Pocket Guide for Fire Sprinkler Inspection Requirements

Key Deficiencies with NFPA References

NFPA 25 2017 & NFPA 13/72 2016

The purpose of this guide is to help you determine if the system will work as intended. This is a quick reference field guide, with select abbreviated sections of NFPA 25, 13, 72 and the plumbing code.

Inspectors should familiarize themselves with NFPA *25 ITM Water-Based Fire Protection Systems*. Historical fire data confirms that properly designed, installed, and maintained fire sprinkler systems have a significant record of saving lives and reducing property loss from fire.

May 2019

Regular Fire Sprinkler Testing is Required by the International Fire Code and NFPA 1, 101, & 5000

Chapter 9, Fire Protection Systems of the 2018 International Fire Code requires water based fire protection systems to be inspected, tested and maintained at regular intervals in accordance with NFPA 25: Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems. Chapter 9, of the NFPA Life Safety Code also requires the same provisions. All automatic fire sprinkler systems, standpipe systems and fire pumps must be inspected and maintained in accordance with NFPA 25.

INSPECTION

Item	Frequency	Reference
Gauges monitoring air/nitrogen pressure (dry, and pre-action systems)	Monthly/Qtrly	13.2.7.1
Gauges monitoring water pressure (all systems)	Qtrly	13.2.7.1
Control valves (sealed, locked or electrically supv.)	Weekly/Monthly	13.3.2.1
Waterflow alarm devices	Quarterly	5.2.4/13.2.6
Valve supervisory signal devices	Quarterly	5.2.4/13.3.2.1.3
Supervisory signal devices (except valve supervisory switches)	Quarterly	5.2.4 & 13.2.8.1

Cover Photo: Mike Figolah, Retired Fire Chief

Hydraulic nameplate	Annually	5.2.5
Buildings (Fire Protection 40°F) (Owner's responsibility)	Ongoing constantly	4.1.2
Hanger/Braces/Supports	Annually	5.2.3
PIPE AND FITTINGS	Annually	5.2.2
Sprinklers	Annually	5.2.1
Spare sprinklers	Annually	5.2.1.4/5.4.1.5
Information sign	Annually	5.2.7-5.2.8
Anti Freeze information sign	Annually	5.2.9
Fire department connections	Quarterly	13.8.1
Valves (all types)	Per Table	Table 13.1.1.2
Obstruction, internal assessment/inspection of piping	Every 5 years/Annually	14.2/14.4
Heat trace	Per manufacturer	5.2.6
Air Compressor	Monthly	13.10.1.1

TEST

Item	Frequency	Reference
Waterflow alarm devices (Mechanical/Water Motor Gongs)	Quarterly	5.3.2.1
Vane and pressure switch–type devices	Semi-Annually	5.3.2.2
Valve supervisory signal devices	Semi Annually	13.3.3.5.1
Supervisory signal devices (except valve supervisory switches)	Annually	13.2.8.2
Main drain	Annually/Quarterly	13.2.5
Antifreeze solution (May differ for new listed anti-freeze)	Annually	5.3.3

Table 5.1.1.2 (and Table 13.1.1.2) Summary of Sprinkler System Inspection, Testing and Maintenance

Table 5.1.1.2 (and Table 13.1.1.2) Summary of Sprinkler System Inspection, Testing and Maintenance

Gauges Tested and or Replace		5 years	13.2.7.2
Sprinklers (extra-high or greater temperature solder type)		Replace or Sample Test 5 years	5.3.1.1.1.4
Sprinklers (fast-response)	Replace or Sample Test	At 20 years and every 10 years after	5.3.1.1.1.3
Sprinklers	Replace or Sample Test	At 50 years and every 10 years after	5.3.1.1.1
Sprinklers	Replace or Sample Test	At 75 years and every 5 years after	5.3.1.1.1.5
Sprinklers (dry)	Replace or Sample Test	At 10 years and every 10 years after	5.3.1.1.1.6
Sprinklers (in harsh environments)	Replace or Sample Test	5 years	5.3.1.1.2
Valves (all types)		Varies	13.1.1.2
Valve status test		Control valve is closed/re-opened at riser	13.3.3.4
FDC Piping Hydrostatic Test		5 yrs	13.8.5
Air Compressor		Annually	13.10.3

MAINTENANCE

Valves (all types)	Annually/5 yrs/as needed	Table 13.1.1.2
Low-point drains (pre action/dry pipe systems)	After operation/seasonal	13.4.3.3.3/13.4.5.3.2
Sprinklers and automatic spray nozzles protecting commercial cooking equipment and ventilation systems	Annually Replace depending on circumstances	5.4.1.7
Heat trace	Per mfg requirements	5.2.6
Air Compressor	Mfg. Specs/ Annual for oil	13.10.4

Fire Sprinklers

Damaged– i.e., Bent frame/broken deflector/ damaged cover plate or escutcheon if part of a listed assembly (NFPA 13- 6.2.7)
-NFPA 25 5.2.1.1.1*

Leaking– NFPA 25 5.2.1.1.1
Painted– Paint other than that applied by the manufacturer. -NFPA 25 5.2.1.1.1
Corroded– i.e., Sprinkler has corrosion detrimental to sprinkler performance.
-NFPA 25 5.2.1.1.1
Loaded– Sprinkler has loading detrimental to performance.
-NFPA 25 5.2.1.1.1

Manufacture Date – Located on head.
–**50 years/older** NFPA 5.3.1.1.1
(10 year repeated for older than 50 NFPA 5.3.1.1.1.1)
–**20 years fast response** NFPA 5.3.1.1.1.3
–**5 years extra high 325ºF+** NFPA 5.3.1.1.1.4*
–**75 years/older repeated 5 years** NFPA 5.3.1.1.1.5
–**10 years dry sprinklers** NFPA 5.3.1.1.1.6*
(retest/resample at 10 year intervals)
–**5 years harsh/corrosive** NFPA 5.3.1.1.2*
(retest/resample at 5 year intervals)

Proper Clearance – 5.2.1.2.1* Unless greater distances are required by 5.2.1.2.2, 5.2.1.2.3, or 5.2.1.2.4, or lesser distances are permitted by 5.2.1.2.6, clearance between the deflector and the top of storage shall be 18 in. or greater, 5.2.1.2.2 where standards other than NFPA 13 specify greater clearance to storage minimums, they shall be followed.

Fire Sprinklers Cont'd.

5.2.1.2.3* Clearance between the deflector and the top of storage shall be 36 in. or greater for special sprinklers

Bulb Has Lost Fluid – Could be empty or half full.
-NFPA 25 5.2.1.1.1(4)

Missing Escutcheon Rings & Plates (Part of a listed assembly)
-NFPA 25-5.2.1.1.5

Position of Sprinkler – Any sprinkler that has been installed in the incorrect orientation shall be repositioned. (Be careful with this- a sprinkler above the ceiling tile is still in a pendent position- it is a change in the building (if the ceiling dropped it is not a violation of 25 a contractor may cite (section 4.1.6)- the exception is for an escutcheon that is hanging down or above the ceiling because the cut sheet for a recessed sprinkler actually states that its correct orientation is flush with the ceiling)
-NFPA 25 5.2.1.1.2

Painted Cover Plate – Fail if not painted from the manufacturer.
NFPA 25 5.2.1.1.1

Check for recalled Sprinklers see website. (A.4.1.5)

Missing Components

Spare Sprinkler Box with list of sprinklers
-NFPA 25 5.2.1.4 & 5.4.1.5.6

Spare Sprinklers in Box – Proper quantity & type of spare heads:
System has under 300 sprinklers = no less than 6
System has 300-1,000 sprinklers = no less than 12
System has over 1,000 sprinklers = no less than 24
-NFPA 25 5.4.1.5

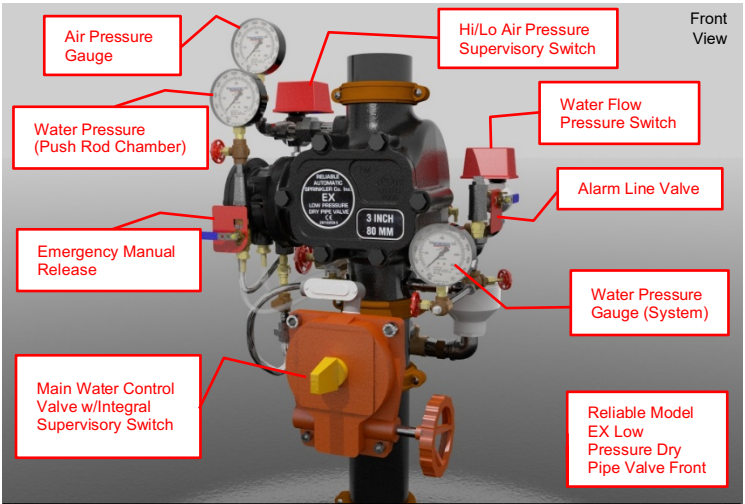
Spare Sprinkler Wrench
– NFPA 25 5.4.1.5.5

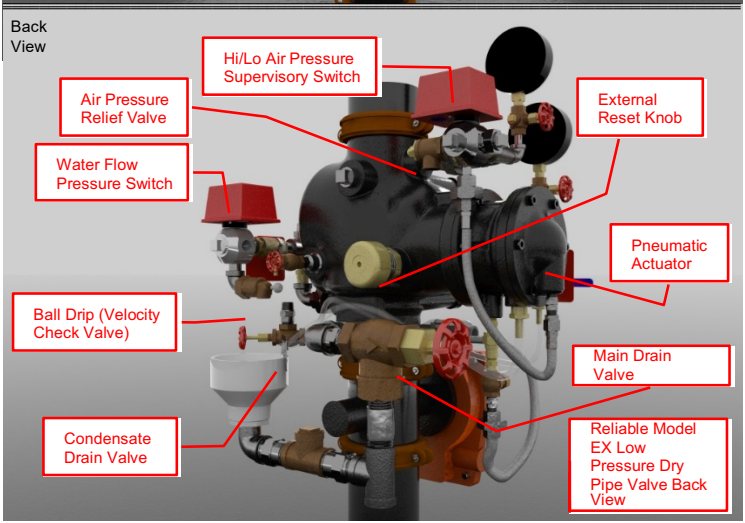
Signage – Control valves & FDC
–NFPA 25 13.3.2.2 & 13.8.1

Fire Dept. Connection Caps – FDC should also be visible and accessible.
–NFPA 25 13.8.1

Hangers/Braces/Supports – Loose, damaged, or unattached
-NFPA 25 5.2.3.2

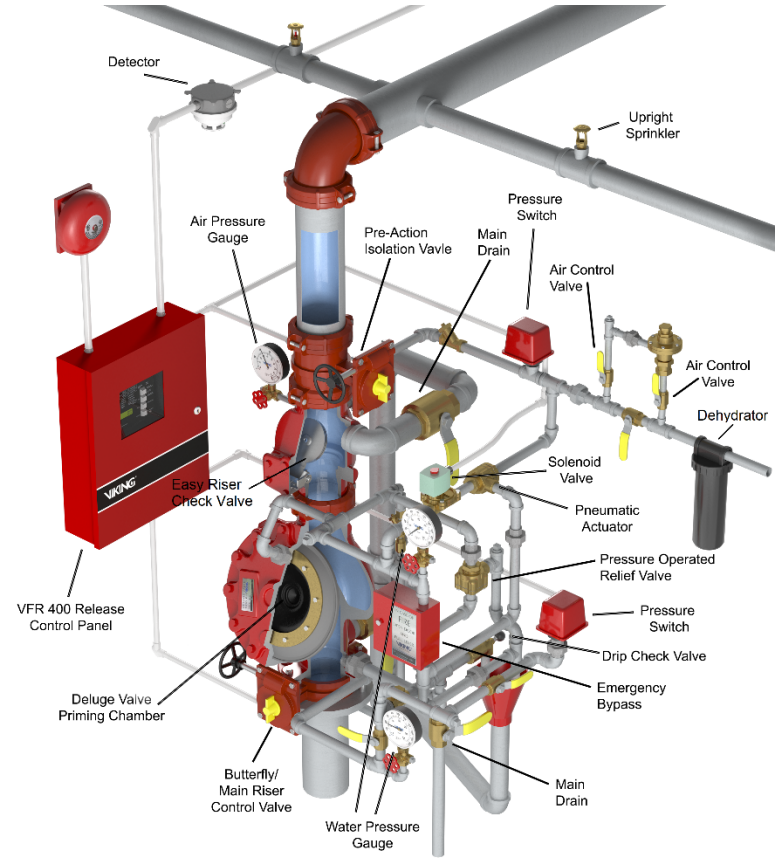
Reliable Dry Pipe Valve





(Images courtesy of Reliable Automatic Sprinkler Co., Inc.)

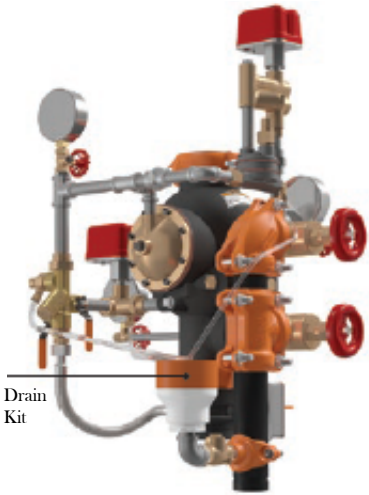
Viking Pre-Action Valve

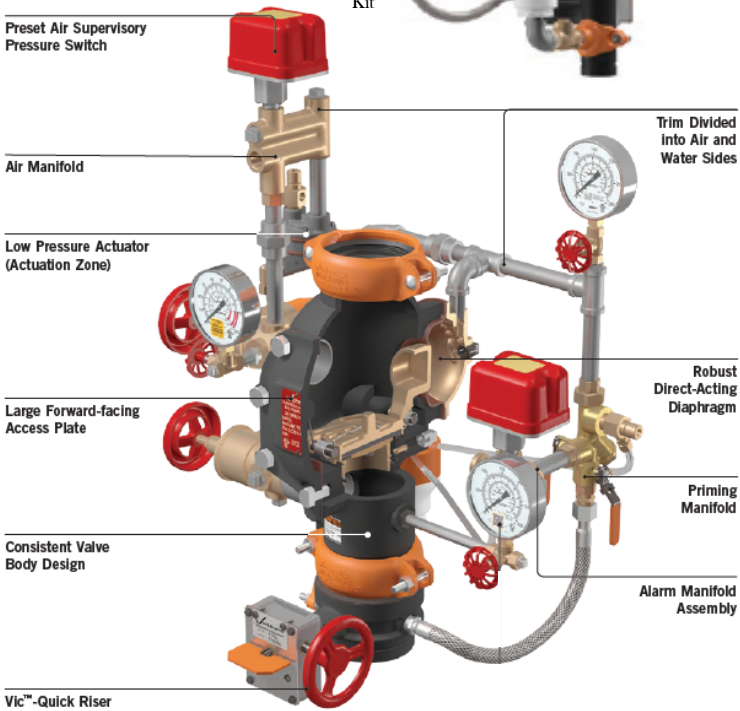


(Image courtesy of Viking Group, Inc. vikinggroupinc.com)

VICTAULIC® FIRELOCK NXT™ AUTOMATIC VALVE

DRY | DELUGE | PREACTION | FIREPAC





(Image courtesy of Victaulic victaulic.com)

Waterflow Switches

Missing Cover or Damaged
Waterflow alarm and supervisory signal initiating devices shall be inspected quarterly to verify that they are free of physical damage.
-NFPA 25 5.2.4

Unable to Adjust – i.e., device is mechanically damaged and will not initiate alarm within 90 sec. ***Water flow may be required to report in less than 90 seconds per local jurisdiction.**
-NFPA 72 17.12.2 2016

Does Not Report Alarm To Panel – i.e., wiring issue, mechanical issue with device (bad or missing paddle).
-NFPA 72 17.12.2 2016

Tamper Switches

Missing Cover or Damaged
Waterflow alarm and supervisory signal initiating devices shall be inspected quarterly to verify that they are free of physical damage.
-NFPA 25 5.2.4

Does Not Report Supervisory/trouble at Panel – i.e., Wiring issue or mechanically defective. OS&Y must report within first 2 revolutions or 1/5 distance from its normal position.
-NFPA 25 13.3.3.5.2

Signal does not restore when valve is returned to normal– i.e., valve cannot be adjusted /mechanically damaged.
-NFPA 25 13.3.3.5.3

Control Valves

The valve inspection shall verify that the valves are in the following condition:
(1) In the normal open or closed position
(2)* Sealed, locked, or supervised
(3) Accessible
(4) Post indicator valves (PIVs) are provided with correct wrenches
(5) Free from external leaks
(6) Provided with applicable identification
-NFPA 25 13.3.2.2*

*Each control valve shall be operated annually through its full range and returned to its normal position. -NFPA 25 13.3.3.1

Main Drain

Damaged or missing valve – i.e, Broken handle.
-NFPA 25 13.2.3

Proper drainage for main drain – to minimize water damage (Owner's responsibility- recommendation to install proper drainage)
-NFPA 25 13.2.4 & 4.1.1.2.1

Main Drain Test

Record the pressure indicated by the supply water gauge

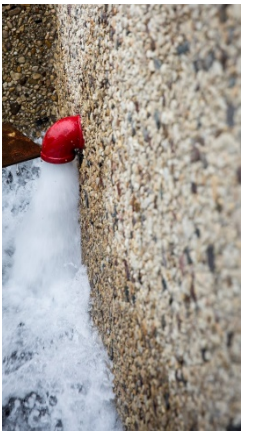
Close the alarm control valve on alarm valve.

Fully open the main drain valve. After the flow has stabilized, record the residual (flowing) pressure

indicated by the water supply gauge.
Close the main drain (slowly).

When there is a 10% reduction in full flow pressure when compared to the original acceptance or previous tests, the cause shall be identified & corrected if necessary.

-NFPA 25 A.13.2.5/ 13.2.5.3



Wet Pipe System Flow Alarm

Test water flow alarms by opening the inspector's test valve or by using automated test equipment in accordance with 4.6.6 (Notify alarm company to avoid false alarms owner's responsibility- NFPA 4.1.4). --NFPA 13.2.6.3/4.1.4

Fire Department Connections

Verify connection is visible and accessible, not damaged, caps or plugs are in place, identification sign is in place, automatic ball drip drain is working properly, and check valve is not leaking
-NFPA 25 13.8.1

Gauges

Date – Gauges shall be replaced every five years or tested every five years by comparison with a calibrated gauge.
-NFPA 25 13.2.7.2

Damaged Gauge – i.e., broken glass/missing glass, not operable.
-NFPA 25 13.2.7.1

External Piping

Corrosion on piping and fittings – i.e., Corrosion buildup on piping.
-NFPA 25 5.2.2.1

Piping leaks – i.e., pinhole leaks formed as a result of corrosion.
-NFPA 25 5.2.2.1

Damaged piping – i.e., bent or cracked pipe.
-NFPA 25 5.2.2.1

Internal Piping

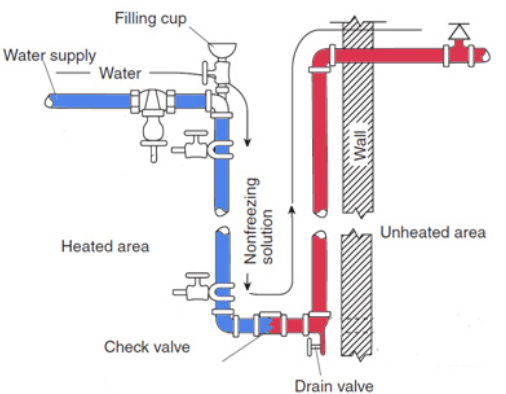
Assessment of internal metal piping condition – Minimum every 5 years or by approved risk assessment. (Piping protecting freezers- annually)
-NFPA 25 14.2.1.1/14.4

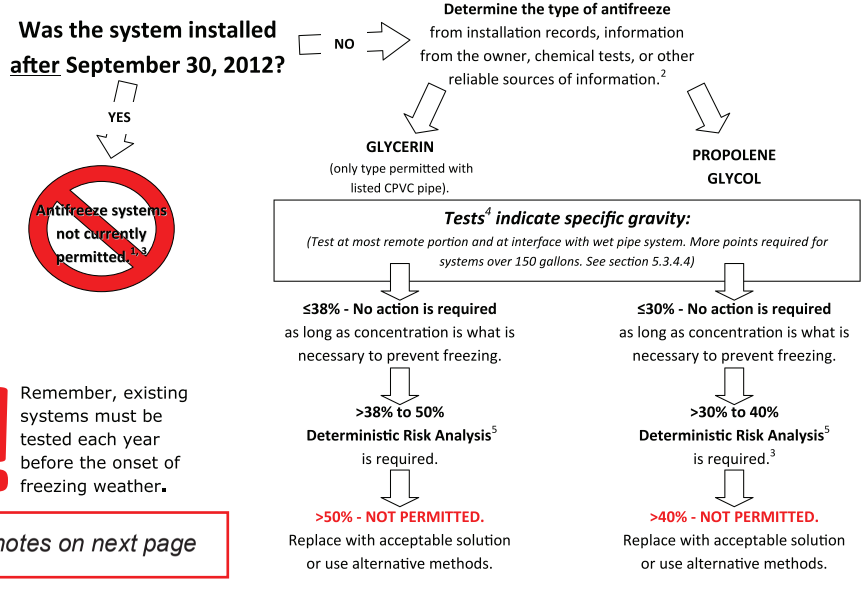
Antifreeze Systems

Antifreeze Systems – Annually, before the onset of freezing weather, the antifreeze solution shall be tested
-NFPA 25 5.3.3*

Except as permitted below all Antifreeze systems must use listed antifreeze solutions.
-NFPA 25 5.3.3.4

For systems that were installed prior to September 30, 2012, listed antifreeze solutions shall not be required until September 30, 2022, where all of the following conditions are met:
-NFPA 25 5.3.3.4.1(1) and NFPA 25 5.3.3.4.1(2) Concentration limited to 50% glycerin or 40% propylene glycol meeting ALL conditions in 5.3.3. Any added shall be factory premix solutions.





Remember, existing systems must be tested each year before the onset of freezing weather.

*Footnotes on next page

Existing Antifreeze System Decision-Making Guide

Based on the 2017 edition of NFPA 25

Footnotes:

1. These systems are assumed to meet the requirements of NFPA 13, 2013 edition.
2. If type cannot be determined, or is found to be a type no longer permitted, the system shall be drained completely and replaced with an acceptable solution.
3. See NFPA 25-2014 section 5.3.4.2.2 for information on concentrations above 30% in certain ESFR systems.
4. Test for specific gravity using a hydrometer with a suitable scale or a refractometer having a scale calibrated for the antifreeze solution.
5. Must be prepared by a qualified person approved by the AHJ. See annex A.5.3.4.2.1(3) for more information.

Flowchart Courtesy of John Corso of NFSA. www.NFSA.ORG.

See NFSA Antifreeze Tech Notes for further information.

New UL Certified Antifreeze information available at: firesprinklertesting.org/antifreeze/

Special Note: as of May 2019 the only Anti-Freeze to meet NFPA Anti-Freeze Requirements is Tyco LFP Antifreeze for Fire Sprinkler Systems.

http://tyco-fire.com/e-catalog/Tyco-LFP-Overview-11-18.pdf

Standpipes NFPA 14

NFPA 25 Table 6.1.1.2 Summary of Standpipe and Hose Systems ITM Frequency

Inspection
Cabinet Annually 6.2.8
Control valves Chapter 13
Gauges monthly/quarterly Chapter 13
Hose Inspection Annually 6.2.5
Hose connection Annually 6.2.3
Hose nozzle Annually 6.2.6
Hose storage device Annually 6.2.7
Hydraulic design information sign Annually 6.2.2
Hose valves Chapter 13
Hose connection Annually 6.2.3
Piping Annually 6.2.4
Pressure-regulating devices Chapter 13

Test
Flow test 5 years (all classes of systems) 6.3.1
Hose 5 years/3 years NFPA 1962 4.2.2
Hose valves Chapter 13
Hydrostatic test (not all systems) 5 years 6.3.2
Main drain test Chapter 13
Pressure control valve Chapter 13
Pressure-reducing valve Chapter 13
Supervisory signal devices (except valve supervisory switches) Chapter 13
Valve status test Chapter 13
Valve supervisory devices Chapter 13
Waterflow alarm devices Chapter 13

Maintenance
Hose connections Annually 6.1.1.2
Hose valves Chapter 13
Valves (all types) Annually/as needed Chapter 13

Fire Pump NFPA 20

BE SURE TO CHECK TIA 17-2 REGARDING WE NO LONGER OPEN THE DOOR ON AN ELECTRIC MOTOR DRIVEN CONTROLLER

NFPA 25 Table 8.1.1.2 Summary of Fire Pump ITM

Inspection Frequency- Weekly

Diesel & Electric pump system 8.2.2(3)&(4)
Pump & pump house/room 8.2.2(1)&(2)
Steam pump system 8.2.2(5)

Inspection Frequency - Annually

Alignment 8.3.6.4
Cable/wire insulation only from outside the controller for electric driven motors 8.1.1.2.5
Engine crankcase breather 8.1.1.2.12
Exhaust system and drain condensate trap and silencers 8.1.1.2.13
Flexible hoses & connections, fuel tank vents & overflow 8.1.1.2.10 & 8.1.1.2.11
Plumbing parts – in & outside of electrical panels only from outside the controller for electric driven motors 8.1.1.2.6
Printed circuit board corrosion (PCBs) only from outside the controller for electric driven motors 8.1.1.2.4
Shaft movement or endplay while running 8.1.1.2.1
Suction screens 8.3.3.12

Test Frequency-Weekly

Pump operation (no flow) Weekly/monthly 8.3.1
Diesel fire pump 8.3.2.4 (30 minutes)
Electric fire pump Weekly/monthly 8.3.2.3 (10 minutes)

Test Frequency-Quarterly

Fuel tank, float switch, and supervisory signal for interstitial space 8.1.1.2.7

Test Frequency – Annually

Diesel fuel testing (semiannually if reconditioned or replaced) 8.3.4

Fire pump alarm signals 8.3.3.10

Pressure relief valve 8.3.3.8/ 13.5.6.2.3

Power transfer switch 8.3.3.9

Pump performance (flow) 8.3.3

Pump house/room environmental conditions 8.3.6.3

Supervisory signal for high cooling water temp 8.1.1.2.8

Calibration of gauges, transducers, etc. used for measurement (except flow meters) 8.3.3.2.2.2

Maintenance Frequency – Annually

Batteries 8.1.1.2.15

Circulating water filter 8.1.1.2.20

Control and power wiring connections only from outside the controller for electric driven motors 8.1.1.2.16

Electrical connections only from outside the controller for electric driven motors 8.1.1.2.2

Controller Per manufacturer 8.5

Diesel active fuel maintenance system or per mfg. 8.3.4.3

Diesel engine system Per manufacturer 8.5

Electric motor and power system Per manufacturer 8.5

Engine oil & Filter or 50 operating hours 8.1.1.2.17 & .18

Fuel tank – check for water and foreign materials 8.1.1.2.9

Measure back pressure on engine turbo 8.1.1.2.14

Pressure gauges and sensors 8.1.1.2.21

Pump / motor bearings and coupling or as required 8.1.1.2.3

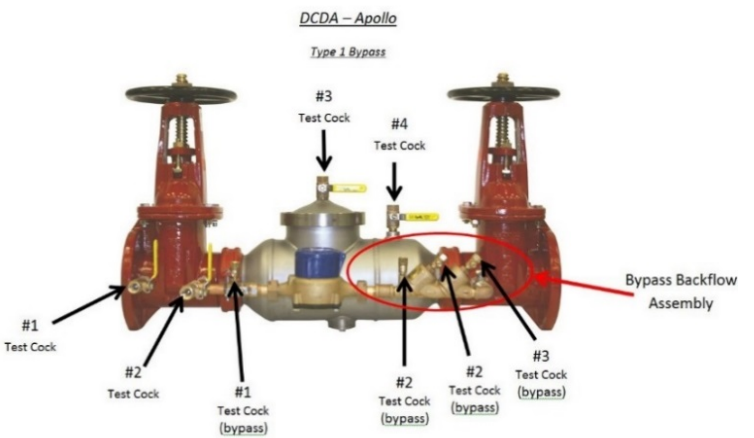
Sacrificial anode 8.1.1.2.19

Backflow: Plumbing Code Example - Illinois

Title 77: Public Health
Chapter I: Department of Public Health
Subchapter r: Water and Sewage Part 890 Illinois Plumbing Code section 890.1130 Protection of Potable Water Approval of Devices and Maintenance. All reduced pressure principle (RPZ), reduced pressure detector (RPDA), double check (DCA) and double check detector (DCDA) backflow prevention assemblies shall be tested and approved by a Cross-Connection Control Device Inspector (CCCDI) and at least annually after initial inspection.
Section 890.1130 Protection of Potable Water

Double Detector Check

This assembly consists of two internally loaded check valves, either spring or internally loaded, weighted, installed as a unit between two tightly closing resilient-seated shutoff valves as an assembly, and fittings with properly located resilient seated test ports or cocks.

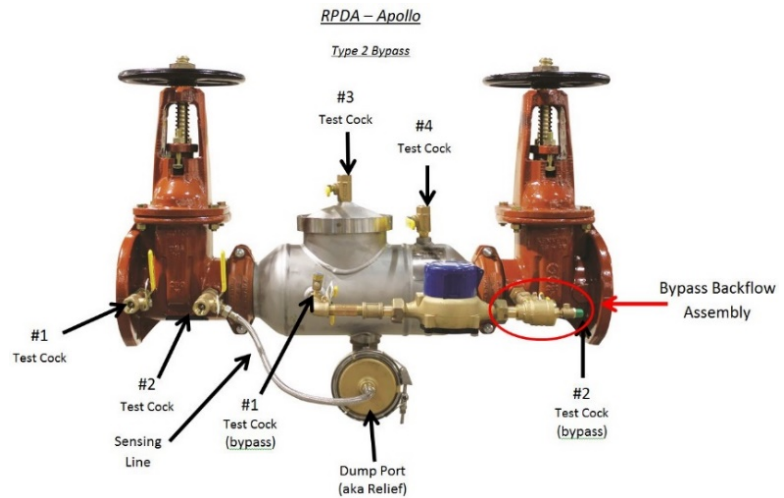


(Photo courtesy of Chicago Backflow, Inc.)

Reduce Pressure Zone

Two independently acting check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and below the first check valve.

These units are located between two tightly closed resilient seated shutoff valves, as an assembly, and are equipped with properly located resilient seated test cocks.



(Photo courtesy of Chicago Backflow, Inc.)

Reduce Pressure Zone

Inspection

Backflow Prevention Assemblies based on supervision of control valves Weekly/monthly 13.7.1

Reduced Pressure Assemblies Weekly to insure no discharge from relief port 13.7.1.1

All must have Internal inspection 5 years 13.7.1.3

Testing

Forward Flow Test Annually 13.7.2.1*

Backflow Prevention Assemblies Annually 13.7.2

*Except if fire pump test through backflow 13.7.2.1.2

Some states require a copy of all fire sprinkler system inspection reports to be submitted to local fire officials having jurisdiction. Some have 3rd party providers receiving the reports on behalf of the jurisdictions.

Other states require the inspection reports to be stored by the owner. (4.3.3) Also, in some states, inspectors are required to be NICET II certified or trained through an approved apprentice program. NFPA recommends using qualified personnel. (4.1.1.2)

Are you checking these items before work begins? Correct any procedure violating state law and/or call the state fire marshal.

For more Information, please visit:

nfsa.org/guides firesprinklertesting.org

Standards referenced developed by NFPA. nfpa.org

Northern Illinois Fire Sprinkler Advisory Board

Save Lives. Protect Property.

NFPA® MEMBER