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21-1313 Sprinkler O&M

NFPA 25

Standard for the

Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

2011 Edition

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex G.

Chapter 1 Administration

1.1* Scope. This document establishes the minimum requirements for the periodic inspection, testing, and maintenance of water-based fire protection systems, including land-based and marine applications.

1.1.1 Coordination with NFPA 72 Testing Requirements. This standard does not address all of the inspection, testing, and maintenance of the electrical components of the automatic fire detection equipment ~~for use to activate~~ preaction and deluge systems that are addressed by NFPA 72, *National Fire Alarm and Signaling Code*.

1.1.1.1 The inspection, testing, and maintenance required by this standard and NFPA 72, *National Fire Alarm and Signaling Code*, shall be coordinated so that the system operates as intended.

1.1.1.2* All inspections, testing, and maintenance required by NFPA 72 shall conform to NFPA 72, and all inspections, testing, and maintenance required by this standard shall conform to this standard.

1.1.2 Types of Systems.

1.1.2.1 The types of systems addressed by this standard include, but are not limited to, sprinkler, standpipe and hose, fixed water spray, private fire hydrants, water mist, and foam water.

~~1.1.2.2~~ **Also included in this standard are** water supplies that are part of these systems, such as private fire service mains and appurtenances, fire pumps and water storage tanks, and valves that control system flow.

~~1.1.3~~ **The document also addresses impairment handling and reporting. This standard applies to fire protection systems that have been properly installed in accordance with generally accepted practices. Where a system has not been installed in accordance with generally accepted practices, the corrective action is beyond the scope of this standard. This standard addresses the operating condition of fire protection systems as well as impairment handling and reporting and applies to fire protection systems that have been properly installed in accordance with generally accepted practice.**

1.1.3.1* This standard does not require the inspector to verify the adequacy of the design of the system.

~~1.1.4~~ **Corrective action needed** to ensure that the system performs ~~operates~~ in a satisfactory manner shall be in accordance with the appropriate installation standard.

~~1.1.3~~ **1.1.5** This standard shall not apply to sprinkler systems designed, installed, and ~~installed~~ maintained in accordance with NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*.

1.2* Purpose.

1.2.1 The purpose of this document is to provide requirements that ensure a reasonable degree of protection for life and property from fire through minimum inspection, testing, and maintenance methods for water-based fire protection systems.

1.2.2 In those cases where it is determined that an existing situation involves a distinct hazard to life or property, the authority having jurisdiction shall be permitted to require inspection, testing, and maintenance methods in excess of those required by the standard.

1.3* Application.

1.3.1 It is not the intent of this document to limit or restrict the use of other inspection, testing, or maintenance programs that provide an equivalent level of system integrity and performance to that detailed in this document.

1.3.2 The authority having jurisdiction shall be consulted and approval obtained for such alternative programs.

1.4* Units. Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI).

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

1.4.2 SI units have been converted by multiplying the quantity by the conversion factor and then rounding the result to the appropriate number of significant digits. Where nominal or trade sizes exist, the nominal dimension has been recognized in each unit.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2005~~2010~~ edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2007~~2010~~ edition.

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, 2007~~2010~~ edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2007~~2010~~ edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2007 edition.

NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, 2007 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2007~~2010~~ edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 2003~~2008~~ edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2007~~2010~~ edition.

NFPA 72[®], *National Fire Alarm Code[®] and Signaling Code*, 2007~~2010~~ edition.

NFPA 110, *Standard for Emergency and Standby Power Systems*, 2005~~2010~~ edition.

NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 2006~~2011~~ edition.

NFPA 409, *Standard on Aircraft Hangars*, 2004~~2011~~ edition.

~~NFPA 750, *Standard on Water Mist Fire Protection Systems*, 2006 edition.~~

NFPA 1962, *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose*, 2003~~2008~~ edition.

2.3 Other Publications.

2.3.1 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D 3359, *Standard Test Methods for Measuring Adhesion by Tape Test*, 1997-2008.

2.3.2 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2005~~2010~~ edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2007~~2010~~ edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2007~~2010~~ edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2007 edition.

NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, 2007 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2007~~2010~~ edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2007~~2010~~ edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2008~~2011~~ edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems*, 2006~~2010~~ edition.

NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*, 2008 edition.

~~NFPA 1071, *Standard for Emergency Vehicle Technician Professional Qualifications*, 2006 edition.~~

NFPA 1141, *Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas*, 2008 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.4 Shall. Indicates a mandatory requirement.

3.2.5 Should. Indicates a recommendation or that which is advised but not required.

3.2.6 Standard. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

3.3 General Definitions.

~~**3.3.1-3.3.1*** Alarm Receiving Facility. The place where alarm or supervisory signals are received. This can include proprietary supervising stations, central supervising stations, remote supervising stations, or public fire service communications centers. The place where alarm or supervisory signals are received.~~

3.3.2* Automatic Detection Equipment. Equipment that automatically detects heat, flame, products of combustion, flammable gases, or other conditions likely to produce fire or explosion and cause other automatic actuation of alarm and protection equipment.

3.6.5* Water Spray-Fixed System. ~~A special fixed pipe system connected to a reliable fire protection water supply and equipped with water spray nozzles for specific water discharge and distribution over the surface or area to be protected. The piping system is connected to the water supply through an automatically or manually actuated valve that initiates the flow of water. An automatic valve is actuated by operation of automatic detection equipment installed in the same areas as the water spray nozzles. (In special cases, the automatic detection system also is located in another area.)~~ An automatic or manually actuated fixed pipe system connected to a water supply and equipped with water spray nozzles designed to provide a specific water discharge and distribution over the protected surfaces or area. [15, 2007]

3.6.6 Water Tank. A tank supplying water for water-based fire protection systems.

Chapter 4 General Requirements

4.1 Responsibility of the Property Owner or ~~Occupant-Designated Representative.~~

4.1.1* Responsibility for Inspection, Testing, Maintenance, and Maintenance-Impairment. ~~The responsibility for properly maintaining a water-based fire protection system shall be that of the owner of the property. The property owner or designated representative shall be responsible for properly maintaining a water-based fire protection system.~~

4.1.1.1 Buildings. The building owner shall ensure that all areas of the building containing water-filled piping shall be maintained at a minimum temperature of 40°F (4.4°C) and not exposed to freezing conditions.

4.1.1.1.1* Inspection, testing, maintenance, and impairment shall be implemented in accordance with procedures meeting those established in this document and in accordance with the manufacturer's instructions.

4.1.1.1.2 Inspection, testing, and maintenance shall be performed by personnel who have developed competence through training and experience.

4.1.1.1.3* Where the property owner or designated representative is not the occupant, the property owner or designated representative shall be permitted to delegate the authority for inspecting, testing, maintenance, and impairment of the fire protection systems to a designated representative.

4.1.1.1.4 Where a designated representative has received the authority for inspection, testing, maintenance, and impairment, the designated representative shall comply with the requirements identified for the property owner or designated representative throughout this standard.

4.1.1.2* Accessibility. ~~The property owner or occupant-designated representative shall provide ready accessibility to components of water-based fire protection systems that require inspection, testing, and maintenance.~~

4.1.1.2.1 Inspection, testing, and maintenance shall be implemented in accordance with procedures meeting those established in this document and in accordance with the manufacturer's instructions.

4.1.1.2.2 These tasks shall be performed by personnel who have developed competence through training and experience.

~~**4.1.1.3 Where the property owner is not the occupant, the property owner shall be permitted to pass on the authority for inspecting, testing, and maintaining the fire protection systems to the occupant, management firm, or managing individual through specific provisions in the lease, written use agreement, or management contract.**~~

4.1.1.4 Where an occupant, management firm, or managing individual has received the authority for inspection, testing, and maintenance, the occupant, management firm, or managing individual shall comply with the requirements identified for the owner or occupant throughout this standard.

4.1.3 Notification of System Shutdown. The property owner or ~~occupant-designated representative~~ shall notify the authority having jurisdiction, the fire department, if required, and the alarm-receiving facility before testing or shutting down a system or its supply.

4.1.3.1 The notification of system shutdown shall include the purpose for the shutdown, the system or component involved, and the estimated time of shutdown.

4.1.3.2 The authority having jurisdiction, the fire department, and the alarm-receiving facility shall be notified when the system, supply, or component is returned to service.

4.1.4* Corrections and Repairs.

4.1.4.1 ~~The property owner or occupant-designated representative shall promptly correct or repair deficiencies, damaged parts, deficiencies or impairments found while performing that are found during the inspection, test, and maintenance requirements of required by this standard.~~

~~**4.1.4.1* 4.1.4.2***~~ **Corrections and repairs shall be performed by qualified maintenance personnel or a qualified contractor.**

4.1.5* Changes in Occupancy, Use, Process, or Materials. The property owner or ~~occupant-designated representative~~ shall not make changes in the occupancy, the use or process, or the materials used or stored in the building without evaluation of the fire protection systems for their capability to protect the new occupancy, use, or materials.

4.1.5.1 ~~The evaluation required by 4.1.5 shall not be considered part of the normal inspection, testing, and maintenance required by this standard.~~

4.1.5.1.2 The evaluation shall consider factors that include, but are not limited to, the following:

- (1) Occupancy changes such as converting office or production space into warehousing
- (2) Process or material changes such as metal stamping to molded plastics
- (3) Building revisions such as relocated walls, added mezzanines, and ceilings added below sprinklers
- (4) Removal of heating systems in spaces with piping subject to freezing

~~4.1.6~~ **4.1.6* Addressing Changes in Hazard.**

4.1.6.1 ~~Where changes in the occupancy, hazard, water supply, storage commodity, storage arrangement, building modification, or other condition that affects the installation criteria of the system are identified, the property owner or occupant-designated representative shall promptly take steps, such as contacting a qualified contractor, consultant, or engineer, and the authority having jurisdiction, steps to evaluate the adequacy of the installed system in order to protect the building or hazard in question.~~

~~4.1.6.1-4.1.6.2~~ Where the evaluation reveals a deficiency causing a threat to life or property, the property owner shall make appropriate corrections. All requirements of the authority having jurisdiction shall be followed. Where the evaluation reveals that the installed system is inadequate to protect the building or hazard in question, the property owner or designated representative shall make the required corrections.

4.1.6.3 Corrections shall be approved.

4.1.7 Valve Location. The property owner shall ensure that responsible occupants are made aware of the location of the shutoff valves and the procedures for shutting down the system. The location of shutoff valves shall be identified.

4.1.8 Information Sign.

4.1.8.1 A permanently marked metal or rigid plastic information sign shall be placed at the system control riser supplying an antifreeze loop, dry system, preaction system, or auxiliary system control valve.

4.1.8.2 Each sign shall be secured with a corrosion-resistant wire, chain, or other acceptable ~~approved~~ means and shall indicate at least the following information:

- (1) Location of the area served by the system
- (2) Location of auxiliary drains and low-point drains for dry pipe and preaction systems
- (3) The presence and location of antifreeze or other auxiliary systems
- (4) The presence and location(s) of heat tape

4.2-4.1.9 Impairments.

~~4.2.1-4.1.9.1~~ Where an impairment to a water-based fire protection system occurs, the procedures outlined in Chapter 15 of this standard shall be followed, including the attachment of a tag to the impaired system.

~~4.2.2-4.1.9.2~~ Where a water-based fire protection system is returned to service following an impairment, the system shall be verified to be working properly by means of an appropriate inspection or test.

4.3-4.2 Corrective Action. Manufacturers shall be permitted to make modifications to their own listed product in the field with listed devices that restore the original performance as intended by the listing, where acceptable to the authority having jurisdiction.

4.4-4.3 Records.

~~4.4.1-4.3.1~~ Records shall be made for all inspections, tests, and maintenance of the system and its components and shall be made available to the authority having jurisdiction upon request.

~~4.4.2-4.3.2~~ Records shall indicate the procedure performed (e.g., inspection, test, or maintenance), the organization that performed the work, the results, and the date.

~~4.4.3-4.3.3~~ Records shall be maintained by the property owner.

~~4.4.4-4.3.4~~ As-built system installation drawings, hydraulic calculations, original acceptance test records, and device manufacturer's data sheets shall be retained for the life of the system.

~~4.4.5-4.3.5~~ Subsequent records shall be retained for a period of 1 year after the next inspection, test, or maintenance of that type required by the standard.

~~4.5-4.4~~ Inspection. System components shall be inspected at intervals specified in the appropriate chapters.

~~4.6-4.5~~ Testing.

~~4.6.1-4.5.1~~ All components and systems shall be tested to verify that they function as intended.

~~4.6.1.1-4.5.2~~ The frequency of tests shall be in accordance with this standard.

~~4.6.1.1.1~~ ~~As an alternative means of compliance, subject to the authority having jurisdiction, components and systems shall be permitted to be inspected, tested and maintained under a performance-based program.~~

~~4.6.2-4.5.3~~ Fire protection system components shall be restored to full operational condition following testing, including reinstallation of plugs and caps for auxiliary drains and test valves.

~~4.6.3-4.5.4~~ During testing and maintenance, water supplies, including fire pumps, shall remain in service unless under constant attendance by qualified personnel or unless impairment procedures in Chapter 15 are followed.

~~4.6.4-4.5.5~~ Test results shall be compared with those of the original acceptance test (if available) and with the most recent test results.

~~4.6.5-4.5.6~~ When a major component or subsystem is rebuilt or replaced, the subsystem shall be tested in accordance with the original acceptance test required for that subsystem.

4.5.7* Automated Testing. (Reserved)

4.6* Performanced-Based Programs. As an alternative means of compliance, subject to the authority having jurisdiction, components and systems shall be permitted to be inspected, tested, and maintained under a performance-based program.

4.7* Maintenance. Maintenance shall be performed to keep the system equipment operable or to make repairs.

4.8 Safety.

4.8.1 General. Inspection, testing, and maintenance activities shall be conducted in a safe manner, accordance with applicable safety regulations.

~~4.8.1-4.8.2~~ Confined Spaces. Legally required precautions shall be taken prior to entering confined spaces such as tanks, valve pits, or trenches.

~~4.8.2-4.8.3~~ Fall Protection. Legally required equipment shall be worn or used to prevent injury from falls to personnel.

~~4.8.3-4.8.4~~ Hazards. Precautions shall be taken to address any hazards, such as protection against drowning where working on the top of a filled embankment or a supported, rubberized fabric tank, or over open water or other liquids.

~~4.8.4-4.8.5~~ Hazardous Materials.

~~4.8.4.1-4.8.5.1~~ Legally required equipment shall be used where working in an environment with hazardous materials present.

~~4.8.4.2-4.8.5.2~~ The property owner or designated representative shall advise anyone performing inspection, testing, and maintenance on any system under the scope of this document, with regard to hazardous materials stored on the premises.

~~4.0-4.8.6~~ Electrical Safety. Legally required precautions shall be taken when testing or maintaining electric controllers for motor-driven fire pumps.

Chapter 5 Sprinkler Systems

5.1 General.

5.1.1 Minimum Requirements.

5.1.1.1 This chapter shall provide the minimum requirements for the routine inspection, testing, and maintenance of sprinkler systems.

5.1.1.2 Table 5.1.1.2 shall be used to determine the minimum required frequencies for inspection, testing, and maintenance.

5.1.1-5.1.2 Valves and Connections. Valves and fire department connections shall be inspected, tested, and maintained in accordance with Chapter 13.

5.1.3 Obstruction Investigations. The procedures outlined in Chapter 14 shall be followed where there is a need to conduct an obstruction investigation.

5.1.3-5.1.4 Impairments. The procedures outlined in Chapter 15 shall be followed where an impairment to protection occurs.

Table 5.1.1.2 Summary of Sprinkler System Inspection, Testing, and Maintenance

Item	Frequency	Reference
Inspection		
Gauges (dry, preaction, and deluge systems)	Weekly/monthly	5.2.4.2, 5.2.4.3, 5.2.4.4
Control valves		Table 13.1
Waterflow alarm devices	Quarterly	5.2.5
Valve supervisory alarm devices	Quarterly	5.2.5
Supervisory signal devices (except valve supervisory switches)	Quarterly	5.2.5
Gauges (wet pipe systems)	Monthly	5.2.4.1
Hydraulic nameplate	Quarterly	5.2.6
Buildings	Annually (prior to freezing weather)	4.1.1.1
Hanger/seismic bracing	Annually	5.2.3
Pipe and fittings	Annually	5.2.2
Sprinklers	Annually	5.2.1
Spare sprinklers	Annually	5.2.1.4
Information sign	Annually	5.2.6.1
Fire department connections		Table 13.1
Valves (all types)		Table 13.1
Obstruction, internal inspection of piping	5 years	14.2
Test		
Waterflow alarm devices		
Mechanical devices	Quarterly	5.3.3.1
Vane and pressure switch type devices	Semiannually	5.3.3.2
Valves supervisory alarm devices		Table 13.1
Supervisory signal devices (except valve supervisory switches)		Table 13.1
Main drain		Table 13.1
Antifreeze solution	Annually	5.3.4
Gauges	5 years	5.3.2
Sprinklers — extra-high temperature	5 years	5.3.1.1.4
Sprinklers — fast-response	At 20 years and every 10 years thereafter	5.3.1.1.3
Sprinklers	At 50 years and every 10 years thereafter	5.3.1.1.1
Sprinklers	At 75 years and every 5 years thereafter	5.3.1.1.5
Sprinklers — dry	At 10 years and every 10 years thereafter	5.3.1.1.6
Maintenance		
Valves (all types)		Table 13.1
Low-point drains (dry pipe system)		13.4.4.3.2
Sprinklers and automatic spray nozzles protecting commercial cooking equipment and ventilation systems	Annually	5.4.1.9
Investigation		
Obstruction		14.3

~~5.1.3~~ **5.1.5 Notification to Supervisory Service.** To avoid false alarms where a supervisory service is provided, the alarm receiving facility shall be notified by the property owner or designated representative as follows:

- (1) Before conducting any test or procedure that could result in the activation of an alarm
- (2) After such tests or procedures are concluded

~~5.1.4~~ **5.1.6** Hose connections shall be inspected, tested, and maintained in accordance with Chapters 6 and 13.

5.2* Inspection.

5.2.1 Sprinklers.

5.2.1.1* Sprinklers shall be inspected from the floor level annually.

5.2.1.1.1* Sprinklers shall not show signs of leakage; shall be free of corrosion, foreign materials, paint, and physical damage; and shall be installed in the ~~proper~~correct orientation (e.g., upright, pendent, or sidewall).

5.2.1.1.2 Any sprinkler that shows signs of any of the following shall be replaced:

- (1) Leakage
- (2) Corrosion
- (3) Physical damage
- (4) Loss of fluid in the glass bulb heat responsive element
- (5)*Loading
- (6) Painting unless painted by the sprinkler manufacturer

5.2.1.1.3* Any sprinkler that has been installed in the incorrect orientation shall be replaced.

~~5.2.1.1.2~~ **5.2.1.1.4** Any sprinkler shall be replaced that has signs of leakage; is painted, other than by the sprinkler manufacturer, corroded, damaged, or loaded; or ~~is~~ in the improper orientation.

~~5.2.1.1.3~~ **5.2.1.1.5** Glass bulb sprinklers shall be replaced if the bulbs have emptied.

~~5.2.1.1.4*~~ **5.2.1.1.6*** Sprinklers installed in concealed spaces such as above suspended ceilings shall not require inspection.

~~5.2.1.1.5~~ **5.2.1.1.7** Sprinklers installed in areas that are inaccessible for safety considerations due to process operations shall be inspected during each scheduled shutdown.

~~5.2.1.1.6~~ Sprinklers that are subject to recall shall be replaced per the manufacturer's requirements.

5.2.1.2* The minimum clearance required by the installation standard shall be maintained below all sprinkler ~~deflectors~~.

5.2.1.3 Stock, furnishings, or equipment closer to the sprinkler ~~deflector~~ than permitted by the clearance rules allow of the installation standard shall be corrected.

~~5.2.1.3~~ **5.2.1.4** The supply of spare sprinklers shall be inspected annually for the following:

- (1) ~~The proper number and type of sprinklers~~The correct number and type of sprinklers as required by 5.4.1.4 and 5.4.1.5
- (2) A sprinkler wrench for each type of sprinkler as required by 5.4.1.6

5.2.2* Pipe and Fittings. Sprinkler pipe and fittings shall be inspected annually from the floor level.

5.2.2.1 Pipe and fittings shall be in good condition and free of mechanical damage, leakage, and corrosion.

5.2.2.2 Sprinkler piping shall not be subjected to external loads by materials either resting on the pipe or hung from the pipe.

5.2.2.3* Pipe and fittings installed in concealed spaces such as above suspended ceilings shall not require inspection.

5.2.2.4 Pipe and fittings installed in areas that are inaccessible for safety considerations due to process operations shall be inspected during each scheduled shutdown.

5.2.3* Hangers and Seismic Braces. Sprinkler pipe hangers and seismic braces shall be inspected annually from the floor level.

5.2.3.1 Hangers and seismic braces shall not be damaged or loose.

5.2.3.2 Hangers and seismic braces that are damaged or loose shall be replaced or refastened.

5.2.3.3* Hangers and seismic braces installed in concealed spaces such as above suspended ceilings shall not require inspection.

5.2.3.4 Hangers and seismic bracing installed in areas that are inaccessible for safety considerations due to process operations shall be inspected during each scheduled shutdown.

5.2.4 Gauges.

5.2.4.1* Gauges on wet pipe sprinkler systems shall be inspected monthly to ensure that they are in good condition and that normal water supply pressure is being maintained.

5.2.4.2 Gauges on dry, preaction, and deluge systems shall be inspected weekly to ensure that normal air and water pressures are being maintained.

5.2.4.3 Where air pressure supervision is connected to a constantly attended location, gauges shall be inspected monthly.

5.2.4.4* For dry pipe or preaction systems protecting freezers, in accordance with Figure A-5.2.4.4, freezers with two air pressure gauges on the air line(s) between the compressor and the dry pipe or preaction valve, the air pressure gauge near the compressor shall be compared weekly to the pressure gauge above the dry pipe or preaction valve.

5.2.4.4.1 When the gauge near the compressor is reading higher than the gauge near the dry pipe valve, the air line in service shall be taken out of service, and the alternate air line opened to equalize the pressure.

5.2.4.4.2 The air line taken out of service shall be internally inspected, shall have all ice blockage removed, and shall be reassembled for use as a future alternate air line.

~~5.2.5 Buildings.~~ Annually, prior to the onset of freezing weather, buildings with wet pipe systems shall be inspected to verify that windows, skylights, doors, ventilators, other openings and closures, blind spaces, unused attics, stair towers, roof houses, and low spaces under buildings do not expose water-filled sprinkler piping to freezing and to verify that adequate heat [minimum 40°F (4.4°C)] is available.

~~5.2.6 Alarm Devices.~~ Alarm devices shall be inspected quarterly to verify that they are free of physical damage.

5.2.7* Hydraulic Nameplate. ~~The hydraulic nameplate for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.~~

5.2.5 Waterflow Alarm and Supervisory Devices. Waterflow alarm and supervisory alarm devices shall be inspected quarterly to verify that they are free of physical damage.

5.2.6* Hydraulic Design Information Sign. The hydraulic design information sign for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible.

5.2.7 Heat Tape. Heat tape shall be inspected per manufacturer's requirements.

5.2.8* Information Sign. The information sign shall be inspected annually to verify that it is securely attached and is legible.

5.3 Testing.

5.3.1* Sprinklers.

5.3.1.1* Where required by this section, sample sprinklers shall be submitted to a recognized testing laboratory acceptable to the authority having jurisdiction for field service testing.

5.3.1.1.1 Where sprinklers have been in service for 50 years, they shall be replaced or representative samples from one or more sample areas shall be tested. ~~Test procedures shall be repeated at 10-year intervals.~~

5.3.1.1.1.1 Test procedures shall be repeated at 10-year intervals.

5.3.1.1.1.1.2 Sprinklers manufactured prior to 1920 shall be replaced.

5.3.1.1.1.2-3* Sprinklers manufactured using fast-response elements that have been in service for 20 years shall be replaced, or representative samples shall be tested. ~~They shall be tested and then~~ retested at 10-year intervals.

5.3.1.1.1.3-5.3.1.1.4* Representative samples of solder-type sprinklers with a temperature classification of extra high [325°F (163°C)] or greater that are exposed to semicontinuous to continuous maximum allowable ambient temperature conditions shall be tested at 5-year intervals.

5.3.1.1.1.4-5.3.1.1.5 Where sprinklers have been in service for 75 years, they shall be replaced or representative samples from one or more sample areas shall be submitted to a recognized testing laboratory acceptable to the authority having jurisdiction for field service testing. ~~Test procedures shall be tested and repeated at 5-year intervals.~~

5.3.1.1.1.5-5.3.1.1.6* Dry sprinklers that have been in service for 10 years shall be replaced or representative samples shall be tested. ~~They shall be tested and then~~ retested at 10-year intervals.

5.3.1.1.2* Where sprinklers are subjected to harsh environments, including corrosive atmospheres and corrosive water supplies, on a 5-year basis, ~~either~~ sprinklers shall ~~either~~ be replaced or representative sprinkler samples shall be tested.

5.3.1.1.3 Where historical data indicate, longer intervals between testing shall be permitted.

5.3.1.2* A representative sample of sprinklers for testing per 5.3.1.1.1 shall consist of a minimum of not less than four sprin-

klers or 1 percent of the number of sprinklers per individual sprinkler sample, whichever is greater.

5.3.1.3 Where one sprinkler within a representative sample fails to meet the test requirement, all sprinklers within the area represented by that sample shall be replaced.

5.3.1.3.1 Manufacturers shall be permitted to make modifications to their own sprinklers in the field with listed devices that restore the original performance as intended by the listing, where acceptable to the authority having jurisdiction.

5.3.2* Gauges.

5.3.2.1 Gauges shall be replaced every 5 years or tested every 5 years by comparison with a calibrated gauge.

5.3.2.2 Gauges not accurate to within 3 percent of the full scale shall be recalibrated or replaced.

5.3.3 Waterflow Alarm Devices.

5.3.3.1 Mechanical waterflow alarm devices including, but not limited to, water motor gongs, shall be tested quarterly.

5.3.3.2* Vane-type and pressure switch-type waterflow alarm devices shall be tested semiannually.

5.3.3.3 Testing ~~the~~ waterflow alarm ~~devices~~ on wet pipe systems shall be accomplished by opening the inspector's test connection.

5.3.3.3.1 Where freezing weather conditions or other circumstances prohibit use of the inspector's test connection, the bypass connection shall be permitted to be used.

5.3.3.4 Fire pumps shall not be ~~turned off~~ ~~taken out of service~~ during testing unless constantly attended by qualified personnel or all impairment procedures contained in Chapter 15 are followed.

5.3.3.5* Testing ~~the~~ waterflow alarm ~~devices~~ on dry pipe, pre-action, or deluge systems shall be accomplished by using the bypass connection.

5.3.4* Antifreeze Systems. The freezing point of solutions in antifreeze shall be tested annually by measuring the specific gravity with a hydrometer or refractometer and adjusting the solutions if necessary.

5.3.4.1* Solutions shall be in accordance with Table 5.3.4.1(a) and Table 5.3.4.1(b).

5.3.4.1.1* Listed CPVC sprinkler pipe and fittings shall be protected from freezing with glycerin only. The use of diethylene, ethylene, or propylene glycols shall be specifically prohibited.

5.3.4.1.2 The concentration of antifreeze solution shall be limited to the minimum necessary for the anticipated minimum temperature.

5.3.4.2 The use of antifreeze solutions shall be in accordance with any state or local health regulations.

5.3.4.3 The antifreeze solution shall be tested at its most remote portion and where it interfaces with the wet pipe system.

Table 5.3.4.1(a) Antifreeze Solutions to Be Used If Nonpotable Water Is Connected to Sprinklers

Material	Solution (by Volume)	Specific Gravity at 60°F (15.6°C)	Freezing Point	
			°F	°C
Glycerine*				
Diethylene glycol (Not for CPVC)	50% water	1.078	-13	-25.0
	45% water	1.081	-27	-32.8
	40% water	1.086	-42	-41.1
	Hydrometer scale 1.000 to 1.120 (subdivisions 0.002)			
Ethylene glycol (Not for CPVC)	61% water	1.056	-10	-23.3
	56% water	1.063	-20	-28.9
	51% water	1.069	-30	-34.4
	47% water	1.073	-40	-40.0
	Hydrometer scale 1.000 to 1.120 (subdivisions 0.002)			
Propylene glycol* (Not for CPVC)				
Calcium chloride 80% "flake" (Not for CPVC)				
	lb CaCl ₂ /gal of water			
Fire protection grade†				
Add corrosion inhibitor of sodium bichromate ¾ oz/gal water	2.83	1.183	0	-17.8
	3.38	1.212	-10	-23.3
	3.89	1.237	-20	-28.9
	4.37	1.258	-30	-34.4
	4.73	1.274	-40	-40.0
	4.93	1.283	-50	-45.6

*If used, see Table 5.3.4.1(b).

†Free from magnesium chloride and other impurities.

Table 5.3.4.1(b) Antifreeze Solutions to Be Used If Potable Water Is Connected to Sprinklers

Material	Solution (by Volume)	Specific Gravity at 60°F (15.6°C)	Freezing Point	
			°F	°C
Glycerine C.P. or U.S.P. grade*	50% water	1.145	-20.9	-29.4
	40% water	1.171	-47.3	-44.1
	30% water	1.197	-22.2	-30.1
	Hydrometer scale 1.000 to 1.200			
Propylene glycol (Not for CPVC)	70% water	1.027	+9	-12.8
	60% water	1.034	-6	-21.2
	50% water	1.041	-26	-32.2
	40% water	1.045	-60	-51.1
	Hydrometer scale 1.000 to 1.200 (subdivisions 0.0002)			

*C.P. = Chemically pure; U.S.P. = United States Pharmacopoeia 96.9%.

5.3.4.3.1 When antifreeze systems have a capacity larger than 150 gal (568 L), tests at one additional point for every 100 gal (379 L) shall be made.

5.3.4.3.2 If the test results indicate an incorrect freeze point at any point in the system, the system shall be drained, the solution adjusted, and the systems refilled.

5.3.4.3.3 For premixed solutions, the manufacturer's instructions shall be permitted to be used with regard to the number of test points and refill procedure.

5.4 Maintenance.

5.4.1 Sprinklers.

5.4.1.1* Replacement sprinklers shall have the proper characteristics for the application ~~intended. These shall intended, which~~ include the following:

- (1) Style
- (2) Orifice size and K-factor
- (3) Temperature rating
- (4) Coating, if any
- (5) Deflector type (e.g., upright, pendent, sidewall)
- (6) Design requirements

5.4.1.1.1* Spray sprinklers shall be permitted to replace old-style sprinklers.

5.4.1.1.2 Replacement sprinklers for piers and wharves shall comply with NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*.

5.4.1.2 Only new, listed sprinklers shall be used to replace existing sprinklers.

5.4.1.3* Special and quick-response sprinklers as defined by NFPA 13, *Standard for the Installation of Sprinkler Systems*, shall be replaced with sprinklers of the same orifice, size, temperature range and thermal response characteristics, and K-factor.

5.4.1.4* A supply of spare sprinklers (never fewer than six) shall be maintained on the premises so that any sprinklers that have operated or been damaged in any way can be promptly replaced.

5.4.1.4.1 The sprinklers shall correspond to the types and temperature ratings of the sprinklers in the property.

5.4.1.4.2 The sprinklers shall be kept in a cabinet located where the temperature in which they are subjected will at no time exceed 100°F (38°C).

5.4.1.4.2.1 Where dry sprinklers of different lengths are installed, spare dry sprinklers shall not be required, provided that a means of returning the system to service is furnished.

5.4.1.5 The stock of spare sprinklers shall include all types and ratings installed and shall be as follows:

- (1) For protected facilities having under 300 sprinklers — no fewer than 6 sprinklers
- (2) For protected facilities having 300 to 1000 sprinklers — no fewer than 12 sprinklers
- (3) For protected facilities having over 1000 sprinklers — no fewer than 24 sprinklers

5.4.1.6* A special sprinkler wrench shall be provided and kept in the cabinet to be used in the removal and installation of sprinklers.

5.4.1.6.1 One sprinkler wrench shall be provided for each type of sprinkler installed.

5.4.1.7 Sprinklers protecting spray coating areas shall be protected against overspray residue.

5.4.1.7.1* Sprinklers subject to overspray accumulations shall be protected using ~~plastic cellophane~~ bags having a ~~maximum~~ thickness of 0.003 in. (0.076 mm) ~~or less or shall be protected with small thin paper bags.~~

5.4.1.7.2 Coverings shall be replaced when deposits or residue accumulate.

5.4.1.8* Sprinklers shall not be altered in any respect or have any type of ornamentation, paint, or coatings applied after shipment from the place of manufacture.

5.4.1.9 Sprinklers and automatic spray nozzles used for protecting commercial-type cooking equipment and ventilating systems shall be replaced annually.

5.4.1.9.1 Where automatic bulb-type sprinklers or spray nozzles are used and annual examination shows no buildup of grease or other material on the sprinklers or spray nozzles, such sprinklers and spray nozzles shall not be required to be replaced.

5.4.2* Dry Pipe Systems. Dry pipe systems shall be kept dry at all times.

5.4.2.1 During nonfreezing weather, a dry pipe system shall be permitted to be left wet if the only other option is to remove the system from service while waiting for parts or during repair activities.

5.4.2.2 Refrigerated spaces or other areas within the building interior where temperatures are maintained at or below 40°F (4.4°C) shall not be permitted to be left wet.

~~5.4.2.3~~ **5.4.2.3** Air driers shall be maintained in accordance with the manufacturer's instructions.

5.4.2.4 Compressors used in conjunction with dry pipe sprinkler systems shall be maintained in accordance with the manufacturer's instructions.

5.4.3* Installation and Acceptance Testing. Where maintenance or repair requires the replacement of sprinkler system components affecting more than 20 sprinklers, those components shall be installed and tested in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

5.4.4* Marine Systems. Sprinkler systems that are normally maintained using fresh water as a source shall be drained and refilled, then drained and refilled again with fresh water following the introduction of raw water into the system.

5.5 Component Action Requirements.

5.5.1 Whenever a component in a sprinkler system is adjusted, repaired, reconditioned, or replaced, the actions required in Table 5.5.1 shall be performed.

~~5.5.1.1 Where the original installation standard is different from the cited standard, the use of the appropriate installing standard shall be permitted.~~

~~5.5.1.2~~ **5.5.2** A main drain test shall be required if the system control or other upstream valve was operated in accordance with 13.3.3.4.

~~5.5.3 Where the original installation standard is different from the cited standard, the use of the appropriate installing standard shall be permitted.~~

~~5.5.1.3~~ **5.5.4** These actions shall not require a design review, which is outside the scope of this standard.

Table 5.5.1 Summary of Component Replacement Action Requirements

Component	Adjust	Repair/ Recondition	Replace	Required Action
Water Delivery Components				
Pipe and fittings affecting less than 20 sprinklers	X	X	X	Check for leaks at system working pressure
Pipe and fittings affecting more than 20 sprinklers	X	X	X	Hydrostatic test in conformance with NFPA 13, <i>Standard for the Installation of Sprinkler Systems</i>
Sprinklers, less than 20	X		X	Check for leaks at system working pressure
Sprinklers, more than 20	X		X	Hydrostatic test in conformance with NFPA 13
Fire department connections	X	X	X	See Chapter 13
Antifreeze solution	X		X	Check freezing point of solution
Valves				Check for leaks at system working pressure
Fire pump				See Chapter 13 See Chapter 8
Alarm and Supervisory Components				
Vane-type waterflow	X	X	X	Operational test using inspector's test connection
Pressure switch-type waterflow	X	X	X	Operational test using inspector's test connection
Water motor gong	X	X	X	Operational test using inspector's test connection
High and low air pressure switch	X	X	X	Operational test of high and low settings
Valve supervisory device	X	X	X	Test for conformance with NFPA 13 and/or NFPA 72, <i>National Fire Alarm and Signaling Code</i>
Detection system (for deluge or preaction system)	X	X	X	Operational test for conformance with NFPA 13 and/or NFPA 72
Status-Indicating Components				
Gauges			X	Verify at 0 bar (0 psi) and system working pressure
Testing and Maintenance Components				
Air compressor	X	X	X	Operational test for conformance with NFPA 13
Automatic air maintenance device	X	X	X	Operational test for conformance with NFPA 13
Main drain	X	X	X	Main drain test
Auxiliary drains	X	X	X	Check for leaks at system working pressure; Main drain test
Inspector's test connection	X	X	X	Check for leaks at system working pressure; Main drain test
Structural Components				
Hanger/seismic bracing	X	X	X	Check for conformance with NFPA 13
Pipe stands	X	X	X	Check for conformance with NFPA 13
Informational Components				
Identification signs	X	X	X	Check for conformance with NFPA 13
Hydraulic placards	X	X	X	Check for conformance with NFPA 13

Chapter 6 Standpipe and Hose Systems

6.1 General.

6.1.1 Minimum Requirements.

6.1.1.1 This chapter shall provide the minimum requirements for the routine inspection, testing, and maintenance of standpipe and hose systems.

6.1.1.2 Table 6.1.1.2 shall be used to determine the minimum required frequencies for inspection, testing, and maintenance.

6.1.2 Table 6.1.2 shall be used for the inspection, testing, and maintenance of all classes of standpipe and hose systems.

6.1.3 Checkpoints and corrective actions outlined in Table 6.1.2 shall be followed to determine that components are free of corrosion, foreign material, physical damage, tampering, or other conditions that adversely affect system operation.

6.1.4 Valves and Connections. Valves and fire department connections shall be inspected, tested, and maintained in accordance with Chapter 13.

6.1.5 Obstruction Investigations. The procedures outlined in Chapter 14 shall be followed where there is a need to conduct an obstruction investigation.

6.1.6 Impairments. Where the inspection, testing, and maintenance of standpipe and hose systems results or involves a system that is out of service, the impairment procedures outlined in Chapter 15 shall be followed.

6.1.7 Where approved by the authority having jurisdiction, existing hose shall be permitted to be removed and shall not be recorded as a deficiency.

6.1.8 Notification to Supervisory Service. To avoid false alarms where a supervisory service is provided, the alarm receiving facility shall be notified by the property owner or designated representative as follows:

- (1) Before conducting any test or procedure that could result in the activation of an alarm
- (2) After such tests or procedures are concluded

6.2 Inspection.

6.2.1 Components of standpipe and hose systems shall be visually inspected annually or as specified in Table 6.1.1.2.

Table 6.1.1.2 Summary of Standpipe and Hose Systems Inspection, Testing, and Maintenance

Item	Frequency	Reference
Inspection		
Control valves		Table 13.1
Pressure regulating devices		Table 13.1
Piping	Annually	6.2.1
Hose connections		Table 13.1
Cabinet	Annually	NFPA 1962
Gauges	Weekly	6.2.2
Hose	Annually	NFPA 1962
Hose storage device	Annually	NFPA 1962
Hose nozzle	Annually and after each use	NFPA 1962
Hydraulic design information sign	Annually	6.2.3
Test		
Waterflow alarm devices		Table 13.1
Valve supervisory alarm devices		Table 13.1
Supervisory signal devices (except valve supervisory switches)		Table 13.1
Hose storage device	Annually	NFPA 1962
Hose	5 years/3 years	NFPA 1962
Pressure control valve		Table 13.1
Pressure reducing valve		Table 13.1
Hydrostatic test	5 years	6.3.2
Flow test	5 years	6.3.1
Main drain test		Table 13.1
Maintenance		
Hose connections	Annually	Table 6.1.2
Valves (all types)	Annually/as needed	Table 13.1

6.2.2 Table 6.2.2 shall be used for the inspection, testing, and maintenance of all classes of standpipe and hose systems.

6.2.3 Checkpoints and corrective actions outlined in Table 6.2.2 shall be followed to determine that components are free of corrosion, foreign material, physical damage, tampering, or other conditions that adversely affect system operation.

6.2.2 Gauges.

6.2.2.1 Gauges on automatic standpipe systems shall be inspected monthly to ensure that they are in good condition and that normal water supply pressure is being maintained.

6.2.2.2 Gauges on dry preaction and deluge valves shall be inspected weekly to ensure that normal air and water pressure are being maintained.

6.2.2.3 Where air pressure supervision is connected to a constantly attended location, gauges shall be inspected monthly.

6.2.3* Hydraulic Design Information Sign. When provided, the hydraulic design information sign for standpipe systems shall be inspected annually to verify that it is attached securely and is legible.

6.3 Testing. Where water damage is a possibility, an air test shall be conducted on the system at 25 psi (1.7 bar) prior to introducing water to the system.

6.3.1 Flow Tests.

6.3.1.1* A flow test shall be conducted every 5 years at the hydraulically most remote hose connections of each zone of

an automatic standpipe system to verify the water supply still provides the design pressure at the required flow.

6.3.1.2 Where a flow test of the hydraulically most remote outlet(s) is not practical, the authority having jurisdiction shall be consulted for the appropriate location for the test.

6.3.1.3 All systems shall be flow tested and pressure tested at the requirements for the design criteria in effect at the time of the installation.

6.3.1.3.1 The actual test method(s) and performance criteria shall be discussed in advance with the authority having jurisdiction.

6.3.1.4 Standpipes, sprinkler connections to standpipes, or hose stations equipped with pressure reducing valves or pressure regulating valves shall have these valves inspected, tested, and maintained in accordance with the requirements of Chapter 13.

6.3.1.5 A main drain test shall be performed on all standpipe systems with automatic water supplies in accordance with the requirements of Chapter 13.

6.3.1.5.1 The test shall be performed at the low point drain for each standpipe or the main drain test connection where the supply main enters the building (when provided).

6.3.1.5.2 Pressure gauges shall be provided for the test and shall be maintained in accordance with 5.3.2.

Table 6.1.2 Standpipe and Hose Systems

Component/Checkpoint	Corrective Action
Hose Connections	
Cap missing	Replace
Fire hose connection damaged	Repair
Valve handles missing	Replace
Cap gaskets missing or deteriorated	Replace
Valve leaking	Close or repair
Visible obstructions	Remove
Restricting device missing	Replace
Manual, semiautomatic, or dry standpipe — valve does not operate smoothly	Lubricate or repair
Piping	
Damaged piping	Repair
Control valves damaged	Repair or replace
Missing or damaged pipe support device	Repair or replace
Damaged supervisory devices	Repair or replace
Hose	
Inspect	Remove and inspect the hose, including gaskets, and rerack or rereel at intervals in accordance with NFPA 1962, <i>Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose</i>
Mildew, cuts, abrasions, and deterioration evident	Replace with listed lined, jacketed hose
Coupling damaged	Replace or repair
Gaskets missing or deteriorated	Replace
Incompatible threads on coupling	Replace or provide thread adapter
Hose not connected to hose rack nipple or valve	Connect
Hose test outdated	Retest or replace in accordance with NFPA 1962
Hose Nozzle	
Hose nozzle missing	Replace with listed nozzle
Gasket missing or deteriorated	Replace
Obstructions	Remove
Nozzle does not operate smoothly	Repair or replace
Hose Storage Device	
Difficult to operate	Repair or replace
Damaged	Repair or replace
Obstruction	Remove
Hose improperly racked or rolled	Remove
Nozzle clip in place and nozzle correctly contained?	Replace if necessary
If enclosed in cabinet, will hose rack swing out at least 90 degrees?	Repair or remove any obstructions
Cabinet	
Check overall condition for corroded or damaged parts	Repair or replace parts; replace entire cabinet if necessary
Difficult to open	Repair
Cabinet door will not open fully	Repair or move obstructions
Door glazing cracked or broken	Replace
If cabinet is break-glass type, is lock functioning properly?	Repair or replace
Glass break device missing or not attached	Replace or attach
Not properly identified as containing fire equipment	Provide identification
Visible obstructions	Remove
All valves, hose, nozzles, fire extinguisher, etc., easily accessible	Remove any material not related

6.3.2 Hydrostatic Tests.

6.3.2.1 Hydrostatic tests of not less than 200 psi (13.8 bar) pressure for 2 hours, or at 50 psi (3.4 bar) in excess of the maximum pressure, where maximum pressure is in excess of 150 psi (10.3 bar), shall be conducted every 5 years on manual standpipe systems and semi-automatic dry standpipe systems, including piping in the fire department connection.

~~6.3.2.1.6~~ **6.3.2.1.1** Manual wet standpipes that are part of a combined sprinkler/standpipe system shall not be required to be tested in accordance with 6.3.2.1.

6.3.2.2* Hydrostatic tests shall be conducted in accordance with 6.3.2.1 on any system that has been modified or repaired.

6.3.2.3 The hydrostatic test pressure shall be measured at the low elevation point of the individual system or zone being tested.

6.3.2.3.1 The inside standpipe piping shall show no leakage.

6.3.3 Alarm Devices, Waterflow Alarm and Supervisory Alarm Devices.

6.3.3.1 Where provided, waterflow alarm and supervisory alarm devices shall be tested in accordance with 13.2.6 and 13.3.3.5.

6.3.3.1.3.2 Where freezing conditions necessitate a delay in testing, tests shall be performed as soon as weather allows.

6.3.4* Gauges.

6.3.4.1 Gauges shall be replaced every 5 years or tested every 5 years by comparison with a calibrated gauge.

6.3.4.2 Gauges not accurate to within 3 percent of the full scale shall be recalibrated or replaced.

6.4 Maintenance.

6.4.1 Maintenance and repairs shall be in accordance with 6.2.36.1.3 and Table 6.21.2.

6.4.1.4.2 Equipment that does not pass the inspection or testing requirements shall be repaired and tested again or replaced.

6.5 Component Action Requirements.

6.5.1 Whenever components in a standpipe and hose system are adjusted, repaired, reconditioned, or replaced, the actions required in Table 6.5.1, **Summary of Component Replacement Action Requirements**, shall be performed.

Table 6.5.1 Summary of Component Replacement Action Requirements

Component	Adjust	Repair	Replace	Required Action
Water Delivery Components				
Control valves	X	X	X	See Chapter 13
Hose valve pressure regulating devices	X	X	X	See Chapter 13
System pressure regulating devices	X	X	X	See Chapter 13
Piping	X	X	X	Hydrostatic test in conformance with NFPA 14, <i>Standard for the Installation of Standpipe and Hose Systems</i>
Fire hose			X	
Hose valve	X	X	X	See Chapter 13
Fire department connections	X	X	X	See Chapter 13
Backflow prevention device	X	X	X	See Chapter 13
Valves				See Chapter 13
Fire pump				See Chapter 8
Alarm and Supervisory Components				
Vane-type waterflow	X	X		Operational test using inspector's test connection
Vane-type waterflow			X	Operational test using inspector's test connection
Pressure switch-type waterflow	X	X	X	Operational test using inspector's test connection
Water motor gong	X	X	X	Operational test using inspector's test connection
Valve supervisory device	X	X	X	Operational test for receipt of alarms and verification of conformance with NFPA 14 and/or NFPA 72, <i>National Fire Alarm and Signaling Code</i>
Status-Indicating Components				
Gauges			X	Verify at 0 psi and system working pressure
System Housing and Protection Components				
Cabinet	X	X	X	Verify compliance with NFPA 14
Hose storage rack	X	X	X	Verify compliance with NFPA 14
Testing and Maintenance Components				
Drain riser	X	X	X	Check for leaks while flowing from connection above the repair
Auxiliary drains	X	X	X	Check for leaks at system working pressure
Main drain	X	X	X	Check for leaks and residual pressure during main drain test
Structural Components				
Hanger/seismic bracing	X	X	X	Verify conformance with NFPA 14
Pipe stands	X	X	X	Verify conformance with NFPA 14
Informational Components				
Identification signs	X	X	X	Verify conformance with NFPA 14
Hydraulic placards	X	X	X	Verify conformance with NFPA 14

Table 13.1.1.2 Summary of Valves, Valve Components, and Trim Inspection, Testing, and Maintenance

Item	Frequency	Reference
Inspection		
<i>Control Valves</i>		
Sealed	Weekly	13.3.2.1
Locked	Monthly	13.3.2.1.1
Tamper switches	Monthly	13.3.2.1.1
<i>Alarm Valves</i>		
Exterior	Monthly	13.4.1.1
Interior	5 years	13.4.1.2
Strainers, filters, orifices	5 years	13.4.1.2
<i>Check Valves</i>		
Interior	5 years	13.4.2.1
<i>Precision/Deluge Valves</i>		
Enclosure (during cold weather)	Daily/weekly	13.4.3.1
Exterior	Monthly	13.4.3.1.6
Interior	Annually/5 years	13.4.3.1.7
Strainers, filters, orifices	5 years	13.4.3.1.8
<i>Dry Pipe Valves/ Quick-Opening Devices</i>		
Gauges	Weekly/monthly	13.4.4.1.2.4, 13.4.4.1.2.5
Enclosure (during cold weather)	Daily/weekly	13.4.4.1.1
Exterior	Monthly	13.4.4.1.4
Interior	Annually	13.4.4.1.5
Strainers, filters, orifices	5 years	13.4.4.1.6
<i>Pressure Reducing and Relief Valves</i>		
Sprinkler systems	Quarterly	13.5.1.1
Hose connections	Annually	13.5.2.1
Hose racks	Annually	13.5.3.1
<i>Fire Pumps</i>		
Casing relief valves	Weekly	13.5.7.1, 13.5.7.1.1
Pressure relief valves	Weekly	13.5.7.2, 13.5.7.2.1
<i>Backflow Prevention Assemblies</i>		
Reduced pressure	Weekly/monthly	13.6.1
Reduced pressure detectors	Weekly/monthly	13.6.1
<i>Fire Department Connections</i>	Quarterly	13.7.1
Testing		
<i>Main Drains</i>	Annually/quarterly	13.2.5, 13.2.5.1, 13.3.3.4
<i>Waterflow Alarms</i>	Quarterly/semiannually	13.2.6
<i>Control Valves</i>		
Position	Annually	13.3.3.1
Operation	Annually	13.3.3.1
Supervisory	Semiannually	13.3.3.5
<i>Precision/Deluge Valves</i>		
Priming water	Quarterly	13.4.3.2.1
Low air pressure alarms	Quarterly/annually	13.4.3.2.13, 13.4.3.2.14
Full flow	Annually	13.4.3.2.2



VALVES, VALVE COMPONENTS, AND TRIM

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Table 13.1.1.2 Summary of Valves, Valve Components, and Trim Inspection, Testing, and Maintenance

Item	Frequency	Reference
Inspection		
<i>Control Valves</i>		
Sealed	Weekly	13.3.2.1
Locked	Monthly	13.3.2.1.1
Tamper switches	Monthly	13.3.2.1.1
<i>Alarm Valves</i>		
Exterior	Monthly	13.4.1.1
Interior	5 years	13.4.1.2
Strainers, filters, orifices	5 years	13.4.1.2
<i>Check Valves</i>		
Interior	5 years	13.4.2.1
<i>Precision/Deluge Valves</i>		
Enclosure (during cold weather)	Daily/weekly	13.4.3.1
Exterior	Monthly	13.4.3.1.6
Interior	Annually/5 years	13.4.3.1.7
Strainers, filters, orifices	5 years	13.4.3.1.8
<i>Dry Pipe Valves/ Quick-Opening Devices</i>		
Gauges	Weekly/monthly	13.4.4.1.2.4, 13.4.4.1.2.5
Enclosure (during cold weather)	Daily/weekly	13.4.4.1.1
Exterior	Monthly	13.4.4.1.4
Interior	Annually	13.4.4.1.5
Strainers, filters, orifices	5 years	13.4.4.1.6
<i>Pressure Reducing and Relief Valves</i>		
Sprinkler systems	Quarterly	13.5.1.1
Hose connections	Annually	13.5.2.1
Hose racks	Annually	13.5.3.1
<i>Fire Pumps</i>		
Casing relief valves	Weekly	13.5.7.1, 13.5.7.1.1
Pressure relief valves	Weekly	13.5.7.2, 13.5.7.2.1
<i>Backflow Prevention Assemblies</i>		
Reduced pressure	Weekly/monthly	13.6.1
Reduced pressure detectors	Weekly/monthly	13.6.1
<i>Fire Department Connections</i>	Quarterly	13.7.1
Testing		
<i>Main Drains</i>	Annually/quarterly	13.2.5, 13.2.5.1, 13.3.3.4
<i>Waterflow Alarms</i>	Quarterly/semiannually	13.2.6
<i>Control Valves</i>		
Position	Annually	13.3.3.1
Operation	Annually	13.3.3.1
Supervisory	Semiannually	13.3.3.5
<i>Precision/Deluge Valves</i>		
Priming water	Quarterly	13.4.3.2.1
Low air pressure alarms	Quarterly/annually	13.4.3.2.13, 13.4.3.2.14
Full flow	Annually	13.4.3.2.2

(continues)

Table 13.1.1.2 *Continued*

Item	Frequency	Reference
<i>Dry Pipe Valves/ Quick-Opening Devices</i>		
Priming water	Quarterly	13.4.4.2.1
Low air pressure alarm	Quarterly	13.4.4.2.6
Quick-opening devices	Quarterly	13.4.4.2.4
Trip test	Annually	13.4.4.2.2
Full flow trip test	3 years	13.4.4.2.2.2
<i>Pressure Reducing and Relief Valves</i>		
Sprinkler systems	5 years	13.5.1.2
Circulation relief	Annually	13.5.7.1.2
Pressure relief valves	Annually	13.5.7.2.2
Hose connections	5 years	13.5.2.2
Hose racks	5 years	13.5.3.2
<i>Backflow Prevention Assemblies</i>	Annually	13.6.2
Maintenance		
<i>Control Valves</i>	Annually	13.3.4
<i>Precision/Deluge Valves</i>	Annually	13.4.3.3.2
<i>Dry Pipe Valves/ Quick-Opening Devices</i>	Annually	13.4.4.3

13.3.1.1 Systems that have more than one control valve that must be closed to work on a system shall have a sign on each affected valve referring to the existence and location of other valves.

13.3.1.2* When a normally open valve is closed, the procedures established in Chapter 15 shall be followed.

13.3.1.2.1 When the valve is returned to service, a drain test (either main or sectional drain, as appropriate) shall be conducted to determine that the valve is open.

13.3.1.3 Each normally open valve shall be secured by means of a seal or a lock or shall be electrically supervised in accordance with the applicable NFPA standards.

13.3.1.4 Normally closed valves shall be secured by means of a seal or shall be electrically supervised in accordance with the applicable NFPA standard.

~~13.3.1.4.1~~ 13.3.1.5 Sealing or electrical supervision shall not be required for hose valves.

13.3.2 Inspection.

13.3.2.1 All valves shall be inspected weekly.

13.3.2.1.1 Valves secured with locks or supervised in accordance with applicable NFPA standards shall be permitted to be inspected monthly.

13.3.2.1.2 After any alterations or repairs, an inspection shall be made by the property owner or designated representative to ensure that the system is in service and all valves are in the normal position and properly sealed, locked, or electrically supervised.

13.3.2.2* The valve inspection shall verify that the valves are in the following condition:

- (1) In the normal open or closed position
- (2) *~~Properly sealed~~, Sealed, locked, or supervised
- (3) Accessible

- (4) Provided with ~~appropriate~~ correct wrenches
- (5) Free from external leaks
- (6) Provided with ~~appropriate~~ applicable identification

13.3.3 Testing.

13.3.3.1 Each control valve shall be operated annually through its full range and returned to its normal position.

13.3.3.2* Post indicator valves shall be opened until spring or torsion is felt in the rod, indicating that the rod has not become detached from the valve.

13.3.3.2.1 This test shall be conducted every time the valve is closed.

13.3.3.3 Post indicator and outside screw and yoke valves shall be backed a one-quarter turn from the fully open position to prevent jamming.

13.3.3.4 A main drain test shall be conducted any time the control valve is closed and reopened at system riser.

13.3.3.5* Supervisory Switches.

13.3.3.5.1 Valve supervisory switches shall be tested semiannually.

13.3.3.5.2 A distinctive signal shall indicate movement from the valve's normal position during either the first two revolutions of a hand wheel or when the stem of the valve has moved one-fifth of the distance from its normal position.

13.3.3.5.3 The signal shall not be restored at any valve position except the normal position.

13.3.4 Maintenance.

13.3.4.1 The operating stems of outside screw and yoke valves shall be lubricated annually.

13.3.4.2 The valve then shall be completely closed and reopened to test its operation and distribute the lubricant.

13.4 System Valves.

13.4.1 Inspection of Alarm Valves. Alarm valves shall be inspected as described in 13.4.1.1 and 13.4.1.2.

13.4.1.1* Alarm valves and system riser check valves shall be externally inspected monthly and shall verify the following:

- (1) The gauges indicate normal supply water pressure is being maintained.
- (2) The valve is free of physical damage.
- (3) All valves are in the appropriate open or closed position.
- (4) The retarding chamber or alarm drains are not leaking.

13.4.1.2* Alarm valves and their associated strainers, filters, and restriction orifices shall be inspected internally every 5 years unless tests indicate a greater frequency is necessary.

13.4.1.3 Maintenance.

13.4.1.3.1 Internal components shall be cleaned/repaired as necessary in accordance with the manufacturer's instructions.

13.4.1.3.2 The system shall be returned to service in accordance with the manufacturer's instructions.

13.4.2 Check Valves.

13.4.2.1 Inspection. Valves shall be inspected internally every 5 years to verify that all components operate correctly, move freely, and are in good condition.

13.4.2.2 Maintenance. Internal components shall be cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

13.4.3 Preaction Valves and Deluge Valves.

13.4.3.1 Inspection.

13.4.3.1.1 Valve enclosure heating equipment for preaction and deluge valves subject to freezing shall be inspected daily during cold weather for its ability to maintain a minimum temperature of at least 40°F (4.4°C).

13.4.3.1.1.1 Valve enclosures equipped with low temperature alarms shall be inspected weekly.

13.4.3.1.2 Low temperature alarms, if installed in valve enclosures, shall be inspected annually at the beginning of the heating season.

13.4.3.1.3 Gauges shall be inspected weekly.

13.4.3.1.3.1 The gauge on the supply side of the preaction or deluge valve shall indicate that the normal supply water pressure is being maintained.

13.4.3.1.4 The gauge monitoring the preaction system supervisory air pressure, if provided, shall be inspected monthly to verify that it indicates that normal pressure is being maintained.

13.4.3.1.5 The gauge monitoring the detection system pressure, if provided, shall be tested monthly to verify that it indicates that normal pressure is being maintained.

13.4.3.1.6 The preaction or deluge valve shall be externally inspected monthly to verify the following:

- (1) The valve is free from physical damage.
- (2) All trim valves are in the appropriate open or closed position.
- (3) The valve seat is not leaking.
- (4) Electrical components are in service.

13.4.3.1.7 The interior of the preaction or deluge valve and the condition of detection devices shall be inspected annually when the trip test is conducted.

13.4.3.1.7.1 Internal inspection of valves that can be reset without removal of a faceplate shall be permitted to be conducted every 5 years.

13.4.3.1.8 Strainers, filters, restricted orifices, and diaphragm chambers shall be inspected internally every 5 years unless tests indicate a greater frequency is necessary.

13.4.3.2 Testing.

13.4.3.2.1* The priming water level in supervised preaction systems shall be tested quarterly for compliance with the manufacturer's instructions.

13.4.3.2.2* Each deluge valve shall be trip tested annually at full flow in warm weather and in accordance with the manufacturer's instructions.

13.4.3.2.2.1 Protection shall be provided for any devices or equipment subject to damage by system discharge during tests.

13.4.3.2.2.1* 13.4.3.2.2.2* Where the nature of the protected property is such that water cannot be discharged for test purposes, the trip test shall be conducted in a manner that does not necessitate discharge in the protected area.

13.4.3.2.2.2-13.4.3.2.2.3 Where the nature of the protected property is such that water cannot be discharged unless protected equipment is shut down (e.g., energized electrical equipment), a full flow system test shall be conducted at the next scheduled shutdown. ~~In all cases, the test frequency shall not exceed 3 years.~~

13.4.3.2.2.4 The full flow test frequency shall not exceed 3 years.

~~13.4.3.2.2.3-13.4.3.2.2.5~~ **13.4.3.2.2.5** The water discharge patterns from all of the open spray nozzles or sprinklers shall be observed to ensure that patterns are not impeded by plugged nozzles, that nozzles are correctly positioned, and that obstructions do not prevent discharge patterns from wetting surfaces to be protected.

(A) Where the nature of the protected property is such that water cannot be discharged, the nozzles or open sprinklers shall be inspected for ~~proper~~**correct** orientation and the system tested with air to ensure that the nozzles are not obstructed.

(B) Where obstructions occur, the piping and sprinklers or nozzles shall be cleaned and the system retested.

13.4.3.2.3 Except for preaction systems covered by 13.4.3.2.5, every 3 years the preaction valve shall be trip tested with the control valve fully open.

13.4.3.2.4 During those years when full flow testing in accordance with 13.4.3.2.3 is not required, the preaction valve shall be trip tested with the control valve partially open.

13.4.3.2.5 Preaction or deluge valves protecting freezers shall be trip tested in a manner that does not introduce moisture into the piping in the freezer.

13.4.3.2.6 Preaction systems shall be tested once every 3 years for air leakage, using one of the following test methods:

- (1) A pressure test at 40 psi (3.2 bar) for 2 hours. The system shall be permitted to lose up to 3 psi (0.2 bar) during the duration of the test. Air leaks shall be addressed if the system loses more than 3 psi (0.2 bar) during this test.
- (2) With the system at normal system pressure, shut off the air source (compressor or shop air) for 4 hours. If the low air pressure alarm goes off within this period, the air leaks shall be addressed.

~~13.4.3.2.6~~ **13.4.3.2.7 Pressure Readings.**

~~13.4.3.2.6.1~~ **13.4.3.2.7.1** Pressure readings shall be recorded at the hydraulically most remote nozzle or sprinkler.

~~13.4.3.2.6.2~~ **13.4.3.2.7.2** A second pressure reading shall be recorded at the deluge valve.

~~13.4.3.2.6.3~~ **13.4.3.2.7.3** These readings shall be compared to the hydraulic design pressures to ensure the original system design requirements are met by the water supply.

~~13.4.3.2.6.4~~ **13.4.3.2.7.4** Where the hydraulically most remote nozzle or sprinkler is inaccessible, nozzles or sprinklers in other than foam-water systems shall be permitted to be checked visually without taking a pressure reading on the most remote nozzle or sprinkler.

~~13.4.3.2.6.5~~ **13.4.3.2.7.5** Where the reading taken at the riser indicates that the water supply has deteriorated, a gauge shall be placed on the hydraulically most remote nozzle or sprinkler and the results compared with the required design pressure.

~~13.4.3.2.7~~ **13.4.3.2.8 Multiple Systems.** The maximum number of systems expected to operate in case of fire shall be tested simultaneously to check the adequacy of the water supply.

~~13.4.3.2.8~~ **13.4.3.2.9 Manual Operation.** Manual actuation devices shall be operated annually.

~~13.4.3.2.9~~ **13.4.3.2.10 Return to Service.** After the full flow test, the system shall be returned to service in accordance with the manufacturer's instructions.

~~13.4.3.2.10~~ **13.4.3.2.11** Grease or other sealing materials shall not be applied to the seating surfaces of preaction or deluge valves.

~~13.4.3.2.11~~ **13.4.3.2.12*** Records indicating the date the preaction or deluge valve was last tripped and the tripping time, as well as the individual and organization conducting the test, shall be maintained at a location or in a manner readily available for review by the authority having jurisdiction.

~~13.4.3.2.12~~ **13.4.3.2.13** Low air pressure alarms, if provided, shall be tested quarterly in accordance with the manufacturer's instructions.

~~13.4.3.2.13~~ **13.4.3.2.14** Low temperature alarms, if installed in valve enclosures, shall be tested annually at the beginning of the heating season.

~~13.4.3.2.14~~ **13.4.3.2.15** Automatic air pressure maintenance devices, if provided, shall be tested yearly at the time of the annual preaction or deluge valve trip test, in accordance with the manufacturer's instructions.

13.4.3.3 Maintenance.

13.4.3.3.1 Leaks causing drops in supervisory pressure sufficient to sound warning alarms, and electrical malfunctions causing alarms to sound, shall be located and repaired.

13.4.3.3.2 During the annual trip test, the interior of the preaction or deluge valve shall be cleaned thoroughly and the parts replaced or repaired as necessary.

13.4.3.3.2.1 Interior cleaning and parts replacement or repair shall be permitted every 5 years for valves that can be reset without removal of a faceplate.

13.4.3.3.3* Auxiliary drains in preaction or deluge systems shall be operated after each system operation and before the onset of freezing conditions (and thereafter as needed).

13.4.3.3.4 Additional maintenance as required by the manufacturer's instructions shall be provided.

13.4.4 Dry Pipe Valves/Quick-Opening Devices.

13.4.4.1 Inspection.

13.4.4.1.1 Valve enclosure heating equipment shall be inspected daily during cold weather for its ability to maintain a minimum temperature of at least 40°F (4°C).

13.4.4.1.1.1 Valve enclosures equipped with low temperature alarms shall be inspected weekly.

13.4.4.1.1.2 Low temperature alarms, if installed in valve enclosures, shall be inspected annually at the beginning of the heating season.

13.4.4.1.2 Gauges shall be inspected weekly.

13.4.4.1.2.1 The gauge on the supply side of the dry pipe valve shall indicate that the normal supply water pressure is being maintained.

13.4.4.1.2.2 The gauge on the system side of the dry pipe valve shall indicate that the proper ratio of air or nitrogen pressure to water supply pressure is being maintained in accordance with the manufacturer's instructions.

13.4.4.1.2.3* The gauge on the quick-opening device, if provided, shall indicate the same pressure as the gauge on the system side of the dry pipe valve.

13.4.4.1.2.4 Gauges on systems with low air or nitrogen pressure alarms shall be inspected monthly.

13.4.4.1.2.5 Gauges on systems other than those with low air or nitrogen pressure alarms shall be inspected weekly.

13.4.4.1.3 Systems with auxiliary drains shall require a sign at the dry or preaction valve indicating the number of auxiliary drains and location of each individual drain.

13.4.4.1.4 The dry pipe valve shall be externally inspected monthly to verify the following:

- (1) The valve is free of physical damage.
- (2) All trim valves are in the appropriate open or closed position.
- (3) The intermediate chamber is not leaking.

13.4.4.1.5 The interior of the dry pipe valve shall be inspected annually when the trip test is conducted.

13.4.4.1.6 Strainers, filters, and restricted orifices shall be inspected internally every 5 years unless tests indicate a greater frequency is necessary.

13.4.4.2 Testing.

13.4.4.2.1* The priming water level shall be tested quarterly.

13.4.4.2.2* Each dry pipe valve shall be trip tested annually during warm weather.

13.4.4.2.2.1 Dry pipe valves protecting freezers shall be trip tested in a manner that does not introduce moisture into the piping in the freezers.

13.4.4.2.2.2* Every 3 years and whenever the system is altered, the dry pipe valve shall be trip tested with the control valve fully open and the quick-opening device, if provided, in service.

13.4.4.2.2.3* During those years when full flow testing in accordance with 13.4.4.2.2.2 is not required, each dry pipe valve shall be trip tested with the control valve partially open.

13.4.4.2.3 Grease or other sealing materials shall not be applied to the seating surfaces of dry pipe valves.

13.4.4.2.4* Quick-opening devices, if provided, shall be tested quarterly.

13.4.4.2.5 A tag or card that shows the date on which the dry pipe valve was last tripped, and the name of the person and organization conducting the test, shall be attached to the valve.

13.4.4.2.5.1 Separate records of initial air and water pressure, tripping air pressure, and dry pipe valve operating conditions shall be maintained on the premises for comparison with previous test results.

13.4.4.2.5.2 Records of tripping time shall be maintained for full flow trip tests.

13.4.4.2.6 Low air pressure alarms, if provided, shall be tested quarterly in accordance with the manufacturer's instructions.

13.4.4.2.7 Low temperature alarms, if installed in valve enclosures, shall be tested annually at the beginning of the heating season.

13.4.4.2.8 Automatic air pressure maintenance devices, if provided, shall be tested annually during the dry pipe valve trip test in accordance with the manufacturer's instructions.

13.4.4.2.9 Dry pipe systems shall be tested once every ~~three~~ 2 years for air leakage, using one of the following test methods:

- (1) A pressure test at 40 psi (3.2 bar) ~~shall be performed for two~~ 2 hours.
 - (a) ~~The system shall be permitted to lose up to 3 psi (0.2 bar) during the duration of the test. Air leaks shall be addressed if the system loses more than 3 psi (0.2 bar) during this test.~~
 - (b) Air leaks shall be addressed if the system loses more than 3 psi (0.2 bar) during this test.
- (2) With the system at normal system pressure, ~~shut off~~ the air source (compressor or shop air) ~~shall be shut off~~ for 4 hours. If the low air pressure alarm goes off within this period, the air leaks shall be addressed.

13.4.4.3 Maintenance.

13.4.4.3.1 During the annual trip test, the interior of the dry pipe valve shall be cleaned thoroughly, and parts replaced or repaired as necessary.

13.4.4.3.2* Auxiliary drains in dry pipe sprinkler systems shall be drained after each operation of the system, before the onset of freezing weather conditions, and thereafter as needed.

13.5 Pressure Reducing Valves and Relief Valves.

13.5.1 Inspection and Testing of Sprinkler Pressure Reducing Valves. Sprinkler pressure reducing valves shall be inspected and tested as described in 13.5.1.1 and 13.5.1.2.

13.5.1.1 All valves shall be inspected quarterly to verify that the valves are in the following condition:

- (1) In the open position
- (2) Not leaking
- (3) Maintaining downstream pressures in accordance with the design criteria
- (4) In good condition, with handwheels installed and unbroken

13.5.1.2* A full flow test shall be conducted on each valve at 5-year intervals and shall be compared to previous test results.

13.5.1.2.1 Adjustments shall be made in accordance with the manufacturer's instructions.

13.5.1.3 A partial flow test adequate to move the valve from its seat shall be conducted annually.

13.5.2 Hose Connection Pressure Reducing Valves.

13.5.2.1 All valves shall be inspected annually to verify the following:

- (1) The handwheel is not broken or missing.
- (2) The outlet hose threads are not damaged.
- (3) No leaks are present.
- (4) The reducer and the cap are not missing.

13.5.2.2* A full flow test shall be conducted on each valve at 5-year intervals and shall be compared to previous test results.

13.5.2.2.1 Adjustments shall be made in accordance with the manufacturer's instructions.

13.5.2.3 A partial flow test adequate to move the valve from its seat shall be conducted annually.

13.5.3 Hose Rack Assembly Pressure Reducing Valves.

13.5.3.1 All valves shall be inspected annually to verify the following:

- (1) The handwheel is not missing or broken.
- (2) No leaks are present.

13.5.3.2 A full flow test shall be conducted on each valve at 5-year intervals and compared to previous test results.

13.5.3.2.1 Adjustments shall be made in accordance with the manufacturer's instructions.

13.5.3.3 A partial flow test adequate to move the valve from its seat shall be conducted annually.

13.5.4 Master Pressure Reducing Valves.

13.5.4.1* Valves shall be inspected weekly to verify that the valves are in the following condition:

- (1)*The downstream pressures are maintained in accordance with the design criteria.
- (2) The supply pressure is in accordance with the design criteria.
- (3) The valves are not leaking.
- (4) The valve and trim are in good condition.

13.5.4.2* A partial flow test adequate to move the valve from its seat shall be conducted quarterly.

13.5.4.3* A full flow test shall be conducted on each valve annually and shall be compared to previous test results.

13.5.4.4 When valve adjustments are necessary, they shall be made in accordance with the manufacturer's instructions.

13.5.5 Pressure Reducing Valves.

13.5.5.1 All pressure reducing valves installed on fire protection systems not covered by 13.5.1, 13.5.2, 13.5.3, or 13.5.4 shall be inspected in accordance with 13.5.1.1.

13.5.5.2 All pressure reducing valves installed on fire protection systems not covered by 13.5.1, 13.5.2, 13.5.3, or 13.5.4 shall be tested in accordance with 13.5.1.2.

13.5.6 Hose Valves.

13.5.6.1 Inspection.

13.5.6.1.1 Hose valves shall be inspected quarterly.

13.5.6.1.2 Hose valves shall be inspected to ensure that hose caps are in place and not damaged.

13.5.6.1.3 Hose threads shall be inspected for damage.

13.5.6.1.4 Valve handles shall be present and not damaged.

13.5.6.1.5 Gaskets shall be inspected for damage or deterioration.

13.5.6.1.6 Hose valves shall be inspected for leaks.

13.5.6.1.7 Hose valves shall be inspected to ensure no obstructions are present.

13.5.6.1.8 Hose valves shall be inspected to ensure that restricting devices are present.

13.5.6.2 Testing.

13.5.6.2.1* Class I and Class III standpipe system hose valves shall be tested annually by opening and closing the valves.

13.5.6.2.1.1 ~~Hose Class I and Class III standpipe system hose~~ valves that are difficult to operate or leak shall be repaired or replaced.

13.5.6.2.2* Hose valves on hose stations attached to sprinkler systems and Class II standpipe systems shall be tested every 3 years by opening and closing the valves.

13.5.6.2.2.1 Hose valves on hose stations attached to sprinkler systems and Class II standpipe systems that are difficult to operate or ~~that~~ leak shall be repaired or replaced.

13.5.6.3 Maintenance. Hose valves that do not operate smoothly or open fully shall be lubricated, repaired, or replaced.

13.5.7 Fire Pump Pressure Relief Valves.

13.5.7.1 All circulation relief valves shall be inspected weekly.

13.5.7.1.1 The inspection shall verify that water flows through the valve when the fire pump is operating at shutoff pressure (i.e., churn) to prevent the pump from overheating.

13.5.7.1.2 During the annual fire pump test, the closure of the circulation relief valve shall be verified to be in accordance with the manufacturer's specifications.

13.5.7.2 All pressure relief valves shall be inspected weekly.

13.5.7.2.1 The inspection shall verify that the pressure downstream of the relief valve fittings in the fire pump discharge piping does not exceed the pressure for which the system components are rated.

13.5.7.2.2 During the annual fire pump flow test, the pressure relief valve shall be verified to be correctly adjusted and set to relieve at the correct pressure and to close below that pressure setting.

13.5.8 Maintenance. All damaged or missing components noted during the inspections specified in 13.5.6.1 through 13.5.6.2.2 shall be repaired or replaced in accordance with the manufacturer's instructions.

13.6 Backflow Prevention Assemblies.

13.6.1 Inspection. Inspection of backflow prevention assemblies shall be as described in 13.6.1.1 through 13.6.1.2.2.

13.6.1.1 The double check assembly (DCA) valves and double check detector assembly (DCDA) valves shall be inspected weekly to ensure that the OS&Y isolation valves are in the normal open position.

13.6.1.1.1 Valves secured with locks or electrically supervised in accordance with applicable NFPA standards shall be inspected monthly.

13.6.1.2* Reduced pressure assemblies (RPA) and reduced pressure detector assemblies (RPDA) shall be inspected weekly to ensure that the differential-sensing valve relief port is not continuously discharging and the OS&Y isolation valves are in the normal open position.

13.6.1.2.1 Valves secured with locks or electrically supervised in accordance with applicable NFPA standards shall be inspected monthly.

13.6.1.2.2 After any testing or repair, an inspection by the property owner or designated representative shall be made to ensure that the system is in service and all isolation valves are in the normal open position and properly locked or electrically supervised.

13.6.2 Testing.

13.6.2.1* All backflow preventers installed in fire protection system piping shall be tested annually ~~in accordance with the following:~~

~~(1) A by conducting a forward flow test shall be conducted of the system at the designed flow rate, including hose stream demand, of the system, where hydrants or inside hose stations are located downstream of the backflow preventer.~~

~~(2) A backflow performance test, as required by the authority having jurisdiction, shall be conducted at the completion of the forward flow test.~~

13.6.2.1.1 For backflow preventers sized 2 in. (50 mm) and under, the forward flow test shall be acceptable to conduct without measuring flow, where the test outlet is of a size to flow the system demand.

13.6.2.1.2 Where water rationing is enforced during shortages lasting more than 1 year, an internal inspection of the backflow preventer to ensure the check valves will fully open shall be acceptable ~~permitted~~ in lieu of conducting the annual forward flow test.

13.6.2.1.3 Where connections do not permit a full flow test, tests shall be completed at the maximum flow rate possible.

13.6.2.1.4 The forward flow test shall not be required where annual fire pump testing causes the system demand to flow through the backflow preventer device.

13.6.2.2 Where connections do not permit a full flow test, tests shall be conducted at the maximum flow rate possible.

13.6.3 Maintenance.

13.6.3.1 Maintenance of all backflow prevention assemblies shall be conducted by a trained individual following the manufacturer's instructions in accordance with the procedure and policies of the authority having jurisdiction.

13.6.3.2 Rubber parts shall be replaced in accordance with the frequency required by the authority having jurisdiction and the manufacturer's instructions.

13.7 Fire Department Connections.

13.7.1 Fire department connections shall be inspected ~~quarterly. The inspection shall~~ quarterly to verify the following:

- (1) The fire department connections are visible and accessible.
- (2) Couplings or swivels are not damaged and rotate smoothly.
- (3) Plugs or caps are in place and undamaged.
- (4) Gaskets are in place and in good condition.
- (5) Identification signs are in place.
- (6) The check valve is not leaking.
- (7) The automatic drain valve is in place and operating properly.
- (8) The fire department connection clapper(s) is in place and operating properly.

13.7.2 If fire department connection plugs or caps are not in place, the interior of the connection shall be inspected for obstructions, and it shall be verified that the fire department connection clapper is operational over its full range.

13.7.3 Components shall be repaired or replaced as necessary in accordance with the manufacturer's instructions.

13.7.4 Any obstructions that are present shall be removed.

13.8 Component Testing Requirements.

13.8.1 Whenever a valve, valve component, and/or valve trim is adjusted, repaired, reconditioned, or replaced, the action required in Table 13.8.1 shall be performed.

13.8.2 Where the original installation standard is different from the cited standard, the use of the appropriate installing standard shall be permitted.

13.8.3 A main drain test shall be conducted in accordance with 13.3.3.4 if the system control or other upstream valve was operated.

13.8.4* These actions shall not require a design review.

Table 13.8.1 Summary of Component Replacement Action Requirements

Component	Adjust	Repair/ Recondition	Replace	Inspection, Test, and Maintenance Procedures
Water delivery components				
Post indicator and wall indicator valves	X	X	X	(1) Inspect for leaks at system pressure (2) Perform full operational test conforming to 13.3.3.1 (3) Perform spring torsion check conforming to 13.3.3.1 and 13.3.3.2 (4) Verify target visibility at shut and full open position (5) Test supervisory device (6) Main drain test
Control valves other than post indicator and wall indicator valves	X	X	X	(1) Inspect for leaks at system pressure (2) Perform full operational test conforming to 13.3.3.1 (3) Perform spring torsion check for OS&Y valves conforming to 13.3.3.2 (4) Verify supervisory device (5) Main drain test
Alarm check valve	X	X	X	(1) Inspect for leaks at system pressure per 13.4.1 (2) Test all alarms and supervisory signals affected by the alarm valve (3) Main drain test
Dry pipe valve	X	X	X	(1) Inspect for leaks at system pressure (2) Trip test per 13.4.4.2 (3) Inspect condition of valve seat (4) Test all dry pipe system alarms and supervisory signals (5) Main drain test
Deluge/preaction valve	X	X	X	(1) Inspect for leaks at system pressure per 13.4.3 (2) Trip test (3) Inspect condition of valve seat (4) Test all deluge/preaction system alarms and supervisory signals (5) Main drain test
Quick opening device	X	X	X	(1) Inspect for leaks at system pressure per 13.4.4.2.2 (2) Trip test (3) Main drain test
Pressure regulating device — hose valves	X	X	X	(1) Inspect for leaks at system pressure per 13.5.1 (2) Full flow test (3) Main drain test (Only when a control valve has been closed)

(continues)

Table 13.8.1 *Continued*

Component	Adjust	Repair/ Recondition	Replace	Inspection, Test, and Maintenance Procedures
Pressure regulating devices — other than hose valve	X	X	X	(1) Inspect for leaks at system pressure per Section 13.5 (2) Test pressure setting with full flow and without flow (3) Test supervisory device and alarm (4) Main drain test
Hose valve	X	X	X	(1) Inspect for leaks at system pressure per 13.5.6 (2) Main drain test
Backflow prevention device	X	X	X	(1) Inspect for leaks at system pressure per Section 13.6 (2) Forward flow test per 13.6.2.1 (3) Test supervisory device and alarm (4) Main drain test
Check valves	X	X	X	(1) Inspect for leaks at system pressure per 13.4.2 (2) Inspect for leaking through check valve (3) Main drain test
Fire department connection	X	X		(1) Inspect for leaks at system pressure per Section 13.7 (2) Main drain test (Only when a control valve has been closed)
Fire department connection — sprinkler system(s)			X	(1) Isolate and hydrostatic test for 2 hours at 150 psi (2) Main drain test (Only when a control valve has been closed)
Fire department connection — other than sprinkler system(s)			X	(1) Isolate and hydrostatic test for 2 hours at 50 psi above the normal working pressure (200 psi minimum) (2) Main drain test (Only when a control valve has been closed)
Strainers	X	X	X	Inspect and clean in accordance with manufacturer's instructions
Main drain valves	X	X	X	Main drain test per 13.2.5
Gauges			X	Calibrate per 13.2.7
Alarm and supervisory components				
Alarm device	X	X	X	Test for conformance with NFPA 13 and/or NFPA 72
Supervisory device	X	X	X	Test for conformance with NFPA 13 and/or NFPA 72
System protection components				
Pressure relief valve — fire pump installation	X	X	X	See 8.3.3.3 and 13.5.7
Pressure relief valve — other than fire pump installation			X	Verify relief valve is listed or approved for the application and set to the correct pressure
Informational components				
Identification signs	X	X	X	Inspect for compliance with NFPA 13 and 13.3.1