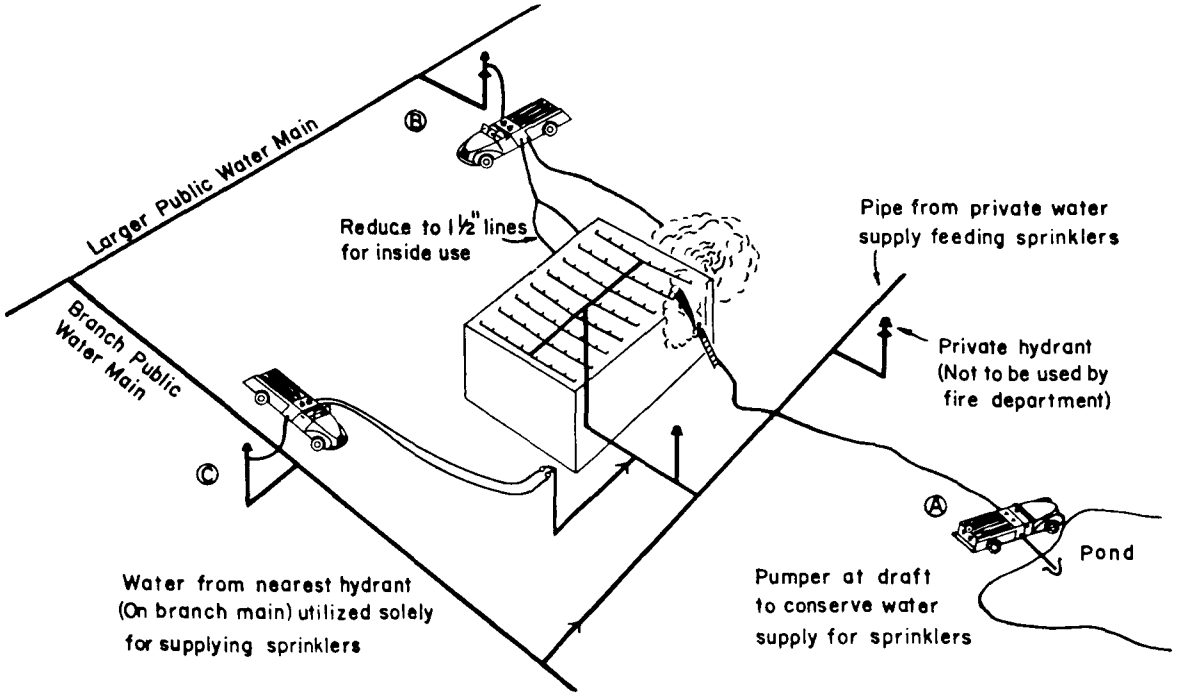

Figure 1-4.5(b). Where hose streams must be used, water must be taken from sources that do not reduce the sprinklered protection. Pumpers should be supplied either by: (A) drafting from static sources; (B) connecting to water mains not needed for sprinkler supply; (C) connecting to large mains which flow tests have indicated are inadequate to supply both sprinklers and the required hose streams.

[750 gallons-per-minute (2839-*l*/min) pumpers are designed to give 525 gallons per minute (1987 *l*/min) at 200 pounds per square inch (13.8 bars) at draft and 1,000 gallons-per-minute (3785-*l*/min) pumpers provide 700 gallons per minute (2650 *l*/min) at 200 pounds per square inch (13.8 bars) at draft. Higher flows may be obtained from good hydrants.]

The sprinkler fire department connection on a single sprinkler system is generally on the system side of the main control valve [*see Figure 1-4.5(c)*]. In such cases, the fire department pumper can immediately provide pressure to the system whether the main sprinkler control valve is open or not. In the case, however, of a building protected by more than one sprinkler system, the fire department connection is usually located at a point between the gate valve controlling the water supply and the gate valves controlling the individual systems. Therefore, closure of a gate valve controlling one of the individual systems would deprive that particular system of the use of the fire department connection. Gate valves are not permitted to be installed in the direct line from the fire department connection.

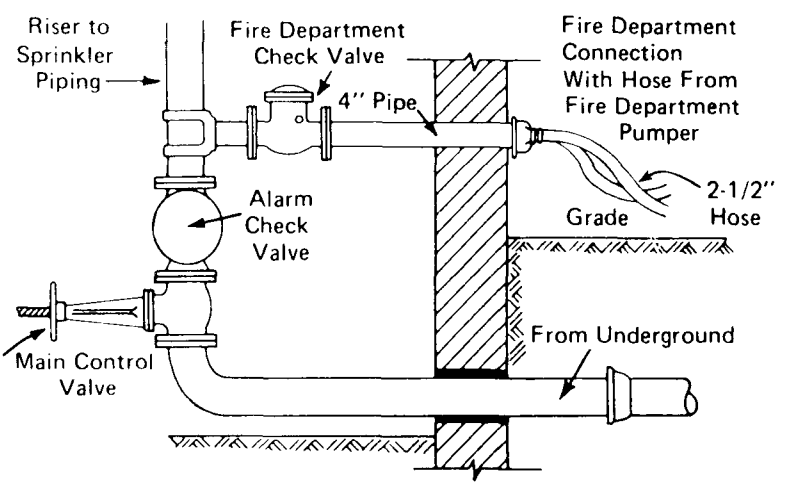

Figure 1-4.5(c). The fire department connection is generally arranged so that water can be pumped to the sprinklers even though the main sprinkler control valve and sprinkler shutoff valve happen to be closed. Also, the use of the fire department pump makes it possible to provide better pressures for the sprinklers than is normally available from a gravity tank or city main.

(d) An officer should immediately be ordered to the fire area to determine the location and extent of fire. He will determine whether sprinklers have extinguished the fire or are holding the fire under control. He will check for any possible extension of fire both horizontally or vertically including concealed spaces. He should have a portable radio so that he can immediately report to the officer in charge. Where there are sectional or floor valves he should make certain that these are open. In such cases when the fire is extinguished, sprinklers may be shut off at the sectional or floor valve without shutting off the entire system. The inspection records should indicate the location of such valves. In all cases, the officer in charge must use good judgment before he orders any sprinkler system valve to be closed.

(e) As quickly as possible and before any sprinkler valve is closed, hose lines should be used to prevent any extension of fire and to complete extinguishment. In general, 1½-inch hose with combination spray nozzles can be used for this purpose. These lines are not only more efficient for interior fire fighting but discharge 50 to 100 gallons per minute (189 to 379 *l*/min) as compared with 200 to 250 gallons per minute (757 to 946 *l*/min) from 2½-inch lines. The smaller lines thus divert less of the available water from the sprinkler system and reduce water damage. As a general rule, it is much more effective to distribute water through the sprinkler system. Hose streams will be required to merely mop up and extinguish fire in concealed spaces out of reach of sprinklers. Where the fire area is on upper floors or otherwise remote from the fire department apparatus it may be desirable to also use standpipe equipment as discussed elsewhere in this text. From a fire fighter's point of view, the effect of the sprinklers may be compared with the well-known effect of spray nozzles.

(f) The ladder company, squad company, or other unit performing "truck" duties should be ordered to ventilate the fire area as needed in order that there be no delay in advancing hose lines to complete extinguishment. Windows should be opened promptly in the fire area. Smoke removal fans should be used as necessary. If a serious fire is found to be in progress, full fire department ventilation procedures including opening of skylights and roofs may be indicated provided that charged hose lines are available to immediately attack the fire.

(g) Only when the fire is completely extinguished should sprinklers be shut off. If it becomes necessary to enter the fire area to mop-up residual fire, it is important to have charged hose lines in place and provide adequate ventilation. If there is a sectional or floor valve, this should be closed. However, if the only control is at

the main valve, the order should be sent by radio or messenger to the men stationed at this valve. 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 only a few sprinkler heads are operating, sprinkler tongs or tapered wooden wedges may be used to immediately stop the flow from the opened heads. This use of tongs or wedges keeps the system in operation (but not the individual sprinkler heads in which the tongs are inserted) and is sometimes a faster operation than shutting the control valve (*see Figure 1-5.1*).

(h) As soon as manpower permits, salvage operations should be started.

NOTE: Salvage techniques are described in the pamphlet on Fire Department Salvage Operations published by the American Insurance Association (formerly National Board of Fire Underwriters), 85 John Street, New York, NY 10038.

(i) When overhauling is completed so that there is no possible danger of rekindling requiring use of sprinklers, the lines from the pumper to the sprinkler system fire department connection may be ordered disconnected.

Figures 1-3.2 and 1-4.5(b) show the proper placement and use of fire department pumpers and hose streams at fires in sprinklered properties.

1-5 Restoring Protection.

1-5.1 When possible, sprinkler protection should be restored by installing new heads of the proper type and rating. Orders should then be given to the man at the valve to turn on the water. If new heads are not immediately available, the sprinkler tongs or wedges may be left in place until the heads are replaced so that protection may be promptly restored. If the temperature is below freezing and adequate heat cannot be maintained, the piping must be drained until heat can be restored or until air pressure is restored to a dry-pipe system and the sprinkler dry valve has been reset. If there is no sight glass to indicate when a system is drained, a man should be directed to check the flow from the drain. Whenever possible, the fire department should not leave the scene until the system has been placed back in operation.

NOTE: NFPA 1901, *Standard for Automotive Fire Apparatus (see Appendix A)*, calls for 12 assorted sprinkler heads, 6 sprinkler stoppers or wedges, and 2 sprinkler head wrenches to be carried on ladder trucks or other apparatus equipped for salvage work. The wrenches must be suitable for servicing the various types of sprinkler heads. The sprinkler heads carried should include standard types for both upright use where piping is exposed and pendent use where piping is concealed. All fire departments, regardless of size and type of organization, whether

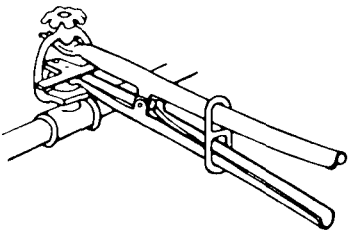

Figure 1-5.1. One variety of sprinkler stop or tongs.

paid or volunteer, should have available a supply of automatic sprinkler heads for use as replacement after the fire is extinguished. Such supply of sprinkler heads should be of various degree ratings and marked to be readily identifiable as replacements. Mechanical tongs or wedges of hardwood or similar material, if used to stop flow while the system is being shut off and drained, should be replaced immediately with proper sprinklers. *(See NFPA Industrial Fire Brigades Training Manual.) (See Appendix A)*

1-5.2 Ordinarily, fire departments do not pump air into a dry-pipe system or reset dry valves or deluge valves. This is the responsibility of the property owner or his sprinkler contractor.

1-5.3 Unless there is a representative of the owner or occupant on the premises, the officer in charge should direct the fire alarm operator to notify the owner or authorized representative that the sprinklers have operated and that protection should be restored. If there is central station supervision of valves, that company should be contacted if a runner has not arrived before the fire department is ready to leave the premises.

NOTE: Where automatic sprinkler protection cannot be restored and no representative of the owner or occupant is present, it is good practice to leave a fire fighter on the premises as a watchman so that sprinklers can be turned on promptly should a fire rekindle or another fire occur. If any appreciable amount of burning has occurred in the building or stock that might cause rekindling, it is good practice to leave a detail with a watch line until the private protection is restored.

1-6. After the Fire.

1-6.1 Many large losses have occurred in sprinklered buildings when subsequent fires occurred before sprinkler protection was restored. Protection should be restored, if possible, before the department leaves the scene. If this is not possible, the fire department job at a fire in a sprinklered property is not completed when the apparatus returns to quarters. It is very important to follow up with an inspection to see that normal protection is completely restored.

1-6.2 Each fire department should have a regular method for following up on restoration of automatic sprinkler protection. This may be handled by the fire prevention bureau, by the officers of the

fire company in the district where the fire occurred or by the chief of the district. A good practice frequently followed is for the chief in charge at the fire to revisit the property several hours later to follow up on the situation to make certain that protection has been restored. This often provides an opportunity to obtain additional information relative to the circumstances of the fire and make suggestions to the occupants both as to fire prevention and action to be taken in the event of future fires.

1-6.3 It is also very important that the officer in charge include with his fire report essential data regarding the operation of the sprinkler system. This should always include notation of which company connected to the sprinkler fire department connection and pumped into the sprinkler system and the effect of the sprinkler operation on the fire. Any equipment such as hose streams or extinguishers used in controlling the fire should be noted. If the sprinklers were shut off or not operating properly, this should be reported and the reasons given.

1-6.4 A fire department report of fire in a sprinklered building should include pertinent additional information regarding automatic sprinkler operation such as:

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

1-6.5 Of course, the fire report will also indicate other fire fighting equipment, such as hose streams used on the fire. In addition, a company that has pumped into a sprinkler system should prepare a detailed report including orders received, lines connected to sprinklers, water supply used, pressure maintained, and length of time sprinklers were supplied.

Chapter 2 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. Heads having various size orifices are available. Small orifice sprinklers (¼-inch, 5/16-inch, and ⅜-inch) [6.4, 7.9 and 9.5 mm] are used when windows are narrow or recessed or where the water supply is limited. Large orifice sprinklers are used for more serious hazards where water supply permits. NFPA 13, *Standard for Installation of Sprinkler Systems,* specifies the size of risers and pipes necessary to supply the various sizes of sprinkler heads required (*see Appendix A*).

2-2 Prefire Planning. The important things the fire department must know in planning operations in properties having outside sprinklers are the following:

(a) Is the system automatically or manually operated?

(b) If the system is automatically operated, where are the control valves used to shut off the sprinklers?

(c) If the system is manually operated, where are the control valves for turning the system on and off and who is responsible for operation of the valves?

(d) What water supplies are provided for the outside sprinklers?

(e) Is there a fire department connection for pumping into the outside sprinklers? [*See Figure 1-2.6(b).*]

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 pumpers.

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. Next to the saving of life, one of the first responsibilities of the fire department is the protection of exposures. The proper use of outside sprinklers helps the department to carry out this responsibility.

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 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 buildings and it is important to open the correct valves. Care must be taken to conserve water supply by shutting off the outside sprinklers when they are no longer needed.

2-4.3 The officer in charge should:

(a) Make certain that sufficient help is called to handle a serious exposure fire.

(b) Send a man to the proper control valve with orders to turn on the outside sprinklers as necessary.

(c) Order an engine company to pump into the fire department connection supplying the outside sprinklers.

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

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

(f) Send men to the roof to make certain that no part of the roof structure has ignited.

(g) Begin salvage operations in exposed buildings.

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

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. Unfortunately, in some cases fire departments have ignored the availability of standpipe systems and have established no inspection or operational procedures for their effective use.

3-1.2 Complete details regarding standpipe systems appear in NFPA 14, *Standard for the Installation of Standpipes and Hose Systems (see Appendix A)*. There are three classes of standpipe service. Class I is designed for use by fire departments and those trained in handling heavy fire streams (2½-inch hose and hose connections). Class II is designed for use primarily by the building occupants until the arrival of the fire department (1½-inch hose and hose connections). Class III is designed for use by either fire departments and those trained in handling heavy hose streams (2½-inch hose) or by the building occupants (1½-inch hose).

3-2 Inspection and Prefire Planning.

3-2.1 The procedure for fire department study of standpipe systems is in many ways similar to that of automatic sprinkler systems. The inspector must determine the source and reliability of water supply and follow the piping, noting the control valves. However, instead of sprinkler heads the system supplies outlets for hose streams.

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 Pressure gages are required for each discharge pipe from a fire pump or public main, at the pressure tank, at the air pump

Figure 3-2.1. Suggested Inspection Form for Properties Having Fire Standpipe Systems.

Name of Plant . . . . . Fire Inspection District No. . . . . .
Location . . . . . Fire Alarm Code No. . . . . .
Description of Property . . . . . No. of Stories . . . .
Plant Official Responsible for Standpipe System . . . . . .
Phone . . . . . .
Type of Standpipe Systems:
First Aid Standpipe for Occupants . . . . . No. of Risers . . . . . .
Size of Risers . . . . . No. of Hose Outlets . . . . . Location of Valves Controlling Standpipes . . . . . .
Fire Dept. Standpipes . . . No. of Risers . . . Size of Risers . . . . . .
No. of Hose Outlets . . . . . Location of Valves Controlling Standpipes . . . . . .
Water Supplies to Standpipes:
Gravity Tank . . . . . Pressure Tank . . . . . .
Volume in Storage . . . . . .
Fire Pumps: Manual or Automatic Operation . . . . . .
Capacity . . . . . Location . . . . . .
Public Water Main . . . . . Static Pressure . . . . . .
Private Water Main . . . . . Static Pressure . . . . . .
. . . . . gpm Available at . . . . . Residual Pressure at . . . . . Elevation
Fire Department Connections:
Location of Connections . . . . . .
Standpipe Supplied:
First Aid . . . . . Fire Dept . . . . . .
Company Assigned to Pump into Standpipe System on First Alarm . . . . . .
Hydrant to be Used (normal procedure) . . . . . .
Supplemental Pumper Supply Available . . . . . .
Hose Provided at Standpipe Outlets:
Type . . . . . Length . . . . . .
Size . . . . . Condition . . . . . .
Any Special Hose Threads or Adapters Provided? . . . . . .
Type of Nozzle Provided: Straight Stream . . . . . Spray . . . . . .
Are Standpipes Interconnected? . . . . . .
Standpipe Waterflow Alarm Devices . . . . . .
Remarks: Includes any pertinent special information that may affect fire department operations . . . . . .
Inspected by . . . . . Approved by . . . . . Date . . . . . .

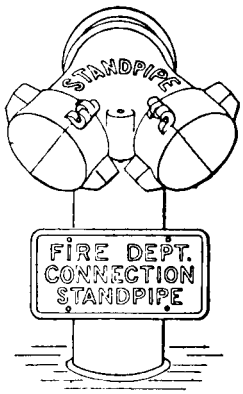

Figure 3-3.2. Typical fire department standpipe connection showing 2½-inch intakes which would be supplied by lines from one of the first responding pumpers.

supplying a pressure tank, and at the top of each riser unless the risers are interconnected at the top where a single gage is satisfactory. Gages must have suitable drain valves and be protected against freezing. The inspector should note the static pressure on each gage and ascertain that valves controlling flow to standpipes are open. Where pressure for a standpipe is from a private fire pump, it may be desirable to have the pump started and observe the pressure at the top of the riser.

3-3.2 Where there is a fire department connection it should be closely inspected to see that it is free of obstruction and to determine the hose layout that will be necessary to pump into the system from the nearest hydrant. If the connection has screw-type caps, these should be removed and the threads inspected to determine that these match the fire department hose thread. The threads may be lubricated with flaked graphite if necessary. If the fire department connection is recessed in a building wall, make certain that hose can be attached and properly tightened. Some fire departments have found it necessary to carry special fittings for this purpose.

3-3.3 NFPA 14, *Standard for Installation of Standpipe and Hose Systems (see Appendix A),* requires that where standpipes are connected to public water supplies there preferably should be a post indicator valve of approved type not less than 40 feet (12.2 m) from the building protected or at least placed where it will be readily accessible and not subject to damage. Where post indicator valves cannot be used, underground gates should conform to the above requirements as far as practicable.