

Table 5.1 Summary of Sprinkler System Inspection, Testing, and Maintenance

Item	Activity	Frequency	Reference
Gauges (dry, preaction, and deluge systems)	Inspection	Weekly/monthly	5.2.4.2, 5.2.4.3
Control valves	Inspection	Weekly/monthly	Table 12.1
Alarm devices	Inspection	Quarterly	5.2.6
Gauges (wet pipe systems)	Inspection	Monthly	5.2.4.1
Hydraulic nameplate	Inspection	Quarterly	5.2.7
Buildings	Inspection	Annually (prior to freezing weather)	5.2.5
Hanger/seismic bracing	Inspection	Annually	5.2.3
Pipe and fittings	Inspection	Annually	5.2.2
Sprinklers	Inspection	Annually	5.2.1
Spare sprinklers	Inspection	Annually	5.2.1.3
Fire department connections	Inspection	Quarterly	Table 12.1
Valves (all types)	Inspection		Table 12.1
Alarm devices	Test	Quarterly/semiannually	5.3.3
Main drain	Test	Annually	Table 12.1
Antifreeze solution	Test	Annually	5.3.4
Gauges	Test	5 years	5.3.2
Sprinklers — extra-high temperature	Test	5 years	5.3.1.1.1.3
Sprinklers — fast response	Test	At 20 years and every 10 years thereafter	5.3.1.1.1.2
Sprinklers	Test	At 50 years and every 10 years thereafter	5.3.1.1.1
Valves (all types)	Maintenance	Annually or as needed	Table 12.1
Obstruction investigation	Maintenance	5 years or as needed	10.2.1, 10.2.2
Low point drains (dry pipe system)	Maintenance	Annually prior to freezing and as needed	12.4.4.3.3

5.1.1 Valves and Connections. Valves and fire department connections shall be inspected, tested, and maintained in accordance with Chapter 12.

5.1.2 Impairments. The procedures outlined in Chapter 14 shall be followed where an impairment to protection occurs.

5.1.3 Notification to Supervisory Service. To avoid false alarms where a supervisory service is provided, the alarm receiving facility shall be notified by the 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 Records. Records shall be maintained in accordance with Section 4.3.

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 orientation (e.g., upright, pendent, or sidewall).

5.2.1.1.2 Any sprinkler shall be replaced that has signs of leakage; is painted, corroded, damaged, or loaded; or in the improper orientation.

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

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

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

5.2.1.2* Unacceptable obstructions to spray patterns shall be corrected.

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

- (1) The proper number and type of sprinklers
- (2) A sprinkler wrench for each type of sprinkler

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, corrosion, and misalignment.

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

(B) The foam concentrate tank shall be drained and flushed. (Foam concentrate shall be permitted to be salvaged and re-used.)

11.4.6 Standard Balanced Pressure Proportioner.

(A) The foam concentrate pump shall be operated. Foam concentrate shall be circulated back to the tank.

(B) Foam pumps, drive train, and drivers shall be serviced in accordance with the manufacturer's instructions and frequency, but not at intervals of more than 5 years.

(C) The diaphragm balancing valve shall be flushed through the diaphragm section with water or foam concentrate until fluid appears clear or new.

(D) The foam concentrate tank shall be inspected internally for corrosion and sediment. Excessive sediment shall require draining and flushing of the tank.

11.4.7 In-Line Balanced Pressure Proportioner.

(A) The foam concentrate pump shall be operated. Foam concentrate shall be circulated back to the tank.

(B) Foam pumps, drive train, and drivers shall be serviced in accordance with the manufacturer's instructions and frequency, but not at intervals of more than 5 years.

(C) The diaphragm balancing valve shall be flushed through the diaphragm section with water or foam concentrate until fluid appears clear or new.

(D) The foam concentrate tank shall be inspected internally for corrosion and sediment. Excessive sediment shall require draining and flushing of the tank.

11.4.8 Pressure Vacuum Vents. The procedures specified in 11.4.8(A) through 11.4.8(H) shall be performed on pressure vacuum vents every 5 years.

(A) The vent shall be removed from the expansion dome. While the vent is removed, it shall be ensured that the opening is not blocked and that dirt or other foreign objects do not enter the tank.

(B) The vent bonnet shall be removed. The vacuum valve and pressure valve shall be lifted out.

(C) The vent body shall be flushed internally and the vacuum valve and the pressure valve shall be washed thoroughly. It shall be ensured that the screen is not clogged, and the use of any hard, pointed objects to clear the screen shall be avoided.

(D) If the liquid has become excessively gummy or solidified, the vent body and parts shall be soaked in hot soapy water.

(E) The vent body shall be turned upside down and drained thoroughly. Parts shall be dried by placing them in a warm and dry area or by using an air hose.

(F) Parts shall be sprayed with a light Teflon[®] coating, and the vent shall be reassembled. The use of any type of oil for lubrication purposes shall be avoided, as oil is harmful to the foam liquid.

(G) The vent bonnet shall be replaced, and the vent shall be turned upside down slowly a few times to ensure proper freedom of the movable parts.

(H) The vent shall be attached to the liquid storage tank expansion dome.

Chapter 12 Valves, Valve Components, and Trim

12.1* General. This chapter shall provide the minimum requirements for the routine inspection, testing, and maintenance of valves, valve components, and trim. Table 12.1 shall be used to determine the minimum required frequencies for inspection, testing, and maintenance.

Table 12.1 Summary of Valves, Valve Components, and Trim Inspection, Testing, and Maintenance

Item	Activity	Frequency	Reference
Control Valves			
Sealed	Inspection	Weekly	12.3.2.1
Locked	Inspection	Monthly	12.3.2.1.1
Tamper switches	Inspection	Monthly	12.3.2.1.1
Alarm Valves			
Exterior	Inspection	Monthly	12.4.1.1
Interior	Inspection	5 years	12.4.1.2
Strainers, filters, orifices	Inspection	5 years	12.4.1.2
Check Valves			
Interior	Inspection	5 years	12.4.2.1
Preaction/Deluge Valves			
Enclosure (during cold weather)	Inspection	Daily/weekly	12.4.3.1
Exterior	Inspection	Monthly	12.4.3.1.6
Interior	Inspection	Annually/5 years	12.4.3.1.7
Strainers, filters, orifices	Inspection	5 years	12.4.3.1.8
Dry Pipe Valves/Quick-Opening Devices			
Enclosure (during cold weather)	Inspection	Daily/weekly	12.4.4.1.1
Exterior	Inspection	Monthly	12.4.4.1.4
Interior	Inspection	Annually	12.4.4.1.5
Strainers, filters, orifices	Inspection	5 years	12.4.4.1.6
Pressure Reducing and Relief Valves			
sprinkler systems	Inspection	Quarterly	12.5.1.1

Table 12.1 *Continued*

Item	Activity	Frequency	Reference
Hose connections	Inspection	Quarterly	12.5.2.1
Hose racks	Inspection	Quarterly	12.5.3.1
Fire pumps			
Casing relief valves	Inspection	Weekly	12.5.6.1, 12.5.6.1.1
Pressure relief valves	Inspection	Weekly	12.5.6.2, 12.5.6.2.1
Backflow Prevention Assemblies			
Reduced pressure	Inspection	Weekly/monthly	12.6.1
Reduced pressure detectors	Inspection	Weekly/monthly	12.6.1
Fire Department Connections	Inspection	Quarterly	12.7.1
Main Drains	Test	Annually/quarterly	12.2.6, 12.2.6.1, 12.3.3.4
Water-Flow Alarms	Test	Quarterly	12.2.7
Control Valves			
Position	Test	Annually	12.3.3.1
Operation	Test	Annually	12.3.3.1
Supervisory	Test	Semiannually	12.3.3.5
Preaction/Deluge Valves			
Priming water	Test	Quarterly	12.4.3.2.1
Low air pressure alarms	Test	Quarterly	12.4.3.2.10
Full flow	Test	Annually	12.4.3.2.2
Dry Pipe Valves/ Quick-Opening Devices			
Priming water	Test	Quarterly	12.4.4.2.1
Low air pressure alarm	Test	Quarterly	12.4.4.2.6
Quick-opening devices	Test	Quarterly	12.4.4.2.4
Trip test	Test	Annually	12.4.4.2.2
Full flow trip test	Test	3 years	12.4.4.2.2.2
Pressure Reducing and Relief Valves			
Sprinkler systems	Test	5 years	12.5.1.2
Circulation relief	Test	Annually	12.5.6.1.2
Pressure relief valves	Test	Annually	12.5.6.2.2
Hose connections	Test	5 years	12.5.2.2
Hose racks	Test	5 years	12.5.3.2
Backflow Prevention Assemblies	Test	Annually	12.6.2
Control Valves	Maintenance	Annually	12.3.4
Preaction/Deluge Valves	Maintenance	Annually	12.4.3.3.2
Dry Pipe Valves/ Quick-Opening Devices	Maintenance	Annually	12.4.4.3.2

12.2 General Provisions.

12.2.1 The owner shall have manufacturer's literature available to provide specific instructions for inspecting, testing, and maintaining the valves and associated equipment.

12.2.2 All pertinent personnel, departments, authorities having jurisdiction, or agencies shall be notified that testing or maintenance of the valve and associated alarms is to be conducted.

12.2.3* All system valves shall be protected from physical damage and shall be accessible.

12.2.4 Before opening a test or drain valve, it shall be verified that adequate provisions have been made for drainage.

12.2.5 The general appearance and condition of all valves shall be observed and noted, and it shall be verified that all valves are in the appropriate open or closed position.

12.2.6* Main Drain Test. A main drain test shall be conducted annually at each water-based fire protection system riser to determine whether there has been a change in the condition

of the water supply piping and control valves. (See also 12.3.4.2.)

12.2.6.1 Systems where the sole water supply is through a backflow preventer and/or pressure reducing valves, the main drain test of at least one system downstream of the device shall be conducted on a quarterly basis.

12.2.7 Water-Flow Alarm. All water-flow alarms shall be tested quarterly in accordance with the manufacturer's instructions.

12.2.8 Gauges.

12.2.8.1 Gauges shall be inspected monthly to verify that they are in good condition and that normal pressure is being maintained.

12.2.8.1.1 Where other sections of this standard have different frequency requirements for specific gauges, those requirements shall be used.

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

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

12.2.9 Records. Records shall be maintained in accordance with Section 4.3.

12.3 Control Valves in Water-Based Fire Protection Systems.

12.3.1* Each control valve shall be identified and have a sign indicating the system or portion of the system it controls.

12.3.1.1* When a normally open valve is closed, the procedures established in Chapter 14 shall be followed.

12.3.1.1.1 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.

12.3.1.2 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.

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

12.3.1.3.1 Sealing or electrical supervision shall not be required for hose valves.

12.3.2 Inspection.

12.3.2.1 All valves shall be inspected weekly.

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

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

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

- (1) In the normal open or closed position
- (2)*Properly sealed, locked, or supervised
- (3) Accessible
- (4) Provided with appropriate wrenches
- (5) Free from external leaks
- (6) Provided with appropriate identification

12.3.3 Testing.

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

12.3.3.2* 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.

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

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

12.3.3.4 A main drain test shall be conducted annually at each system riser and any time the valve is closed at each system riser or feed main after the control valve has been closed to determine whether there has been a change in the condition of the water supply piping and control valves.

12.3.3.5* Supervisory Switches.

12.3.3.5.1 Valve supervisory switches shall be tested semiannually.

12.3.3.5.2 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.

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

12.3.4 Maintenance.

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

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

12.4 System Valves.

12.4.1 Inspection of Alarm Valves. Alarm valves shall be inspected as described in 12.4.1.1 and 12.4.1.2.

12.4.1.1* Alarm 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.

12.4.1.2* 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.

12.4.1.3 Maintenance.

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

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

12.4.2 Check Valves.

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

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

12.4.3 Preaction Valves and Deluge Valves.

12.4.3.1 Inspection. 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 4°C (40°F).

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

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

12.4.3.1.3 Gauges shall be inspected weekly.

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

12.4.3.1.4 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.