



PDHonline Course M538 (2 PDH)

**An Introduction to Fire Suppression
Systems Inspection, Testing and
Maintenance**

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An Introduction to Fire Suppression Systems Inspection, Testing and Maintenance

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(Figures, tables and formulas in this publication may at times be a little difficult to read, but they are the best available. **DO NOT PURCHASE THIS PUBLICATION IF THIS LIMITATION IS UNACCEPTABLE TO YOU.**)

1. RCM METHODOLOGY. The objective of Inspection, Testing and Maintenance (ITM) for fixed fire protection systems is to assure that the systems will function on demand. (Reliability-Centered Maintenance) RCM analysis identifies any defects responsible for system malfunction and how they can be detected and corrected before a fire. A byproduct of RCM analysis is a list of ITM tasks and how often they must be accomplished (frequencies) to achieve a desired reliability (0.99 for this discussion). The RCM analysis emphasized task effectiveness (“Is it the right thing to do and is it done right?”) and timeliness (“Is it done before a demand?”). The resulting list of tasks and frequencies, therefore, considered frequency and probabilities of demands and failures.

1.1 FEATURES REQUIRING MAINTENANCE. All fire protection features installed in DOD facilities must be maintained in accordance with this discussion. Features that have been disabled in place pending removal are not considered installed.

1.2 UNREQUIRED FEATURES. A critical component of any reliability-centered maintenance program is ensuring that the components being maintained are required to be present. Fire protection features not specifically required by shall be removed to minimize the maintenance workload burden. Unrequired features can be abandoned in place pending final removal if all public interface devices are removed.

2. ITM TASK DESCRIPTIONS AND FREQUENCIES.

2.1 TASK DESCRIPTIONS . The ITM tasks in tables 1 through 26 were selected to ensure that the fire protection system would function on demand. Technical tasks must be performed according to the manufacturer’s instructions.

2.1.1 SUPERVISED COMPONENTS . Supervision of components increases the likelihood that conditions or faults will be detected without an inspection activity. In these cases, the ITM task is to respond to the alarm and to test the supervisor device (e.g., valve tamper switch) periodically. Accordingly, the tables reflect the improved fault or condition detection by specifying less frequent inspections. Different frequencies are recommended for monitored and for unmonitored fire alarm control equipment. A monitored system is a system that transmits trouble alarms to a supervisory station.

2.1.2 EVENT-DRIVEN TESTS. Some tests should be event driven. For example, a main drain test is intended to verify the open condition of a control valve to a sprinkler or water spray system, and needs to be done only when the control valve has been operated for maintenance or testing.

2.1.3 EXCLUDED NATIONAL FIRE CODE TASKS. Some tasks recommended in the National Fire Codes are not included in these frequency tables. The detailed analysis used here excluded tasks that did not contribute to the overall system operational reliability and did not need to be performed. These deleted tasks do not improve the operability of the systems because: (1) the faults they detect are not significant; (2) the faults are detected by other tasks or means; or (3) the faults will be self-evident (“fix it when it breaks”) and do no significantly impair the system. The deleted tasks are not required to be accomplished and shall not be included in reoccurring maintenance programs.

2.1.4 NON-ITM ACTIVITIES. Inspection activities listed at the end of each ITM table are not part of the ITM program but are part of building overall inspection and are listed for information only. They were not included in the model used to develop the 99 percent reliability requirements; however, they should be incorporated into each activity's fire prevention, safety, facility condition, and related inspection or evaluation program.

2.1.5 MEDICAL FACILITIES. For medical facilities that require Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) accreditation, follow the tasks frequencies indicated in the related NFPA codes and standards.

2.1.6 FIRE EXTINGUISHERS. Fire extinguisher and fire extinguisher cabinet maintenance are not addressed here.

2.2 FIRE DETECTION AND ALARM SYSTEMS. The type and frequency of ITM tasks for fire detection and alarm systems depend on whether the system is monitored or not. Guidance on the tasks in Table 1 is contained in the “Inspection, Testing, and Maintenance” section of NFPA Standard 72 (NFPA 72).

WARNING

Fire alarm systems with more than two abnormal conditions (trouble conditions) are outside their minimum tested or listed operating parameters and may not meet their performance requirement for receipt or transmission of subsequent alarm or additional trouble conditions.

WARNING

Any fire alarm system with more than three unexplained activations (fire indication conditions) in a 6-month period is experiencing a system instability that should be evaluated by a technician or engineer, and appropriate corrective measures should be implemented immediately.

CAUTION

Alarm systems in a TROUBLE condition should be able to transmit an ALARM condition while in trouble; however, because this is not considered to be a normal or acceptable alarm system status, immediate maintenance action is indicated.

NOTE

Any fire alarm system with more than three explained activations (fire indications) resulting from non-fire events being mistaken for actual fires should be evaluated by a technician or engineer to determine if corrective actions are necessary.

Frequency	Component	Tasks
Monthly	1. Control Panels and Annunciator Equipment (unmonitored only)	1. Inspect panel condition (connections, fuses, light-emitting diodes [LED]).
Annual	1. Control Panel and Annunciator Equipment (monitored)	1. Test to verify proper receipt of alarm, supervisory, and trouble signals (inputs) and operation of notification appliances and auxiliary functions (outputs). 2. Verify that all lamps and LEDs are illuminated. 3. Load test backup batteries (when provided).
	2. Initiating Devices: a. Manual Fire Alarm Stations	1. Verify station is accessible (visual).
	b. Radiant Energy Detectors (Optical Detectors)	1. Test to verify alarm initiation and receipt. 2. Verify no facility change that affects performance.
	c. Gas Detectors	1. Test to verify alarm initiation and receipt. 2. Verify no facility change that affects performance.
	3. Notification Appliances and Voice Communication (telephone, speakers, horns, and strobe lights)	1. Test to verify operability.
	4. Digital Alarm Transmitters and Receivers	1. Test to verify operability.

Table 1
Fire Detection and Alarm System ITM Tasks

Frequency	Component	Tasks
2 Years	1. Initiating Devices:	
	a. Manual Fire Alarm Stations	1. Operate to verify alarm receipt.
	b. Heat Detectors (restorable) (Remove devices not required by UFC 3-600-01.)	1. Test with a heat source to verify alarm initiating and receipt. 2. Verify no facility change that affects performance.
	c. Smoke Detectors (single-station detectors, system detectors, and air sampling detectors) (Remove devices not required by UFC 3-600-01 or other directives.)	1. Test with manufacturer-approved smoke simulant to verify smoke entry and alarm initiation and receipt. 2. Verify no facility change that affects performance.
	d. Supervisory Devices (low air pressure, temperature, water level)	1. Test to verify initiation and receipt of supervisory alarm.
5 Years	1. Smoke Detectors (Remove devices not required by UFC 3-600-01.)	1. Test detector sensitivity to ensure that the detector has remained within its listed and marked sensitivity range (or 4 percent obscuration light gray smoke, if not marked).
As Part of Building Inspection	Entire System	1. Visually check: <ul style="list-style-type: none"> a. Detectors unblocked and uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed. 2. Exercise evacuation notification appliances for audibility, clarity, and visibility.

Table 1 (continued)
Fire Detection and Alarm System ITM Tasks

2.3 WET PIPE AUTOMATIC SPRINKLER SYSTEMS Technical guidance on the tasks in Table 2 is contained in NFPA 25.

CAUTION

Main drain static or residual test pressures that vary more than 10 percent from the previous test readings or the original acceptance readings require immediate evaluation to determine the cause.

WARNING

Main drain static or residual test pressures that vary more than 20 percent from the previous test readings or the original acceptance readings indicate an emergency situation. Immediate distribution system flow testing is indicated. Immediately conduct main drain tests on all adjacent sprinkler systems to determine the extent to which the sprinkler systems are compromised.

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify valve position.
Annual	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if sealed or electrically supervised).
	3. Alarm Valve and Trim	1. Visually check the exterior of valves, gauges, trim alignment. 2. Verify valve pressure and legibility of the hydraulic nameplate.
	4. Main Drain	1. Conduct a main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3- by 5-inch (3x5) tag and secure it to the system pressure gauge. 3. Compare results with results from previous main drain tests and original acceptance test. 4. Verify that the results are within acceptable limits or identify corrective measures.

Table 2

Wet pipe sprinkler systems ITM Tasks

Frequency	Component	Tasks
Annual (Continued)	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps are removed or missing, check for obstructions.
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability.
5 Years	1. Alarm Valve	1. Clean and inspect internally to verify condition.
	2. Anti-freeze Loops	1. Confirm correct solution mixture.
10 Years	1. Gauges	1. Recalibrate or replace gauges.
20 Years	1. Fast Response Sprinklers and Extra High Temperature Sprinklers	1. Test sample sprinklers to verify response characteristics.
50 Years	1. Standard Sprinklers	1. Replace or test a sample of sprinklers to verify response characteristics.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	1. Conduct main drain test to verify supply (valve position).
As Part of Building Inspection	Entire System	Visually check: 1. Pipe hangers. 2. Sprinklers for obstruction. 3. Piping for leaks. 4. Riser condition.

Table 2 (continued)

Wet pipe sprinkler systems ITM tasks

CAUTION

Main drain static or residual test pressures that vary more than 10 percent from the previous test readings or the original acceptance readings require immediate evaluation to determine the cause.

WARNING

Main drain static or residual test pressures that vary more than 20 percent from the previous test readings or the original acceptance readings indicate an emergency situation. Immediate distribution system flow testing is indicated. Immediately conduct main drain tests on all adjacent sprinkler systems to determine the extent to which the sprinkler systems are compromised.

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify valve position.
Annual	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if sealed or electrically supervised).
	3. Dry Pipe Alarm Valve and Trim	1. Visually inspect the exterior of valves, gauges, trim alignment. 2. Verify valve pressure and legibility of the hydraulic nameplate.
	4. Main Drain	1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge. 3. Compare results with results from previous main drain tests and original acceptance test. 4. Verify that the results are within acceptable limits or identify corrective measures.
	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps are removed or missing, check for obstructions.
	6. Dry Pipe Alarm Valve Enclosure Heating	1. Verify operability at the beginning of the heating season (annually for constant cold areas).
	7. Low Temperature Alarm	1. Verify initiation and receipt of alarm at the beginning of the heating season.

Table 3

Dry pipe automatic sprinkler systems ITM tasks

Frequency	Component	Tasks
Annual (Continued)	8. Low Point Drains	1. Drain all low points to remove condensation prior to the cold season.
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valve stem.
	2. Dry Pipe Alarm Valves	1. Trip valve to verify operability. 2. Inspect internal condition before resetting, and clean valve seat. 3. Check priming water level (before and after trip test).
	3. Quick-Opening Devices	1. Test to verify operability.
	4. Low Air Pressure Alarm	1. Test to verify initiation and receipt of supervisory alarm.
	5. Automatic Air Pressure Maintenance Devices	1. Inspect to verify proper operation.
5 Years	1. Strainers	1. Inspect internally and clean to verify condition.
10 Years	1. Gauges	1. Recalibrate or replace gauges.
20 Years	1. Fast Response Sprinklers and Extra High Temperature Sprinklers	1. Test sample sprinklers to verify response characteristics.
50 Years	1. Standard Sprinkler	1. Replace or test a sample of sprinklers to verify response characteristics.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge.
As Part of Building Inspection	Entire System	Visually check: 1. Pipe hangers. 2. Heads for obstruction. 3. Piping for leaks. 4. Riser condition. 5. Sprinkler spares.

Table 3 (continued)

Dry pipe automatic sprinkler systems ITM tasks

2.5 DELUGE SPRINKLER SYSTEMS. Technical guidance on the tasks is contained in NFPA 25 and NFPA 15.

CAUTION

Main drain static or residual test pressures that vary more than 10 percent from the previous test readings or the original acceptance readings require immediate evaluation to determine the cause.

WARNING

Main drain static or residual test pressures that vary more than 20 percent from the previous test readings or the original acceptance readings indicate an emergency situation. Immediate distribution system flow testing is indicated. Immediately conduct main drain tests on all adjacent sprinkler systems to determine the extent to which the sprinkler systems are compromised.

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify valve position.
Annual	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if sealed or electrically supervised).
	3. Deluge Alarm Valve and Trim	1. Inspect the exterior of valves, gauges, trim alignment. 2. Verify valve pressure and legibility of the hydraulic nameplate.
	4. Main Drain	1. Conduct a main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge. 3. Compare results with results from previous main drain tests and original acceptance test. 4. Verify that the results are within acceptable limits or identify corrective measures.

Table 4
Deluge sprinkler systems ITM tasks

Frequency	Component	Tasks
Annual (Continued)	5. Fire Department Connection	<ol style="list-style-type: none"> 1. Verify accessibility and condition. 2. If caps are removed or missing, check for obstructions.
	6. Valve and Riser Heated Enclosure (if provided)	<ol style="list-style-type: none"> 1. Verify operability at the beginning of the heating season.
	7. Low Temperature Alarm	<ol style="list-style-type: none"> 1. Verify initiation and receipt of alarm at the beginning of the heating season.
2 Years	1. Control Valves	<ol style="list-style-type: none"> 1. Operate valve through entire travel to verify function. 2. Lubricate valve stem.
	2. Deluge Valve	<ol style="list-style-type: none"> 1. Trip to verify operability. 2. Verify that manual actuators are operable. 3. Inspect the internal condition and clean valve seat before resetting.
	3. Low Point Drains	<ol style="list-style-type: none"> 1. Drain all low points after deluge valve test and before cold weather.
5 Years	1. Strainers	<ol style="list-style-type: none"> 1. Inspect internally and clean to verify condition.
10 Years	1. Gauges	<ol style="list-style-type: none"> 1. Recalibrate or replace.
	2. Deluge Valve	<ol style="list-style-type: none"> 1. Conduct full flow test.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	<ol style="list-style-type: none"> 1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge.
As Part of Building Inspection	Entire System	<ol style="list-style-type: none"> 1. Visually check: <ol style="list-style-type: none"> a. Pipe hangers. b. Sprinklers for obstruction. c. Piping for leaks. d. Riser condition. e. Sprinkler spares. 2. Ensure: <ol style="list-style-type: none"> a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed.

Table 4 (continued)
Deluge sprinkler systems ITM tasks

2.6 PRE-ACTION AUTOMATIC SPRINKLER SYSTEMS. Technical guidance on the tasks is contained in NFPA 25.

CAUTION

Main drain static or residual test pressures that vary more than 10 percent from the previous test readings or the original acceptance readings require immediate evaluation to determine the cause.

WARNING

Main drain static or residual test pressures that vary more than 20 percent from the previous test readings or the original acceptance readings indicate an emergency situation. Immediate distribution system flow testing is indicated. Immediately conduct main drain tests on all adjacent sprinkler systems to determine the extent to which the sprinkler systems are compromised.

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify valve position.
Annual	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if sealed or electrically supervised).
	3. Pre-Action Valve and Trim	1. Inspect the exterior of valves, gauges, trim alignment. 2. Verify valve pressure and legibility of the hydraulic nameplate.
	4. Main Drain	1. Conduct a main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge. 3. Compare results with results from previous main drain tests and original acceptance test. 4. Verify that the results are within acceptable limits or identify corrective measures.

Table 5
Pre-Action Automatic Sprinkler Systems ITM Tasks

Frequency	Component	Tasks
Annual (Continued)	5. Fire Department Connection	<ol style="list-style-type: none"> 1. Verify accessibility and condition. 2. If caps are removed or missing, check for obstructions.
	6. Valve and Riser Heated Enclosure (if provided)	<ol style="list-style-type: none"> 1. Verify operability at beginning of heating season.
	7. Low Temperature Alarm	<ol style="list-style-type: none"> 1. Verify initiation and receipt of alarm at the beginning of the heating season.
2 Years	1. Control Valves	<ol style="list-style-type: none"> 1. Operate valve through entire travel to verify function. 2. Lubricate valve stem.
	2. Pre-Action Valve	<ol style="list-style-type: none"> 1. Trip to verify proper operation. 2. Verify manual actuators (if provided). 3. Inspect internal condition and clean valve seat before resetting.
	3. Low Point Drains	<ol style="list-style-type: none"> 1. Drain all low points after pre-action valve trip test and before cold weather (if unheated area).
	4. Air Supply (if present)	<ol style="list-style-type: none"> 1. Test the automatic air pressure maintenance device. 2. Test the low air supply alarm.
5 Years	1. Strainers	<ol style="list-style-type: none"> 1. Clean and inspect the interior to verify condition.
10 Years	1. Gauges	<ol style="list-style-type: none"> 1. Recalibrate or replace gauges.
20 Years	1. Fast-Response Sprinklers and Extra High Temperature Sprinklers	<ol style="list-style-type: none"> 1. Test a sample of sprinklers to verify response characteristics.
50 Years	1. Closed-Head Sprinklers	<ol style="list-style-type: none"> 1. Replace or test sample closed-head sprinklers to verify response characteristics.

Table 5 (continued)
Pre-Action Automatic Sprinkler Systems ITM Tasks

Frequency	Component	Tasks
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	<ol style="list-style-type: none"> 1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge.
As Part of Building Inspection	Entire System	<ol style="list-style-type: none"> 1. Visually check: <ol style="list-style-type: none"> a. Pipe hangers. b. Sprinklers for obstruction. c. Piping for leaks. d. Riser condition. e. Sprinkler spares. 2. Ensure: <ol style="list-style-type: none"> a. Manual stations in place and unobstructed. b. Detectors unblocked/uncovered. c. Panels secured and indicator lamps functional. d. Notification appliances in place.

Table 5

Pre-Action Automatic Sprinkler Systems ITM Tasks (continued)

2.7 WATER SPRAY SYSTEMS. Technical guidance on these tasks is contained in NFPA 25.

CAUTION

Main drain static or residual test pressures that vary more than 10 percent from the previous test readings or the original acceptance readings require immediate evaluation to determine the cause.

WARNING

Main drain static or residual test pressures that vary more than 20 percent from the previous test readings or the original acceptance readings indicate an emergency situation. Immediate distribution system flow testing is indicated. Immediately conduct main drain tests on all adjacent sprinkler systems to determine the extent to which the sprinkler systems are compromised.

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify valve position.
Annual	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if sealed or electrically supervised).
	3. Pre-Action Valve and Trim	1. Inspect the exterior of valves, gauges, trim alignment. 2. Verify valve pressure and legibility of the hydraulic nameplate.
	4. Main Drain	1. Conduct a main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge. 3. Compare results with results from previous main drain tests and original acceptance test. 4. Verify that the results are within acceptable limits or identify corrective measures.
	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps are removed or missing, check for obstructions.
	6. Valve and Riser Enclosure Heater	1. Verify operability at the beginning of the heating season.
	7. Low Temperature Alarm	1. Verify initiation and receipt of alarm at the beginning of the heating season.
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valve stem.
	2. Water Spray Valve	1. Trip to verify operability. 2. Verify manual actuators (if provided). 3. Verify spray pattern. (If experience shows nozzles are not moved, this can be extended to 10 years or after modifications.) 4. Inspect interior of valve and clean valve seat before resetting.

Table 6
Water Spray Systems ITM Tasks

Frequency	Component	Tasks
2 Years (Continued)	3. Low Point Drains	1. Drain all low points after pre-action valve trip test and before cold weather.
5 Years	1. Strainers	1. Clean and inspect interior to verify condition.
10 Years	1. Gauges	1. Recalibrate or replace.
20 Years	1. Fast-Response Sprinklers and Extra High Temperature Sprinklers	1. Test sample heads to verify response characteristics.
50 Years	1. Standard Sprinklers	1. Replace or test a sample of sprinklers to verify response characteristics.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge.
As Part of Building Inspection	Entire System	1. Visually check: a. Pipe hangers. b. Sprinklers for obstruction. c. Piping for leaks. d. Riser condition. e. Sprinkler spares. 2. Ensure: a. Manual stations in place and unobstructed. b. Detectors unblocked/uncovered. c. Panels secured and indicator lamps functional. d. Notification appliances in place.

Table 6 (continued)
Water spray systems ITM tasks

2.8 WATER MIST SYSTEMS. Technical guidance on the tasks is contained in NFPA 750.

Frequency	Component	Task
Weekly	1. Water Tanks (without electric remote supervision of water level)	1. Check water level.
	2. Air Compressor/ Receiver/Cylinders (without electric remote supervision of air pressure)	1. Check air pressure.
Semi-Annual	1. Pumps	1. Complete chum test to ensure operability.
	2. Air Compressors	1. Start to ensure operability.
	3. System Operating Components	1. Inspect to verify valve alignment and that valve is free of damage.
Annual	1. Water Tanks (remote electrically supervised and monitored)	1. Check water level detection device and supervisory controls.
	2. Air Compressors/ Receivers/Cylinders (electric remote supervision of air pressure)	1. Check air pressure and supervisory pressure switch.
	3. Waterflow Alarm	1. Operate to verify initiation and receipt of alarm.
	4. Pumps	1. Conduct full flow functional test.
	5. Pressure Relief Devices	1. Manually operate to ensure operability.
	6. Manual Actuators	1. Verify operability.
	7. Control Valve (sectional water supply valve)	1. Verify operability and position.
5 Years	1. Pressure Cylinders (normally at atmospheric pressure)	1. Pressurize to verify operability.
	2. System	1. Conduct flow test.
	3. Water	1. Verify water quality when refilling.
	4. Water Tanks	1. Inspect tanks for structural integrity prior to refilling.
	5. Nozzle Sampling	1. Test a sample of nozzles to verify response characteristics.

Table 7
Water mist systems ITM tasks

Frequency	Component	Task
5-12 Years	1. Storage Vessels	1. Conduct hydrostatic test for pressure cylinders in accordance with OSHA and U.S. Department of Transportation (DOT) standards.
As Part of Building Inspection	Entire System	1. Visually check: a. Pipe hangers. b. Nozzles for obstruction. c. Piping for leaks. d. Riser condition. e. Nozzle spares. 2. Ensure: a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed.

Table 7 (continued)
Water mist systems ITM tasks

2.9 FOAM AND FOAM-WATER SYSTEMS. Table 8 addresses low-expansion foam systems for flammable liquid tanks as covered in NFPA 11. Table 9 addresses low-expansion foam spray and sprinkler systems, including aqueous film-forming foam (AFFF) as covered in NFPA 16. Table 10 addresses low-expansion foam monitor nozzle systems for multiple applications as covered in NFPA 11. Table 11 addresses low-expansion grate nozzle foam systems for aircraft hangar applications as covered in NFPA 11. Table 12 addresses high-expansion foam systems as covered in NFPA 11.

Frequency	Component	Tasks
Annual	1. Foam Concentrate	1. Inspect for quality and evidence of sludge or deterioration. 2. Take sample and test in accordance with manufacturer's instructions.
	2. Foam Pumps/Proportioners	1. Test to verify operability and proper proportioning. 2. Flush pumps after operation.

Table 8
Low-Expansion Foam Systems for Flammable Liquid Tanks ITM Tasks

Frequency	Component	Tasks
Annual (Continued)	3. System Actuators	1. Verify all manual and automatic actuation functions.
	4. Foam Concentrate Strainers	1. Inspect and clean if necessary.
	5. Distribution/Discharge	1. Ensure that discharge devices are free of damage. 2. Inspect pipe and hanger to verify support and pitch.
2 Years	1. Foam Pumps/Proportioners	1. Test to verify operability and proper proportioning. 2. Flush pumps after operation.
	2. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valve stem.
5 Years	1. Distribution Piping (including underground)	1. Spot-check piping interior for evidence of deterioration.
	2. Strainers (water supply)	1. Inspect and clean if necessary.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	1. Conduct main drain test to verify supply (valve position).
As Part of Building Inspection	Entire System	1. Visually check: a. Pipe hangers. b. Generators for obstruction (air intake or foam discharge). c. Generator nozzles for obstruction and generator screens for damage. d. Piping for leaks. e. Riser condition. 2. Ensure: a. Panels secured and indicator lamps functional. b. Notification appliances in place. c. Manual stations in place and unobstructed.

Table 8 (continued)

Low-Expansion Foam Systems for Flammable Liquid Tanks ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify valve in open (proper) position.
Semi-Annual	1. Foam Concentrate	1. Verify adequate supply.
	2. Foam Proportioning System	1. Test pump to ensure operability. 2. Inspect proportioning system for proper valve alignment and system condition.
Annual	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify valve in proper position.
	2. Foam Concentrate	1. Take sample and test in accordance with manufacturer's instructions.
	3. Foam Concentrate Strainers	1. Inspect exterior to ensure that blow down valve is closed.
2 Years	1. Control Valve	1. Operate valve through entire travel to verify function. 2. Lubricate stem.
	2. Foam Proportioning System	1. Conduct full flow test to ensure proper system function. 2. Verify proper concentration.
	3. Actuators	1. Verify operability of manual and automatic actuators.
	4. Distribution System	1. Verify nozzle (sprinkler) coverage during flow test. 2. Inspect piping hangers, sprinklers, and nozzles for condition and location.
	5. Foam Concentrate Strainers	1. Inspect and clean after flow test.
5 Years	1. Balancing Valve	1. Flush to prevent concentrate buildup on diaphragm.
	2. Strainers (water supply)	1. Inspect and clean if necessary.
10 Years	1. Foam Concentrate Tank	1. Drain, flush, and perform internal inspection for corrosion. If pressure vessel, perform hydrostatic test.

Table 9

Foam Spray and Sprinkler Systems ITM Tasks

Frequency	Component	Tasks
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	1. Conduct main drain test to verify supply (valve position).
As Part of Building Inspection	Entire System	1. Visually check: a. Pipe hangers. b. Sprinklers/nozzles for obstruction. c. Piping for leaks. d. Riser condition. 2. Ensure: a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed. 3. Check sprinkler spares.

Table 9
Foam Spray and Sprinkler Systems ITM Tasks (Continued)

Frequency	Component	Tasks
Monthly	1. Control Valves (without lock or electric supervision)	1. Verify valve in open (proper) position.
Semi-Annual	1. Foam Concentrate	1. Verify adequate supply.
	2. Foam Proportioning System	1. Test pump to ensure operability. 2. Inspect proportioning system for proper valve alignment and system condition.
Annual	1. Control Valves (locked or electrically supervised)	1. Verify valve in proper position.
	2. Foam Concentrate	1. Take sample and test in accordance with manufacturer's instructions.
	3. Foam Concentrate Strainers	1. Inspect exterior to ensure that blow down valve is closed.

Table 10
Foam Monitors Nozzle Systems ITM Tasks

Frequency	Component	Tasks
Annual (Continued)	4. Nozzle and Nozzle Driver	<ol style="list-style-type: none"> Lubricate in accordance with manufacturer's direction. Ensure that nozzle elevation set not to apply foam on aircraft surfaces.
2 Years	1. Control Valve	<ol style="list-style-type: none"> Operate valve through entire travel to verify function. Lubricate stem.
	2. Foam Proportioning System	<ol style="list-style-type: none"> Conduct full flow test to ensure proper system function. Verify proper concentration.
	3. Actuators	<ol style="list-style-type: none"> Verify operability of manual and automatic actuators.
	4. Distribution System	<ol style="list-style-type: none"> Verify nozzle coverage during flow test. Inspect piping hangers, sprinklers, and nozzles for condition and location.
	5. Foam Concentrate Strainers	<ol style="list-style-type: none"> Inspect and clean after flow test.
5 Years	1. Balancing Valve	<ol style="list-style-type: none"> Flush to prevent concentrate buildup on diaphragm.
	2. Strainers (water supply)	<ol style="list-style-type: none"> Inspect and clean if necessary.
10 Years	1. Foam Concentrate Tank	<ol style="list-style-type: none"> Drain, flush, and perform internal inspection for corrosion. If pressure vessel, perform hydrostatic test.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	<ol style="list-style-type: none"> Conduct main drain test to verify supply (valve position). Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge.
As Part of Building Inspection	Entire System	<ol style="list-style-type: none"> Visually check: <ol style="list-style-type: none"> Pipe hangers. Nozzle for obstruction. Piping for leaks. Riser condition. Ensure: <ol style="list-style-type: none"> Detectors unblocked/uncovered. Panels secured and indicator lamps functional. Notification appliances in place. Manual stations in place and unobstructed.

Table 10 (continued)

Foam Monitors Nozzle Systems ITM Tasks (Continued)

Frequency	Component	Tasks
Annual	1. Foam Concentrate	<ol style="list-style-type: none"> 1. Inspect to verify adequate supply. 2. Take sample and test in accordance with manufacturer's instructions.
	2. Foam Nozzles	<ol style="list-style-type: none"> 1. Inspect to verify condition.
2 Years	1. Foam Nozzles	<ol style="list-style-type: none"> 1. Conduct test to verify operability. (Test may be done with water only.)
	2. Actuators	<ol style="list-style-type: none"> 1. Verify that all manual and automatic actuators function.
	3. Foam Proportioning System	<ol style="list-style-type: none"> 1. Conduct full flow test to ensure proper system function. (This may be done through a test connection or through the foam nozzles. Only discharge until full foam flow appears from each nozzle; then end foam injection.) 2. Verify proper concentration.
	4. Control Valve	<ol style="list-style-type: none"> 1. Operate valve through entire travel to verify function. 2. Lubricate stem.
After Activation	1. Strainers	<ol style="list-style-type: none"> 1. Inspect and clean after system actuation or flow test.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	<ol style="list-style-type: none"> 1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge.
As Part of Building Inspection	Entire System	<ol style="list-style-type: none"> 1. Visually Check: <ol style="list-style-type: none"> a. Pipe hangers and mounts. b. Nozzles for obstruction. c. Piping for leaks. d. Riser condition. 2. Ensure: <ol style="list-style-type: none"> a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed.

Table 11
Grate Nozzle Foam Systems ITM Tasks

Frequency	Component	Tasks
Annual	1. Foam Concentrate	1. Inspect to verify adequate supply. 2. Take sample and test in accordance with manufacturer's instructions.
	2. Foam Generator	1. Inspect to verify condition and proper valve alignment.
2 Years	1. Foam Generator	1. Conduct test to verify operability. (Water-powered may be done with water only.)
	2. Actuators	1. Verify that all manual and automatic actuators function.
	3. Foam Proportioning Systems	1. Conduct full flow test to ensure proper system function. (Test may be done through a test connection or through the foam generators. Only discharge until full foam flow appears from each generator; then end foam injection.) 2. Verify proper concentration.
	4. Control Valve	1. Operate valve through entire travel to verify function. 2. Lubricate stem.
After Activation	1. Strainers	1. Inspect and clean after system actuation or flow test.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring the water supply to be shut off)	1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3x5 tag and secure it to the system pressure gauge.
As Part of Building Inspection	Entire System	1. Visually check: a. Pipe hangers. b. Generators for obstruction (air intake or foam discharge). c. Generator nozzles for obstruction and generator screens for damage. d. Piping for leaks. e. Riser condition. 2. Ensure: a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed.

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Table 12
High-Expansion Foam Systems ITM Tasks

2.10 STANDPIPE SYSTEMS Technical guidance on the tasks is contained in NFPA 14 and 25.

Frequency	Component	Tasks
Semi-Annual	1. Hose Connection and Pressure Reducing Valves	1. Inspect for damage, leaking, missing caps, and obstruction.
2 Years	1. Piping	1. Inspect for damage and pipe supports.
	2. Control Valve	1. Operate valve through entire travel to verify function. 2. Lubricate stem.
5 Years	1. Standpipe	1. Conduct flow test to verify flow capacity and minimum discharge pressure. (Test must confirm only flow/pressure—not duration—of supply). 2. Hydrostatic test to ensure integrity (dry standpipe systems only).
As Part of Building Inspection	Entire System	1. Visually check: a. Pipe hangers. b. Connections for obstruction. c. Piping for leaks. d. Riser condition.

Table 13
Standpipe Systems ITM Tasks

2.11 HYDRANTS AND MONITORS. Technical guidance on the tasks in tables 14 and 15 is provided in American Water Works Association (AWWA) Manual 17 (M17) for hydrants and monitors supplied from potable distribution systems; and NFPA 25 for hydrants and monitors supplied by non-potable distribution systems. Flow testing should be accomplished in accordance with AWWA M17, Chapter 6.

CAUTION

Flow tests results that vary more than 10 percent from the previous test readings or the original acceptance readings require immediate evaluation to determine the cause.

WARNING

Flow tests results that vary more than 20 percent from the previous test readings or the original acceptance readings indicate an emergency situation. Immediate distribution system flow testing is indicated. Immediately conduct main drain tests on all adjacent sprinkler systems to determine the extent to which the sprinkler systems are compromised.

Frequency	Component	Task
2 Years	<ol style="list-style-type: none"> Hydrants (normally found on public and private potable water distribution systems) Hydrants on dedicated fire protection water distribution systems Hydrants on reuse (gray) water systems are required to be serviced in accordance with this UFC only if specifically installed to meet a fire protection requirement. 	<ol style="list-style-type: none"> Inspect for accessibility, leaks, and worn threads. Lubricate hydrant to ensure ease of operation. With caps on all outlets, operate not less than five full cycles to ensure proper functioning and distribute lubrication. Flush the hydrant not less than 1 minute or until water runs clear, whichever is longer. Verify drainage of barrel (after all operations and before cold weather).
5 Years	<ol style="list-style-type: none"> Underground and Exposed Piping 	<ol style="list-style-type: none"> Conduct flow tests. These should be coordinated with the 2-year ITM tasks whenever possible. (Approximately 20 percent of the installation's hydrants should be tested each year such that at the end of every 5-year cycle, every hydrant has had a flow test conducted and recorded. Test hydrants should be selected such that piping condition/flow capability in each area of the installation is verified.) Document flow test results and provide a copy to the fire and emergency service organization delivering fire suppression services for the installation.
After Flow	<ol style="list-style-type: none"> Strainers 	<ol style="list-style-type: none"> Inspect and clean after each flow.
As Required	<ol style="list-style-type: none"> Hydrants 	<ol style="list-style-type: none"> Apply protective coatings (paint) to prevent corrosion. Identify by hydrant barrel color code the water distribution system to which the hydrant is connected. <ol style="list-style-type: none"> Potable water. Non-potable fire protection water. Non-potable reuse (gray) water. Identify by hydrant bonnet (top) color code the water flow available from the hydrant. [Color codes may be locally determined or may follow AWWA or NFPA recommendations.]

Table 14
Hydrants ITM Tasks

Frequency	Component	Task
2 Years	1. Yard Monitor Nozzles (normally found on non-potable systems)	<ol style="list-style-type: none"> 1. Inspect for condition. 2. Conduct flow test to verify proper function and range of motion. 3. Lubricate to ensure proper operating conditions.
	2. Hose Houses	<ol style="list-style-type: none"> 1. Inspect for accessibility and physical condition. 2. Verify inventory and equipment condition.
5 Years	1. Underground and Exposed Piping	<ol style="list-style-type: none"> 1. Conduct flow tests. (Approximately 20 percent of the installation's hydrants should be tested each year such that at the end of every 5-year cycle, every hydrant has had a flow test conducted and recorded. Test hydrants should be selected such that piping condition/flow capability in each area of the installation is verified.) 2. Document flow test results.
After Flow	1. Strainers	<ol style="list-style-type: none"> 1. Inspect and clean after each flow.

Table 15

Yard Hydrant Monitors and Hose Houses ITM Tasks

2.12 FIRE PUMPS. Technical guidance on these tasks is contained in NFPA 20 and NFPA 25. When generators are installed specifically to meet fire protection requirements or generators are used to provide standby power for fire pumps, all the requirements in Table 16 related to the engine drives shall be conducted. These requirements shall not supersede requirements for generators serving demands other than fire protection. Generators serving both fire protection and other demands shall conform to the most stringent guidance.

Frequency	Component	Tasks
Monthly	1. Pump House	1. Inspect for proper condition, ventilation, and heating.
	2. Control Valve and Isolation Valve	1. Verify proper valve position.
	3. Pressure Gauges	1. Check reading and verify gauge operability.

Table 16
Fire pumps ITM tasks

Frequency	Component	Tasks
Monthly (Continued)	4. Controllers	<ol style="list-style-type: none"> 1. Verify that automatic controllers are in the automatic (AUTO) setting. 2. Inspect electric connections. 3. Operate manual and automatic stations.
	5. Batteries	<ol style="list-style-type: none"> 1. Verify proper charge.
	6. Pumps	<ol style="list-style-type: none"> 1. Start and churn to verify operability. (Where equipment permits, allow water to flow back to the source.) [Electric pumps shall operate for 10 minutes and engine-driven pumps shall operate for 30 minutes.] 2. Verify operation of relief valves. 3. Verify full level (for engine-driven pumps). 4. Inspect exhaust system for leaks (for engine-driven pumps). 5. For engine driven pumps, start again using second battery set and churn to verify operability. (Where equipment permits, allow water to flow back to the source.)
2 Years	1. Control Valve	<ol style="list-style-type: none"> 1. Operate and lubricate valves to ensure operability.
	2. Controllers	<ol style="list-style-type: none"> 1. Calibrate pressure switches. 2. Exercise circuit breakers and switches to verify operability. 3. Inspect fuses.
	3. Pumps	<ol style="list-style-type: none"> 1. Check coupling alignment to ensure that the shaft is aligned. 2. Check pump shaft end play. 3. Lubricate bearings. 4. Lubricate couplings. 5. Lubricate right-angle drives.
	4. Fuel (engine-driven pumps)	<ol style="list-style-type: none"> 1. Sample fuel to verify quality.
	5. Relief Valves	<ol style="list-style-type: none"> 1. Calibrate valves.
	6. Emergency Power Supply	<ol style="list-style-type: none"> 1. Test to verify availability and capacity for pump motor.
5 Years	1. Pump	<ol style="list-style-type: none"> 1. Conduct flow test to verify pump output. Test may be through a flow meter returning the water to a storage reservoir or through the test header. Recirculation of water to the suction piping is not permitted. In a multi-pump installation, each pump may be tested separately at not less than 100 percent design capacity for 30 minutes.

Table 16 (continued)
Fire pumps ITM tasks

Frequency	Component	Tasks
Weekly (during freezing weather)	1. Tank Heating System (without electric supervision)	1. Verify water temperature. 2. Verify operability of tank heaters.
Monthly	1. Control Valves (without seals, locks, or electric supervision)	1. Verify proper valve position.
Quarterly	1. Water Level (without remote supervision of water level)	1. Verify proper water level in tank.
Annual	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
	2. Water Level (with remote electric supervision of water level)	1. Verify proper water level in tank.
	3. Tank Heating System (with remote electric supervision of water temperature)	1. Verify operability of tank heater (prior to cold weather). 2. Test temperature alarms to verify proper operation. (Maintain thermometer in accordance with manufacturer's recommendations.)
	4. Tank	1. Inspect exterior for condition, damage, corrosion, and accessibility. 2. Verify air pressure (for pressure tanks).
	5. Cathodic Protection	1. Inspect to ensure proper operation.
2 Years	1. Control Valves (including drain valves)	1. Operate valve through entire travel to verify function. 2. Lubricate valves to ensure operability.
	2. Water Level Alarms and Level Indicators	1. Test water level alarms to verify operability and set points.
	3. Tank Vent	1. Inspect and clean tank vents.
3 Years	1. Tank (without cathodic protection)	1. Conduct internal tank inspection to determine condition and amount of corrosion.
5 Years	1. Tanks (with cathodic protection)	1. Conduct internal tank inspection to determine condition and amount of corrosion.
	2. Pressure Gauges	1. Calibrate gauges.
	3. Check Valves	1. Inspect interior of valves.
	4. Level Indicator Test	1. Calibrate level indicator.

Table 17

Water Supply Tanks ITM Tasks

2.14 DRY CHEMICAL SYSTEMS Automatic initiating devices (e.g., heat detectors, smoke detectors) used for system actuation are addressed in paragraph 2.2. Manual

actuation devices (e.g., fusible links, fusible heads, fusible nozzles) are addressed in Table 19. Technical guidance on these tasks is contained in NFPA 17. There is no requirement to replace existing dry chemical systems protecting cooking surfaces, hoods, and ducts. These existing systems that pass the required ITM may continue in service, and these systems may be serviced and repaired as necessary. Existing systems protecting cooking surfaces, hoods, and ducts may not be removed and reinstalled at another location even if the systems met all ITM requirements. All new or replacement systems to protect cooking surfaces, hoods, and ducts must be wet chemical-type systems.

Frequency	Component	Tasks
Semi-Annual	1. Piping	1. Inspect piping for obstructions and proper support.
	2. Storage Vessels	1. Inspect agent container for condition. 2. Verify storage pressure of propellant.
	3. Agent	1. Verify quantity and quality of agent.
	4. Actuators	1. Inspect manual actuators for accessibility. 2. Inspect detection devices (fusible links or heat detectors) for contamination, and clean. 3. Test actuation system without agent release. (Coordinate with annual replacement of fixed temperature sensing elements.) 4. Verify that interfaces (gas shutoff, power shutoff) operate properly.

Table 18
Dry Chemical Systems ITM Tasks

Frequency	Component	Tasks
Annual	1. Actuators	1. Replace fixed temperature sensing elements (fusible links/metal alloy type).
5-12 Years	1. Storage Vessels	1. Conduct hydrostatic test for pressure cylinders in accordance with OSHA and DOT standards.
As Part of Building Inspection	Entire System	1. Visually check: <ol style="list-style-type: none"> a. Pipe hangers. b. Nozzles for obstruction. c. Pipe condition. 2. Ensure: <ol style="list-style-type: none"> a. Detectors unblocked/ uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed. e. Nozzle covers (blow-off caps) in place. f. Pressure gauge within operating range.

Table 18 (continued)
Dry Chemical Systems ITM Tasks

2.15 WET CHEMICAL SYSTEMS. Automatic initiating devices (e.g., heat detectors, smoke detectors) used for system actuation are addressed in paragraph 2.2. Manual actuation devices (e.g., fusible links, fusible heads, fusible nozzles) are addressed in Table 19. Technical guidance on the tasks is contained in NFPA 17A.

Frequency	Component	Tasks
Semi-Annual	1. Piping	1. Inspect piping for obstructions and proper support.
	2. Storage Vessels	1. Inspect agent container for condition. 2. Verify the storage pressure of the propellant.
	3. Agent	1. Verify quantity and quality of agent.

Table 19
Wet Chemical Systems ITM Tasks

Frequency	Component	Tasks
Semi-Annual (Continued)	4. Actuators	<ol style="list-style-type: none"> 1. Inspect manual actuators for accessibility. 2. Inspect detection devices (fusible links or heat detectors) for contamination and clean or replace as necessary. 3. Test actuation system without agent release. (Coordinate with annual replacement of fixed temperature sensing elements) 4. Verify that interfaces (gas shutoff, power shutoff) operate properly.
Annual	1. Actuators	<ol style="list-style-type: none"> 1. Replace fixed temperature sensing elements (fusible metal alloy type).
5-12 Years	1. Storage Vessels	<ol style="list-style-type: none"> 1. Conduct hydrostatic test for pressure cylinders in accordance with OSHA and DOT standards.
As Part of Building Inspection	Entire System	<ol style="list-style-type: none"> 1. Visually check: <ol style="list-style-type: none"> a. Pipe hangers. b. Nozzles for obstruction and proper alignment. c. Riser condition. 2. Ensure: <ol style="list-style-type: none"> a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed. e. Nozzle covers (blow-off caps) in place. f. Pressure gauge within operating range.

Table 19 (continued)
Wet Chemical Systems ITM Tasks

2.16 HALON SYSTEMS. Technical guidance on the tasks is contained in NFPA 12A.

Frequency	Component	Tasks
Annual	1. Piping	1. Inspect piping and nozzles for condition and orientation.
	2. Flexible Hoses	1. Inspect for damage.
	3. Storage Vessels	1. Inspect the exterior of storage containers (tanks, spheres, cylinders).
	4. Agent and Propellant	1. Verify that the quantity of the agent is sufficient. 2. Verify that the pressure of the agent/propellant is sufficient and that the pressure gauge is within operating range.
	5. Actuators	1. Inspect manual actuators for accessibility. 2. Test actuation without agent release.
	6. Auxiliary Equipment	1. Test to verify that interfaces (equipment shutdown, dampers, and door closures) operate properly and are activated by the system actuation.
	7. Valves	1. Verify that valves are in proper alignment.
2 Years	1. Protected Enclosure/Room	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration.
5 Years	1. Cylinders	1. Complete external inspection of non-discharged cylinders to ensure suitability for use.
	2. Flexible Hoses	1. Pressure test hoses to ensure suitability for use.
As Required	1. Agent Cylinders	1. Hydrostatic testing of cylinders is required only when cylinders are to be re-filled/re-charged. Periodic hydrostatic testing is not required.
	2. Protected Enclosure/Room	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration.
	3. After Modification to Compartment/Protected Enclosure	1. If uncertainty exists, follow the enclosure procedures in NFPA 12A.

Table 20
Halon Systems ITM Tasks

Frequency	Component	Tasks
As Part of Building Inspection	Entire System	<ol style="list-style-type: none"> 1. Visually check: <ol style="list-style-type: none"> a. Pipe hangers. b. Nozzles for obstruction. c. Piping for leaks. d. Riser condition. 2. Ensure: <ol style="list-style-type: none"> a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed. e. Nozzle covers in place f. Pressure gauge with operating range.

Table 20 (continued)
 Halon Systems ITM Tasks

WARNING

To prevent accidental release of Halon gas to the environment, do not disconnect and weigh cylinders to accomplish the annual agent quantity verification. Disconnecting cylinders to verify agent quantity damages seals and o-rings. Only liquid level methods should be used to determine agent quantity.

CAUTION

Verification of agent quantity will be accomplished by using a liquid level measuring system that does not require disconnecting and individually weighing the Halon cylinders. Since hydrostatic testing of un-discharged cylinders is no longer required, this will minimize the number of times the cylinders will be disconnected and reconnected to the discharge manifold, reducing leaks and unnecessary agent releases. Liquid level indicators and liquid level index stickers (Hammerhead Tower, Inc, 1720 22nd Street, Santa Monica, CA 90404, 310-828-4595, FAX 310-255-0226) or equal will be used. See Figure 1.

PART NUMBER	DESCRIPTION	PACKAGE QUANTITY
30000	Liquid Level Indicators	16 each
3000010	Liquid Level Index Stickers	8 each

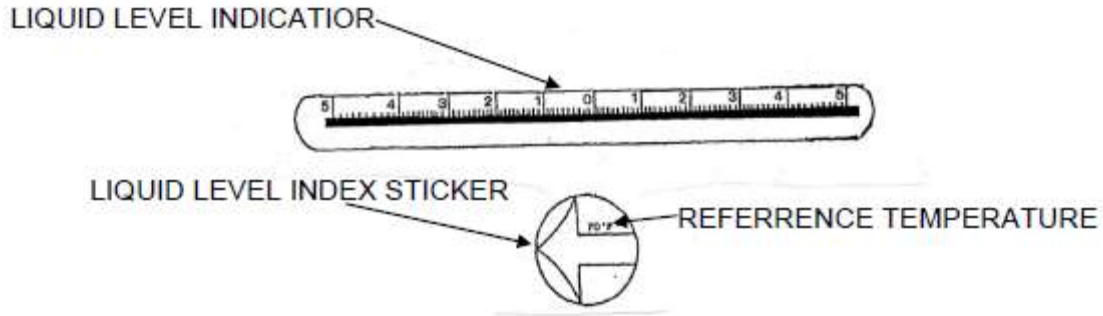


Figure 1
Liquid Level Measuring System

2.17 CLEAN AGENT SYSTEMS. Technical guidance on these tasks is contained in NFPA 2001.

Frequency	Component	Tasks
Annual	1. Piping	1. Inspect piping and nozzles for condition and orientation.
	2. Flexible Hoses	1. Inspect for damage.
	3. Storage Vessels	1. Inspect the exterior of storage containers (tanks, spheres, cylinders).
	4. Agent and Propellant	1. Verify adequate quantity of agent. 2. Verify adequate pressure of agent/propellant and pressure gauge within operating range.
	5. Actuators	1. Inspect manual actuators for accessibility. 2. Test actuation without agent release.

Table-21
Clean Agent Systems ITM Tasks

Frequency	Component	Tasks
Annual (Continued)	6. Auxiliary Equipment	1. Test to verify that interfaces (equipment shutdown, dampers, and door closures) operate properly and are activated by the system actuation.
	7. Valves	1. Verify that the valves are in proper alignment.
2 Years	1. Protected Enclosure or Room	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration.
5 Years	1. Cylinders	1. Perform complete external inspection of non-discharged cylinders to ensure suitability for use.
	2. Flexible Hoses	1. Pressure test hoses to ensure suitability for use.
As Required	1. Protected Enclosure/Room	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration.
	2. After Modification to Compartment/Protected Enclosure	1. If uncertainty exists, follow the enclosure procedures in NFPA 2001.
As Part of Building Inspection	Entire System	<ol style="list-style-type: none"> 1. Visually check: <ol style="list-style-type: none"> a. Pipe hangers. b. Nozzle for obstruction. c. Piping for leaks. d. Riser condition. 2. Ensure: <ol style="list-style-type: none"> a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed. e. Nozzle covers in place. f. Pressure gauge within operating range.

Table-21 (continued)
Clean Agent Systems ITM Tasks

WARNING

To prevent accidental release of extinguishing agents to the environment, do not disconnect and weigh cylinders to accomplish the annual agent quantity verification. Disconnecting cylinders to verify agent quantity damages seals and o-rings. Only liquid level methods should be used to determine agent quantity.

2.18 CARBON DIOXIDE SYSTEMS. Technical guidance on the tasks is contained in NFPA 12.

Frequency	Component	Tasks
Semi-Annual	1. Liquid Level (low pressure carbon dioxide [CO ₂])	1. Verify adequate liquid level with tank level gauge.
Annual	1. Piping and Nozzles	1. Inspect piping for condition and proper support. 2. Check nozzles for obstruction and alignment.
	2. Flexible Hoses	1. Inspect for damage.
	3. Low Pressure Tanks	1. Check level and pressure gauges. 2. Verify valve alignment.
	4. High Pressure Cylinders	1. Inspect for condition and securing.
	5. Actuation System	1. Exercise control panel function, including zone valve operation. 2. Inspect manual actuators for accessibility. 3. Check times and time delay (pre-discharge).
	6. Auxiliary Equipment	1. Test to verify that interfaces (shutdown, door closers, and dampers) operate properly and are activated by the control panel.
2 Years	1. High Pressure Cylinders	1. Verify CO ₂ quantity by weighing cylinders.
As Required	1. Protected Enclosure/Room	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration.
	2. After Modification to Compartment/Protected Enclosure	1. If uncertainty exists, follow the enclosure procedures in NFPA 2001.
As Part of Building Inspection	Entire System	1. Visually check: a. Pipe hangers. b. Nozzles for obstruction. c. Piping for leaks. d. Riser condition. 2. Ensure: a. Detectors unblocked/uncovered. b. Panels secured and indicator lamps functional. c. Notification appliances in place. d. Manual stations in place and unobstructed. e. Nozzle covers in place.

Table 22

Carbon Dioxide Systems ITM Tasks