UFC 3-601-02
7 October 2021
Change 1, 18 April 2025

UNIFIED FACILITIES CRITERIA (UFC)

FIRE PROTECTION SYSTEMS INSPECTION, TESTING, AND MAINTENANCE

UNIFIED FACILITIES CRITERIA (UFC)

FIRE PROTECTION SYSTEMS INSPECTION, TESTING, AND MAINTENANCE

Indicate the preparing activity beside the Service responsible for preparing the document.

U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND

AIR FORCE CIVIL ENGINEER CENTER (Preparing Activity)

Record of Changes (changes are indicated by **1**\ ... /**1**/)

Change No.	Date	Location
1	18 April 2025	Chapters 1 - 3, throughout

This UFC supersedes UFC 3-601-02, dated 8 September 2010.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense agencies, and the DoD field activities in accordance with USD (AT&L) Memorandum, dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA.) Therefore, the acquisition team must ensure compliance with the most stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

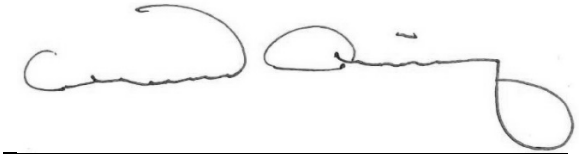
UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Systems Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Defense agencies should contact the preparing Service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD Working Group. Recommended changes with supporting rationale may be sent to the respective DoD Working Group by submitting a Criteria Change Request (CCR) via the internet site listed below.

UFCs are effective upon issuance and are distributed only in electronic media from the following source:

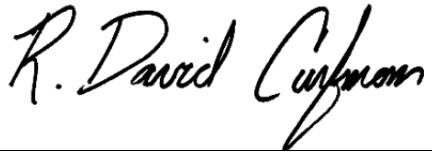
- Whole Building Design Guide web site https://www.wbdg.org/dod.

Refer to UFC 1-200-01, *DoD Building Code)*, for implementation of new issuances on projects.

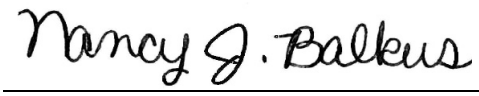
AUTHORIZED BY:



CHRISTINE T. ALTENDORF, PhD, P.E., SES
Chief, Engineering and Construction
U.S. Army Corps of Engineers



R. DAVID CURFMAN, P.E., SES
Chief Engineer and Assistant Commander
of Design and Construction
Naval Facilities Engineering Systems
Command



NANCY J. BALKUS, P.E., SES, DAF
Deputy Director of Civil Engineers
DCS/Logistics, Engineering &
Force Protection (HAF/A4C)
HQ United States Air Force

MICHAEL McANDREW
Deputy Assistant Secretary of Defense
(Construction)
Office of the Assistant Secretary of Defense
(Sustainment)

UNIFIED FACILITIES CRITERIA (UFC)
REVISION SUMMARY SHEET

Document: UFC 3-601-02, *Fire Protection Systems Inspection, Testing, and Maintenance*

Superseding: UFC 3-601-02, dated 8 September 2010, and all subsequent changes.

Description of Changes: This Unified Facilities Criteria (UFC) provides best practice maintenance methods from the DoD, other government agencies, and the private sector for inspection, testing, and maintenance of fire protection systems. Criteria for the following technical areas was added/updated/revised:

- Update Naval Facilities Engineering Command to Naval Facilities Engineering System Command.
- Update Naval Facilities Engineering System Command signature block.
- Adds U.S. Space Force.
- Revises the term “authority having jurisdiction (AHJ)” to conform to UFC 1-200-01 and UFC 3-600-01.
- Life-cycle guidance, Section 2-2.2, “Fire Detection and Alarm System.”
- Fire watch procedures.
- Extreme weather events and natural disasters – guidance for pre-event preparation, trans-event actions, post-event recovery actions.
- Nitrogen generation systems.
- Low-pressure water mist systems.
- Hybrid water mist systems.
- Deletes product information in Halon system ITM
- Fire and smoke barrier opening protectives.
- Heat and combustion products removal and venting systems.
- Ignitable liquid floor drainage assemblies.
- Guidance on AFFF control during ITM (2020 National Defense Authorization Act).
- General guidance on life cycle and obsolescence.
- Air Force guidance on excess features (2008 A4C Policy Letter).
- Navy requirements for contract technicians qualifications.

Reasons for Document:

- This UFC provides updated requirements for inspection, testing, and maintenance (ITM) of fire protection and life safety features in DoD facilities.

Impact:

- Personnel safety and continuity of mission are primary considerations.

Unification Issues:

- None.

TABLE OF CONTENTS

FIGURES

TABLES

This Page Intentionally Left Blank

CHAPTER 1 INTRODUCTION

1-1 BACKGROUND.

This Unified Facilities Criteria (UFC) has been developed from an evaluation of Department of Defense (DoD) facilities, from surveys of maintenance methods, and from selection of the best practices of the DoD, other government agencies, and the private sector. This UFC is based on recognized reliability-centered maintenance (RCM) concepts and reliability-centered risk management. It was prepared using model building maintenance codes, National Fire Protection Association (NFPA®) National Fire Codes®, industry standards, and other recognized standards to the maximum extent feasible. It does not directly adopt the tasks requirements from the model codes. Personnel safety and continuity of mission were primary considerations.

1-2 PURPOSE AND SCOPE.

This UFC provides requirements for inspection, testing, and maintenance (ITM) of active and passive fire protection and life safety features in DoD facilities. Do not deviate from these criteria without prior approval of the Component office of responsibility.

Compliance with criteria issued in accordance with this UFC does not constitute an exception to the public laws. Fire protection criteria must conform to the requirements of this UFC and the NFPA National Fire Codes®, except as modified by this UFC and specifically referenced by this UFC. Additional criteria include portions of the FM Global Property Loss Prevention Data Sheets, as specifically referenced by this UFC.

This UFC for DoD compliance with all U.S.C. Title 10, 15 and 29 occupational health and safety requirements related to fire protection feature maintenance fully meets the intent of the U.S.C. requirements. Any questions related to compliance should be directed to the Component office of responsibility.

1-3 APPLICABILITY.

\1 In addition to the applicability of UFC 1-200-01, paragraph 1-3, this UFC applies to USACE Civil Works. It also applies **/1/** to DoD-leased facilities where DoD, as the lessee, is responsible for maintaining the fire protection and life safety features.

In **\1** Navy-leased **/1/** facilities where the lessor is responsible for maintaining the fire protection and life safety **\1** features **/1/**, the **\1** Navy **/1/** lessee should use this UFC as a guide along with the requirements of the lease contract to the extent possible.

1-3.1 Commercial Facilities on Government Property.

\1 This UFC does not apply to commercially owned and occupied facilities on DoD installations. **/1/** In commercially owned facilities occupied via a ground lease, inspection, testing, and maintenance of fire protection systems will be the sole responsibility of the commercial lessee. The lease agreement may use as guides:

- this UFC;
- the requirements of the local (off-installation) authority having jurisdiction;
- the lessee's internal ITM standards; or
- national consensus codes and standards.

1-4 AUTHORITY.

10 U.S.C. § 1794 requires **\1 ** life threatening **/1/** ITM deficiencies identified in youth program facilities be corrected immediately **\1** or the facility closed by the installation commander **/1/**; non-life-threatening ITM deficiencies **\1** identified in youth program facilities **/1/** may be waived **\1** by the installation commander **/1/** for up to 90 days **\1** while corrections are undertaken **/1/**, after which the **\1** installation commander **/1/** is required to close the facility **\1** when corrections are incomplete **/1/** until corrections are completed.

15 U.S.C. § 272 identifies the necessary consensus technical standards required to implement policy objectives and activities within the area of fire protection engineering including the ITM of installed fire protection features.

1-5 GLOSSARY.

Appendix B contains acronyms, abbreviations, and terms.

1-6 REFERENCES.

Appendix **\1** C **/1/** contains a list of references used in this document. The publication date of the code or standard is not included. Unless otherwise specified, the most recent edition of the referenced publication applies.

1-7 OBJECTIVE.

ITM tasks in this UFC represent the minimum required to achieve a 99 percent overall system reliability in response to an actual fire event.

A byproduct of the reliability centered maintenance analysis is a list of ITM tasks and how often they must be accomplished (frequencies) to achieve the minimum desired 99 per cent (0.99) reliability. The methodology used to develop the ITM tasks in this UFC is summarized in AFCESA/CES Technical Report 01-10, "Risk Based Reliability Centered Maintenance of DoD Fire Protection Systems, 1999 (Defense Technical Information Center AD-A392898)." The model used in the report assumed a system demand of one event in fifty (1/50) years and a task effectiveness (ITM is "done right") of 99 percent. This RCM analysis emphasized task thing to do and is it done right?") and timeliness ("Is it done before a demand?"). The resulting list of tasks and frequencies, therefore, considers frequency and probability effectiveness ("Is it the right of demands and failures.

1-8 CRITERIA.

Use the task frequencies in this UFC in lieu of the tasks and frequencies in the National Fire Codes.

1-8.1 Systems and Applications Not Covered.

When a specific system or application is not addressed by this UFC, follow national building codes, recognized industry standards, and standard engineering practices. In the absence of technical information, contact the DoD Component office of responsibility.

This UFC does not cover acceptance testing, system commissioning, or integrated systems testing. Do not use this UFC for construction contract acceptance or commissioning of fire protection systems or features.

Fire Emergency Services (FES) operations, staffing, and equipment are not addressed in this UFC.

1-8.2 Medical Facilities.

Medical facilities require Joint Commission **\1** accreditation. **/1/** Follow the task frequencies indicated in the related NFPA codes and standards, except when otherwise approved by the Joint Commission.

1-8.3 Conflicts.

If a conflict exists between this UFC and any other DoD document, referenced code, standard, or publication, this UFC takes precedence.

1-9 COMPONENT OFFICE OF RESPONSIBILITY.

The term “authority having jurisdiction (AHJ)” as used in the codes and standards referenced in this UFC means the Component technical representative for fire protection engineering (CFPE) assigned to the Military Service or Defense Component office of responsibility or the Service delegated designated fire protection engineer (DFPE). For additional information on the CFPE and DFPE, see UFC 3-600-01 and Service-specific delegation direction.

The Component offices of responsibility are:

- U.S. Army: HQ USACE/CECW-CE.
- U.S. Navy: NAVFACENGSYSCOM HQ, Chief Fire Protection Engineer
- U.S. Marine Corps: NAVFACENGSYSCOM HQ, Chief Fire Protection Engineer
- U.S. Air Force: AFCEC/CO
- U.S. Space Force: AFCEC/CO

- Defense Logistics Agency (DLA): DS-IE
- National Geospatial-Intelligence Agency (NGA): Security and Installations
- National Reconnaissance Office (NRO): MS&O/ESO
- Washington Headquarters Service (WHS): Office of the Pentagon Fire Marshal
- National Security Agency/Central Security Service: Office of Occupational Health, Environmental and Safety Services (NSA/CSS OHESS).]

1-10 PERSONNEL QUALIFICATIONS.

1-10.1 ITM Tasks.

ITM tasks must be performed by technicians qualified in the maintenance and repair of the specific fire protection system or subsystem.

"Qualified" personnel must only perform ITM and repair tasks on systems for which these personnel have been specifically qualified. Qualified personnel **\1** are permitted to **/1/** supervise other less qualified personnel in the execution of the tasks covered in this UFC. At no time will apprentice-level technicians be allowed to execute the ITM tasks in this UFC without a qualified co-worker on the job site.

1-10.2 Qualified Personnel.

1-10.2.1 Technicians.

\1 Technicians **/1/** meeting any of the following are qualified personnel:

- Recognized journeyman or craftsman-level qualifications for fire protection systems:
  - National Institute for Certification in Engineering Technologies (NICET) Level II **\1** or higher **/1/** certification in Fire Alarm Systems;
  - NICET **\1** Level II certification in Inspection and Testing of Fire Alarm Systems **/1/**;
  - NICET Level II **\1** or higher **/1/** certification in Inspection and Testing of Water-Based Systems; or
  - NICET **\1** certification in **/1/** Special Hazard Suppression Systems.

  NICET Level I personnel must work under the direct supervision of a NICET level **\1** III or IV certified **/1/** technician. **\1** Level IV technicians are authorized to supervise personnel across all technical areas covered in this UFC.) **/1/**
- Other recognized journeyman or craftsman-level qualifications for the specific fire protection feature, formalized labor organization-based journeyman training, or similar programs.

- Completion of the Fire Suppression Systems Maintenance course (J3AZR3E451 01FB) at the Technical Training Center, Sheppard Air Force Base, Texas. The 82nd Training Wing, 782nd Training Group, 366th Training Squadron provides engineer craftsman skills training for all DoD branches and has both Army and Navy detachments assigned to the squadron (366trs.cc@us.af.mil).
- Individually qualified or endorsed by an equipment manufacturer for the specific equipment item maintained.
- A valid, current qualification or license from any state (or local jurisdiction if delegated authority by the state). Local jurisdictions and other organizations may require varying levels of continuing education to maintain recognized journeyman or technician-level qualifications.
- Military personnel holding specific Service qualifications equivalent to journeyman or craftsman technicians and approved by their unit commander.

In OCONUS locations, local nation technicians must hold either one of the previously listed qualifications or a national/local license issued by the government where the installation is located. Individual Status of Forces Agreements (SOFA) will take precedence where technical qualifications are addressed. Overseas locations **\1** will **/1/** contact their command Fire Protection Engineering office (or Component office of responsibility) for **\1** additional **/1/** guidance on local qualification requirements.

1-10.2.2 BOS Contractors.

Installation or base operating support (BOS) contractors must have at least one qualified **\1** supervisor **/1/** technician (1-10.2.1) present on the installation when contractor personnel are executing ITM and repair tasks. All ITM and repair tasks will be accomplished under the supervision of a qualified technician.

Navy BOS contractors must have the specific qualifications identified in Appendix A for Fire Protection ITM technicians.

1-10.2.3 Other Contractors.

Other Service contractors performing ITM and repair tasks must have at least one qualified technician (1-10.2.1) present on the job site when contractor personnel are executing ITM and repair tasks.

Other Navy contractors must have the specific qualifications identified in Appendix A for Fire Protection ITM technicians.

1-10.3 Other Inspections.

This UFC also lists inspection tasks **\1** to **/1/** be performed during other regularly scheduled facility inspections or evaluations that are not part of the ITM requirements

covered herein. Qualified fire prevention personnel, safety personnel, maintenance technicians, or other individuals **\1** are qualified to **/1/** perform these inspection tasks.

1-11 RECORDS.

Each installation must maintain a permanent record of completed ITM tasks in accordance with each agency's program for reoccurring facility maintenance record keeping. Records **\1\ /1/ \1** must be readily available to craft persons and supervisors **/1/**. Where no agency-wide programs exist, records must be developed locally. Records must be maintained for every facility and include, as a minimum, each ITM task, date scheduled, date completed, and the technician completing the task.

When ITM actions modify or change systems or features from the original as-built configuration, the ITM activity is responsible for identifying the required changes to the maintainer of the as-built records.

1-12 SYSTEM IMPAIRMENT OR OUT-OF-SERVICE TAGGING.

System ITM technicians must physically mark any impaired or out-of-service fire protection feature using a red tag.

Impaired and out-of-service tags must provide the following minimum information:

- identification of the system inspected
- employer of the technician performing the inspection
- name of technician
- licenses or certification information required by the component office of responsibility
- interval of inspection

Inspection tags are to be made of durable, weatherproof, colorfast material and must be securely attached to the system pressure gauge, control panel, or other readily visible part of the system.

1-13 SYSTEM IMPAIRMENT OR OUT-OF-SERVICE NOTIFICATION/ WARNING.

Building managers must notify building occupants, users, and the public whenever any of the systems specified in Chapter 2 are either out of service or impaired **\1** and increasing **/1/** risk to any occupants. (Occupational Safety and Health Administration [OSHA] general industry standards are contained in Title 29, Code of Federal Regulations [CFR], Parts 1910.160(b)(2) Occupational Safety and Health Standards, Fire Protection, Fixed extinguishing systems, general and 1960.26(b)(5) Basic Program Elements For Federal Employees Occupational Safety and Health, Programs and Related Matters, Subpart D – Inspection and abatement, Conduct of inspections).

The sign shown in Figure 1-1 must be posted by the facility manager, custodian, official in charge of the workplace, or a person empowered to act, **\1\ /1/** at all principal public and employee entrances to the building. The sign must appear as follows:

- 7 inches high by 10 inches wide in an American National Standards Institute (ANSI) Z535.2-2011-compliant format
- safety orange background color
- black type and graphic
- Arial font (ANSI Z535.1 2017)

\1\ Note: This sign can be downloaded as an editable PDF from https://www.wbdg.org/dod/ufc/ufc-3-601-02 for local printing. **/1/** Signs complying with this format **\1** can **/1/** be ordered from many commercial safety sign manufacturers on a wide variety of materials. **\1** Commercial **/1/** computer software **\1** and hardware **/1/** is available to print this and other safety signs on color printers.

Figure 1-1 System Out-of-Service or Impaired Sign

1-14 REPAIR OR CORRECTION OF IMPAIRMENTS TO SYSTEM OR FEATURE PERFORMANCE.

\1

1-14.1 Response to Abnormal Conditions.

NFPA 72 Chapter 26 provides guidance for the response to abnormal conditions received at the proprietary supervising/alarm receiving centers.

- Alarm signals – Notify the appropriate responders for immediate response.
- Supervisory signals – Dispatch personnel to arrive within 2 hours to investigate and correct the abnormal conditions.
- Trouble signals – Dispatch personnel to arrive within 4 hours to initiate maintenance and repair actions as necessary.

/1/

1-14.2 Impairment Correction.

Correct impairments affecting the performance of installed fire protection features immediately when identified using the highest priority in the appropriate work identification and management system. These processes must meet the OSHA general industry standards requirements for repair or correction of impairments (29 CFR Part 1910.160(b)(2) and 160(b)(6)).

1-14.3 Maintenance Activity Notifications.

The maintenance activity must notify the local fire emergency service authority and the facility or area user when impairments cannot be corrected immediately when identified. The maintenance activity must also advise the facility or area user of the need to post the Warning sign, Figure 1-1, Out-of-Service or Impaired Sign. The fire authority must advise and consult with the facility or area user to determine the immediate measures that must be taken to ensure personnel safety and mission continuity.

1-14.4 Extended Impairment Measures.

When the impairment will exist for more than 72 hours, the local maintenance activity, the local fire authority, the local safety authority, and the facility or area user must jointly develop written compensatory measures to ensure personnel safety and, to the maximum degree possible, mission continuity. **\1\ /1/** The facility user is the lead to coordinate the compensatory measures package. The jointly developed package must also identify the remaining mission risk exposure. In the absence of compensatory measures, evacuate the facility or stop operations. Implementation of compensatory measures must not reduce the priority of the correction of the impairment.

1-14.4.1 Mitigating Measures.

The need for mitigating measures is typically determined on a case-by-case basis. This considers the building, occupancy type, nature and duration of impairment, building occupancy level during the impairment period, active work being conducted on the fire protection features during the impairment, condition of other fire protection systems and features (for example, sprinklers, structural compartmentation), and hazards and assets at risk.

Appropriate mitigating measures **\1\ /1/** range from simple occupant notification to increased fire safety checks or inspections by user or installation fire and safety personnel to full-time fire watch; for example, measures **\1\ /1/** range from minor operational changes to completely ceasing operations. Determining factors vary from testing-related impairments and maintenance activities during **\1** routine **/1/** business through extensive impairments to high-value, high-hazard situations.

1-14.4.2 New Extended Impairments.

The maintenance activity must inform installation and operational commanders of new impairments not corrected within 72 hours, of the jointly developed compensatory measures being recommended, and of the remaining mission risk exposure.

1-14.4.3 Commander Actions.

Commanders **\1** can **/1/** require evacuation of the workplace until impairments are corrected (OSHA general industry standard: 29 CFR Part 1910 Subpart L App A, *Fire Protection*).

Commanders **\1** can **/1/** also limit operations and have an emergency action plan **\1** specifying **/1/** evacuation actions (OSHA general industry standard: 29 CFR Part 1910 Subpart L App A).

1-14.4.4 Fire Watch.

1-14.4.4.1 Fire Watch Personnel Qualifications.

A fire watch is a dedicated function: the individual(s) assigned fire watch responsibilities as mitigating or compensatory measures would not be expected to have other duties beyond fire safety, occupational safety, or security. **\1\ /1/** Dedicated fire safety, occupational safety, or security personnel **\1\ /1/** can be assigned to conduct mitigating or compensatory fire watch activities as part of their functions.

Fire Watch personnel must also be trained in the use of portable fire extinguishers.

1-14.4.4.2 Fire Watch Procedures.

When fire watches are specified as a mitigating or compensatory measure in response to fire protection system impairments, comply with the following requirements:

- Fire watch personnel must make rounds visually observing the area under watch at scheduled times. **\1\ /1/** The area under watch is observed at least once an hour; however, more frequent observation may be necessary.
- Fire watch personnel must keep a record of all time periods of duty, including a signed log entry or other auditable reporting method for each time the facility was patrolled.
- Fire watch personnel must use the telephone or radio equipment to summon aid in case of an emergency.
- Fire watch personnel must notify building occupants in case of an emergency and evacuation is necessary.
- Impairment of fire sprinkler or fire alarm systems protecting the entire facility will require the rounds include all spaces throughout all levels, including the inspection of basements, attics, and concealed spaces.
- Impairment of fire sprinkler or fire alarm systems protecting a portion of the building will require the rounds include all spaces impacted by the impairment.

1-15 SYSTEM IMPAIRMENTS AND REPAIRS AND CORRECTIONS REPORTING.

The maintenance activity must regularly inform installation and operational commanders, not less than twice a year, of the system impairments, compensatory measures in place, projected correction completions, and corrections completed since the last report.

1-16 EXTREME WEATHER EVENTS AND NATURAL DISASTERS.

Extreme weather events, hurricanes, tornados, and severe cold temperature events, as well as other natural disasters **\1** including **/1/** earthquakes and wildland fires, can impact the availability and performance of fire protection systems **\1** and life safety features **/1/**. Fire protection system impacts include broken piping, broken sprinklers, water damage to electrical and electronic system components, and damage to the utility infrastructure serving these systems. These events also increase the risk of accidental fires.

When sufficient warnings are provided, ITM activities and building inspection activities **\1\ /1/** reduce the impact of these events on the fire protection systems. Additional ITM activities during and after these events can **\1\ /1/** help to reduce property damage and bring the facilities back online sooner.

1-16.1 Hurricanes, Typhoons, and Tropical Storms.

Hurricanes, typhoons, and tropical storms **\1\ /1/** cause building damage due to high wind velocities, impacts from wind-borne objects, and water damage due to heavy rains

and local flooding. Advance notice of these storm events does allow time to initiate some ITM tasks **\1\ /1/ \1** to **/1/** reduce the impact of these events on fire protection systems.

1-16.1.1 Pre-Event Actions.

Pre-event ITM actions include:

- Work with installations facilities maintenance personnel to make sure the building envelope is adequately secured. If doors, windows, skylights, and other building openings are broken or not adequately secured, bring it to the attention of installation facilities maintenance personnel so these conditions can be corrected, or temporary measures can be put in place to secure the buildings.
- Verify electrical and fire alarm junction boxes are closed up, conduit is closed up, and the fire alarm panels are closed up and secured.
- Verify firewater storage tanks are filled.
- Verify sufficient fuel supplies are provided for engine driven fire pumps and emergency generator installations.
- Verify fire pump houses are provided with protection from flooding. Ensure drains in the pump rooms are flowing adequately and provide sand bags at pump room entrances if necessary, to prevent flooding of the pump room in low lying areas.

1-16.1.2 Actions During the Event.

Safety of all persons sheltering on the installation regardless of affiliation takes priority during these storm events. Inspection, damage control activities, and system repairs will need to wait until hazardous conditions subside and these activities can be undertaken without risk to personnel.

1-16.1.3 Post Event Actions.

Post event ITM actions include:

- Initial ITM tasks **\1\ /1/** focus on damage control: shutting down damaged systems to reduce water damage **\1** and control of fire extinguishing agents **/1/**.
- Perform visual inspections of all systems, including all system piping and equipment, to identify system damage and to prioritize system repairs.
- Verify radio fire alarm reporting antennas are still in place and connected.
- Verify water supply availability to each facility. Work with installation facility and utilities maintenance personnel to identify damage and repair requirements for the installation water supply.

- Verify if fire alarm systems have been subjected to water damage. Identifying specific alarm system trouble conditions at the fire alarm control panel (FACP) can help to investigate and prioritize system repairs.
- Initiate system impairment procedures for any buildings re-occupied prior to system repairs being completed.
- When the water supply feeding the facility has been damaged, the underground piping needs to be adequately flushed.
- Any water-based fire suppression systems damaged, or are located in buildings structurally damaged, **\1** must **/1/** be subjected to hydrostatic testing prior to putting the systems back in service.

1-16.2 Tornados.

Tornados **\1\ /1/** cause damage to buildings and building systems due to high wind velocities, impacts from wind-borne objects, and water damage.

1-16.2.1 Pre-Event Actions.

Tornado warnings can provide some advanced warning to seek shelter, but there is not usually sufficient time to initiate any pre-event ITM tasks after these warnings. Prior to tornado season, however, ITM actions include:

- Work with installation facilities personnel to **\1** ensure **/1/** the building envelope is adequately secured. If doors, windows, skylights, and other building openings are broken or not adequately secured, bring it to the attention of installation facilities personnel so these conditions can be corrected, or temporary measures can be put in place to secure the buildings.
- Verify electrical and fire alarm junction boxes are closed up, conduit is closed up, and the fire alarm panels are closed up and secured.
- Verify firewater storage tanks are filled.
- Verify sufficient fuel supplies are provided for engine driven fire pumps and emergency generator installations.

1-16.2.2 Actions During the Event.

Safety of all persons sheltering on the installation regardless of affiliation takes priority during these tornado events. Inspection, damage control activities, and system repairs will need to wait until hazardous conditions subside and these activities can be undertaken without risk to personnel.

1-16.2.3 Post Event Actions.

Post event ITM actions include:

- Initial ITM tasks **\1\ /1/** focus on damage control, shutting down damaged systems to reduce water damage **\1** and control of fire extinguishing agents **/1/**.
- Perform visual inspections of all systems, including all system piping and equipment, to identify system damage and to prioritize system repairs.
- Verify water supply availability to each facility. Work with installation facility and utilities maintenance personnel to identify damage and repair requirements for the installation water supply system.
- Initiate system impairment procedures for any buildings re-occupied prior to system repairs being completed.
- When the water supply feeding the facility has been damaged, the underground piping needs to be adequately flushed.
- Any water-based fire suppression systems damaged or located in buildings structurally damaged **\1** must **/1/** be subjected to hydrostatic testing prior to putting the systems back in service.

1-16.3 Flooding and Extreme Rain Events.

Flooding and extreme rain events cause damage to buildings and building systems due to water infiltration and water immersion.

1-16.3.1 Pre-Event Actions.

Pre-event ITM actions include:

- Work with installation facilities personnel to make sure the building envelope is adequately secured. If doors, windows, skylights, and other building openings are broken or not adequately secured, bring it to the attention of base facilities personnel so these conditions can be corrected, or temporary measures can be put in place to secure the buildings.
- Verify electrical and fire alarm junction boxes are closed up, conduit is closed up, and the fire alarm panels are closed up and secured.
- Verify fire water storage tanks are filled.
- Verify sufficient fuel supplies are provided for engine driven fire pumps and emergency generator installations.
- Verify fire pump houses are provided with protection from flooding. Ensure drains in the pump rooms are flowing adequately and provide sand bags at pump room entrances if necessary to prevent flooding of the pump room in low lying areas.

1-16.3.2 Actions During the Event.

Safety of base personnel and contractor personnel takes priority during these heavy rain and flood events. Inspection, damage control activities, and system repairs will need to wait until hazardous conditions subside and these activities can be undertaken without risk to personnel.

ITM actions during the event include:

- Periodic inspection of accessible fire pump installations to ensure pump facilities remain protected from flooding.
- Periodic inspection of fire water storage tanks to identify tank damage and required repairs.
- Respond to system activations or trouble conditions to provide damage control during the event, when safe to do so.

1-16.3.3 Post Event Actions.

Post event ITM actions include:

- Initial damage control: shutting down damaged systems to reduce water damage **\1** and controlling fire extinguishing agents **/1/**.
- Perform visual inspections of all systems, including all system piping and equipment, to identify system damage and to prioritize system repairs.
- Verify water supply availability to each facility. Work with installation facility and utilities maintenance personnel to identify damage and repair requirements for the Installation water supply system.
- Initiate system impairment procedures for any buildings re-occupied prior to system repairs being completed.
- When the water supply feeding the facility has been damaged, the underground piping needs to be adequately flushed.
- Any water-based fire suppression systems damaged or located in buildings structurally damaged **\1** must **/1/** be subjected to hydrostatic testing prior to putting the systems back in service.

1-16.4 Arctic Vortices and Other Low Temperature Extremes.

Sustained freezing temperatures can lead to frozen fire protection piping, resulting in pipe failures, water leakage, and property damage, in addition to rendering the fire protection systems out of service. System design and installation takes this freezing potential into account; therefore, ITM activities associated with systems in areas subject to severe cold temperatures must focus on the equipment provided to protect these systems from freezing.

Low temperature events can occur via two different modalities; the first is a known weather event where the installation weather office can issue advance weather warning allowing for pre-event actions to prevent damage; the second is an unplanned/ unanticipated utility system failure requiring emergency response action in a compressed time frame to prevent adverse facility/mission impacts.

1-16.4.1 Pre-Event Actions.

Several ITM tasks identified in the ITM tables in Chapter 2 for water-based fire protection systems involve equipment provided to prevent these systems from freezing. These tasks need to be scheduled prior to the onset of cold weather so the equipment functions as required.

Pre-event actions include:

- Work with Installation facilities personnel to make sure the building heating systems are operating properly. If building heating systems do not appear to be operating properly, bring it to the attention of Installation facilities personnel so these conditions can be corrected.
- Verify dry-pipe sprinkler systems are in good operating condition.
- Verify drum drips are in good condition and are drained.
- Verify ball drips are in operating condition.
- Where low temperature alarms are provided, these sensors and their alarm outputs **\1** must **/1/** be checked for proper operation and alarm notification.
- Verify eaters provided in non-occupied fire pump rooms, fire riser rooms, and other similar locations are working properly, and thermostats are set appropriately.
- Verify proper operation of firewater storage tank heaters where provided.

1-16.4.2 Actions During the Event.

Action plans addressing utility system failures are based on the anticipated duration of the utility outage. The most critical utilities are electrical, steam, hot water and/or an area wide facility control system maintaining the facility environmental systems.

ITM actions during the event include:

- Monitor building temperatures and low temperature alarms, particularly in unoccupied or low-occupancy buildings. This includes fire riser rooms, fire pump installations, and firewater storage tank installations.
- If sprinkler systems need to be shut down due to low temperature conditions, implement system impairment procedures.

1-16.5 Earthquakes.

Severe earthquakes can result in building structural damage or failure, failure of sprinkler system piping, and sprinkler system piping damage from impacting building walls and ceilings, or other structural members or equipment. The local utility infrastructure supporting the fire protection systems **\1** can **/1/** be damaged in the earthquake.

Post-earthquake building fires are a significant risk due to structural damage and damage to building utilities resulting from an earthquake.

1-16.5.1 Pre-Event Actions.

Although there is typically no warning of a strong earthquake event, ITM tasks identified in the ITM Tables in Chapter 2 are important to ensuring the survivability of these fire protection systems during an earthquake. Performing the required visual inspections of piping, hangars, and bracing improves the robustness and survivability of these systems.

Also, keep firewater storage tanks filled, and ensure adequate fuel supplies for engine driven fire pumps and generators are maintained at all times.

1-16.5.2 Post-Earthquake Actions.

- Initially, ITM tasks focus on damage control: shutting down damaged systems to reduce water damage **\1** and controlling fire extinguishing agents **/1/**.
- Perform visual inspections of all systems, including all system piping and equipment, to identify system damage and to prioritize system repairs.
- Verify water supply availability to each facility. Work with installation facility and utilities maintenance personnel to identify damage and repair requirements for the installation water supply system.
- Initiate system impairment procedures for any buildings re-occupied prior to system repairs being completed.
- When the water supply feeding the facility has been damaged, the underground piping needs to be adequately flushed.
- Any water-based fire suppression systems damaged or located in buildings structurally damaged **\1** must **/1/** be subjected to hydrostatic testing prior to putting the systems back in service.
- Fire alarm systems **\1** will **/1/** have been subjected to mechanical damage as well. Identifying specific alarm system trouble conditions at the FACP can help to investigate and prioritize system repairs.
- After initial fire sprinkler system visual inspections have been completed, conduct an investigation of the underground fire protection supply piping.

This **\1** includes **/1/** hydrant flow testing and fire sprinkler system main drain testing. Results of the post event tests **\1** must **/1**/ be compared to previous test results to identify any compromised underground piping.

1-16.6 Wildland Fires.

Wildland fires can result in large-scale destruction to installation facilities and utilities. Although building fire protection systems **\1** can **/1/** be overwhelmed by the severe fire exposure from wildland fires, operational sprinkler systems within exposed buildings reduce building damage and reduce the fire exposure to adjacent buildings.

1-16.6.1 Pre-Event Actions.

Pre-event ITM actions include:

- Verify firewater storage tanks are filled.
- Verify sufficient fuel supplies are provided for engine driven fire pumps and emergency generator installations.
- Verify fire hydrants are accessible and vegetation is not blocking or hindering access to hydrants.
- Work with installation facilities personnel to make sure buildings are adequately secured. If doors, windows, skylights, and other building openings are broken or not adequately secured, bring it to the attention of installation facilities personnel so these conditions can be corrected, or temporary measures can be put in place to secure the buildings.

1-16.6.2 Actions During Wildfire Events.

Safety of base personnel and contractor personnel takes priority during wildland fire events. Inspection, damage control activities, and system repairs will need to wait until hazardous conditions subside and these activities can be undertaken without risk to personnel.

ITM actions during the event include:

- Periodic inspection of accessible fire pump installations to ensure pump facilities remain operational and adequate fuel supplies are being maintained for fire pumps and emergency generators.
- Periodic inspection of firewater storage tanks to identify any tank damage, and to verify water supplies remain available for firefighting use.
- Respond to system activations or trouble conditions to provide damage control during the event, if safe to do so.

1-16.6.3 Post Wildland Fire Actions.

- Initially ITM tasks focus on damage control: shutting down damaged systems to reduce water damage **\1** and controlling fire extinguishing agents **/1/**.
- Perform visual inspections of all systems, including all system piping and equipment, to identify system damage and to prioritize system repairs.
- Verify water supply availability to each facility. Work with installation facility and utilities maintenance personnel to identify damage and repair requirements for the installation water supply system.
- Initiate system impairment procedures for any buildings re-occupied prior to system repairs being completed.
- When the water supply feeding the facility has been damaged, the underground piping needs to be adequately flushed.
- Any water-based fire suppression systems damaged or located in buildings structurally damaged, must be subjected to hydrostatic testing prior to putting the systems back in service.

1-17 LIFE CYCLE/OBSOLESCENCE.

Fire protection features have widely-varying operational life cycles and degrees of obsolescence. Some of these are code- or standard-driven and are addressed in the Chapter 2 text and tables requiring specific replacement schedules. Other fire protection feature life cycles are driven by more esoteric requirements **\1** determining **/1/** when components and systems must be replaced. Simply being old does not make features obsolesce.

- Manufacturers' expiration dates: Manufacturer establishes a specific expiration date based on manufacture date or installation date; target plan and program for replacement within one year of the date.
- Manufacturer's modification or updates: Failure to install manufacturer recommended modifications or updates within one year of recommended installation date. Target plan and program installation with the manufacturer's recommended time frame.
- Manufacturer's obsolescence: Manufacturer announces phase-out or ceases to support a product line or model. Target plan and program replacement for not later than one year after manufacturer's end of support.
- Software upgrades or updates: Failure to install vendor required or recommended upgrades or updates within 30 days of vendor recommended installation date.

- Software obsolescence: Vendor announces they will cease to provide maintenance and update support for software. Target plan and program replacement for not later than one year after manufacturers' end of support.

1-18 EXCESS FEATURES \1\ (AIR FORCE ONLY) /1/.

For Air Force, removal of existing installed fire protection features in excess of the minimum requirements for new construction established in UFC 3-600-01 is authorized in accordance with Air Force policy established by HQ USAF/A7C Memorandum, "Excess Fire Protection Features," 17 June 2008, and codified in this UFC. Removal of **\1** unrequired **/1/** features reduces unnecessary ITM requirements and unnecessary sustainment, repair, and maintenance costs. Features will not be removed reducing fire protection below the new construction level mandated in UFC 3-600-01. Consult with AFCEC/COS (afcec.rbc@us.af.mil) for additional information and guidance.

\1

1-19 REPLACEMENT PARTS.

Replacement parts must conform to the original equipment manufacturer's recommendations. When required parts are not available, see paragraph 1-16. Replace listed parts with listed parts conforming to the original listing standard or current edition of the standard when indicated by the manufacturer's recommendations. Listing by the original listing nationally recognized testing laboratory is not required.
/1/

This Page Intentionally Left Blank

CHAPTER 2 FACILITY SYSTEMS

2-1 ITM METHODOLOGY.

The objective of ITM for fixed fire protection systems is to assure systems will function on demand. RCM analysis identifies any defects responsible for system malfunction and how they can be detected and corrected before a fire.

2-1.1 Features Requiring Maintenance.

All fire protection and life safety features installed in DoD facilities must be maintained in accordance with this UFC. Features disabled in place pending removal are not considered installed **\1** and do not require maintenance when appropriately locked and tagged as out-of-service pending removal **/1/**.

2-1.2 Non-required Features.

A critical component of any RCM program is ensuring the components being maintained are required to be present. Remove fire protection features not specifically required by UFC 3-600-01 to minimize the maintenance workload burden. Non-required features can be abandoned in place pending final removal if all public interface devices (for example, manual fire alarm pull stations) are removed.

2-2 ITM TASK DESCRIPTIONS AND FREQUENCIES.

2-2.1 Task Descriptions.

The ITM tasks in Tables 2-1 through 2-31 and 3-1 through 3-3 were selected to ensure the fire protection system will function on demand. Technical tasks must be performed according to the manufacturer's instructions.

2-2.1.1 Electrically Supervised Components.

Electrical 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 supervisory device (for example, 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 transmits supervisory and trouble conditions to a remote supervising station (for example, installation fire reporting system).

2-2.1.2 Event-Driven Tests.

Some tests **\1** will **/1/** be event driven. For example, a main drain test is specified to verify the open condition of a control valve on the water supply to a sprinkler or water spray system and needs to be performed when the control valve has been operated for maintenance or testing.

2-2.1.3 Excluded National Fire Code Tasks.

Some tasks recommended in the National Fire Codes are not included in these frequency tables. The detailed analysis documented in AFCESA/CES Technical Report 01-10, *Risk Based Reliability Centered Maintenance of DoD Fire Protection Systems,* 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 not significantly impair the system. The deleted tasks are not required to be accomplished and must not be included in reoccurring maintenance programs.

2-2.1.4 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 must be incorporated into each DoD Component activity's fire prevention, safety, facility condition, and related inspection or evaluation program.

2-2.1.5 Fire Extinguishers.

Maintenance of portable fire extinguishers and fire extinguisher cabinet maintenance is not addressed in this UFC.

2-2.2 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 is contained in the "Inspection, Testing, and Maintenance" section of NFPA Standard 72 (NFPA 72), *National Fire Alarm and Signaling Code*®. Residential smoke alarms are addressed in Chapter 3 of this UFC.

WARNING

Fire alarm systems with abnormal conditions (multiple 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.
(Table 2-1, Task Monthly, 1.2 and Task Annual 2.5)

WARNING

Any fire alarm system with more than three unexplained activations (fire indication conditions) within a 6-month period is experiencing a system instability requiring evaluation by a qualified technician or engineer; **\1** implement **/1/** appropriate corrective measures immediately

CAUTION

Alarm systems in a single TROUBLE condition **\1** must **/1/** be able to transmit an ALARM condition while in trouble; however, because a TROUBLE condition is not a normal or acceptable alarm system status, immediate maintenance action is indicated. (Table 2-1, Task Monthly, 1.2; Task Annual 2.5; and Table 2-2, Task Annual 1.5)

CAUTION

The ITM tasks specified also apply to fire suppression releasing panels and fire detection devices for fire suppression releasing service. Personnel testing systems must be knowledgeable of and experienced with the operation of these fire suppression systems and the hazards involved with inadvertent activations of these systems. Prior to performing any of the testing described in the tables, secure the fire suppression system from inadvertent activation by disconnecting release solenoids or actuators; closing control valves; or performing other actions required to secure the systems during the testing period. **\1** Do not use bypass switches employing a system program as the sole means of safeguarding a releasing system. **/1/** (Table 2-1, Task Annual 3.b.1 and 3.b.6; and 2-year Tasks 2.1 and 2.4)

Table 2-1 Fire Detection and Alarm System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Panels and Annunciator Equipment (unmonitored only)	1. Inspect panel condition (connections, fuses, light-emitting diodes [LEDs]). 2. Resolve any trouble indications.
Annually	1. Control Panel and Annunciator Equipment (monitored)	1. Test to verify proper receipt of alarm, supervisory, and trouble signals (inputs, one of each type) and operation of notification appliances and auxiliary functions (outputs, one of each type). 2. Verify all lamps and LEDs are illuminated. 3. Load test backup batteries using a meter (when provided). 4. Verify condition of power supplies and batteries. 5. Resolve any trouble indications.
	2. Remote Power Supplies and Notification Appliance Circuit Power Extenders	1. Verify all lamps and LEDs are illuminated. 2. Load test backup batteries using a meter (when provided). 3. Verify condition of power supplies and batteries.
	3. Initiating Devices: a. Manual Fire Alarm Stations	1. Verify station is accessible (visual).
	b. Radiant Energy-Sensing Detectors (optical detectors)	1. If used for releasing service, inhibit releasing function. 2. Test to verify alarm initiation and receipt. 3. Verify no facility change affects performance. 4. Verify alignment of the positioning markings at all adjustment locations. 5. If used for releasing service, configure system for automatic operation. 6. If used for releasing service, restore to releasing service.
	c. Gas Detectors	1. Test to verify alarm initiation and receipt. 2. Verify no facility change affects performance.

Frequency	Component	Tasks
	d. Carbon Monoxide Detectors	1. Test to verify alarm initiation and receipt. 2. Verify no facility change affects performance.
	4. Notification Appliances and Voice Communication (telephone, speakers, horns, and strobe lights)	1. Test to verify operability.
	5. Digital Alarm Transmitters and Receivers	1. Test to verify operability.
	6. Radio Alarm Transmitters and Receivers	1. Test to verify operability.
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 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 affects performance.
	d. Supervisory Devices (low air pressure, temperature, water level)	1. Test to verify initiation and receipt of supervisory alarm.
	2. Fire Suppression Devices (low air pressure, temperature, water level)	1. Inhibit releasing function. 2. Test to verify proper operation and system response. 3. Configure system for automatic operation. 4. Restore releasing function.

Frequency	Component	Tasks
5 Years	1. Smoke Detectors (Remove devices not required by UFC 3-600-01.)	1. Test detector sensitivity to ensure the detector has remained within its listed and marked sensitivity range (or 4 percent obscuration light gray smoke, if not marked).
10 Years	1. Carbon Monoxide Detectors	1. Replace detectors.
	2. Radiant Energy-Sensing Detectors (optical detectors)	1. Verify manufacturer's service life for detection elements. UV detection element's **\1\ /1/** service life is 10 years; others vary by manufacturer. 2. Replace detectors exceeding manufacturer's recommended service life for detection elements.
	3. **\1** Rate Compensated Detectors **/1/**	1. **\1** Replace detectors exceeding manufacturer's recommended service life. **/1/**
	4. **\1** Smoke Alarms (single station or interconnected **/1/**	1. **\1** Replace smoke alarms. **/1/**
20 Years **\1** and As Part of Other Building Inspection (not part of ITM requirements) **/1/**	1. Smoke Detectors **\1** not monitored internally or by the control panel for sensitivity or obscuration as appropriate, **/1/** (single-station detectors, and system detectors)	1. Replace detectors.

Frequency	Component	Tasks
	2. Air Sampling Smoke Detectors	1. Replace detection element.
	3. Control Panel and Annunciator Equipment	1. Verify manufacturer's service life for control elements. 2. Verify manufacturer has continued technical and parts support for the specific model. 3. Replace control equipment exceeding manufacturer's recommended service life limits or if the manufacturer has ceased to provide technical and parts support.
	4. Entire System	1. Visually check: 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.

2-2.3 Mass Notification Systems.

Guidance on these tasks is contained in the *Inspection, Testing, and Maintenance* section of NFPA 72.

The inspection, testing, and maintenance of combined fire alarm and mass notification systems must comply with Section 2-2.2 in addition to this section.

Table 2-2 Mass Notification System ITM Tasks

Frequency	Component	Tasks
Annually	1. Fire Alarm Control Panel with Integrated Mass Notification (FMCP)	1. Test to verify proper receipt of signals (inputs) from Local Operating Consoles (LOCs) and the installation's site-wide system and operation of notification appliances and auxiliary functions (outputs). 2. Verify all lamps and LEDs are illuminated. 3. Load test backup batteries using a meter (when provided). 4. Verify condition of power supplies and batteries. 5. Resolve any trouble indications.
	2. LOCs	1. Verify station is accessible (visual).
	3. Notification Appliances and Voice Communication (speakers and strobe lights)	1. Test to verify operability.
	4. Text Message Signs	1. Test to verify operability.
2 Years	1. FMCP and LOCs	1. Operate microphone to verify proper operation. 2. Operate all pre-recorded message activation switches to verify proper operation. 3. Operate all notification zone selection switches, if provided, to verify proper operation.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. FMCP and LOCs are not blocked or obstructed. b. Panels secured and indicator lamps functional. c. Notification appliances in place. 2. Exercise notification appliances for audibility, clarity, and visibility.

2-2.4 Installation Fire Alarm Reporting Systems.

Reserved

2-2.5 Carbon Monoxide (CO) Detection.

Carbon monoxide detectors installed as initiating devices on fire alarm and detection systems are covered in Section 2-2.2. ITM requirements for single station carbon monoxide alarms installed in buildings without fire alarm systems are provided below. Guidance on the tasks is contained in the "Inspection, Testing, and Maintenance" section of NFPA 72.

Table 2-3 Carbon Monoxide (CO) Detection ITM Tasks

Frequency	Component	Tasks
Annually	1. Single Station Carbon Monoxide Alarms	1. Test to verify alarm activation. 2. Verify no facility change affects performance.
7-10 Years	1. Single Station Carbon Monoxide Alarms	1. Replace Detector

2-2.6 Hydrants and Monitors.

Technical guidance on the tasks is contained in UFC 3-230-02; American Water Works Association (AWWA) Manual 17 (M17), *Fire Hydrants: Installation, Field Testing, and Maintenance,* for hydrants and monitors supplied from potable distribution systems; and NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* for hydrants and monitors supplied by non-potable distribution systems. **\1** Accomplish **/1/** flow testing in accordance with AWWA M17, Chapter 6.

WARNING

Flow tests results that have decreased more than 20 percent from the previous test readings or the original acceptance readings indicate an emergency situation. In this case, 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. (Table 2-4, Task 5-Year 1.2 and Table 2-5, Task 5-Year 1.2)

CAUTION

Flow tests results that have decreased more than 10 percent from previous test readings or the original acceptance readings require immediate evaluation to determine the cause. (Table 2-4, Task 5-Year 1.2 and Table 2-5, Task 5-Year 1.2)

Table 2-4 Hydrant ITM Tasks

Frequency	Component	Task
2 Years	1. Hydrants (public and private potable water distribution systems) 2. Hydrants - dedicated fire protection water distribution systems 3. Hydrants - reuse (gray) water systems if specifically installed to meet a fire protection requirement.	1. Inspect for accessibility, leaks, and worn threads. 2. Lubricate hydrant to ensure ease of operation. 3. Flush the hydrant not less than 1 minute or until water runs clear, whichever is longer. 4. Verify drainage of barrel (after all operations and before cold weather).
5 Years	1. Underground and Exposed Piping	1. Conduct flow tests as recommended by AWWA M17, Chapter 6. Coordinate with the 2-year ITM tasks whenever possible. **\1** Not less than **/1/** 20 percent of the installation's hydrants must be tested each year. At the end of **\1** each **/1/** 5-year cycle, every hydrant must have had a flow test conducted and recorded. Select test hydrants **\1** to ensure **/1/** piping condition/flow capability in each area of the installation is verified **\1** each year **/1/**.) 2. Document flow test results and provide a copy to the fire and emergency service organization delivering fire suppression services for the installation. 3. Verify results are within acceptable limits or identify corrective measures.
After Flow	1. Strainers	1. Inspect and clean after each flow.
As Required	1. Hydrants	1. Apply protective coatings (paint) to prevent corrosion. 2. Identify by hydrant barrel color code the water distribution system to which the hydrant is connected, per AWWA Standards: a. potable water b. non-potable fire protection water c. non-potable reuse (gray) water 3. Identify by hydrant bonnet (top) color code the water flow available from the hydrant. (Color codes follow AWWA or NFPA 291 recommendations **\1** unless local alternatives are officially adopted **/1/**.)
Following System or	1. Underground Distribution and Valves.	1. Conduct flow tests as recommended by AWWA M17, Chapter 6. **\1\ /1/**

Frequency	Component	Task
Hydrant Modification or Repair		

Table 2-5 Yard Hydrant Monitors and Hose Houses ITM Tasks

Frequency	Component	Task
2 Years	1. Yard Monitor Nozzles (**\1** dedicated fire protection water distribution systems and **/1/** non-potable systems)	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	1. Inspect for accessibility and physical condition. 2. Verify inventory and equipment condition. 3. Replace hose that has exceeded the expected service life.
5 Years	1. Underground and Exposed Piping	1. Conduct flow tests as recommended by AWWA M17 Chapter 6. (**\1** Not less than **/1/** 20 percent of the installation's hydrants **\1** must **/1/** be tested each year. At the end of **\1** each **/1/** 5-year cycle, every hydrant has had a flow test conducted and recorded. **\1\ /1/** 2. Document flow test results. 3. Verify results are within acceptable limits or identify corrective measures.
After Flow	1. Strainers	1. Inspect and clean after each flow.

2-2.7 Water Supply Tanks.

Technical guidance on these tasks is contained in NFPA 22, *Standard for Water Tanks for Private Fire Protection,* and NFPA 25.

Table 2-6 Water Supply Tank 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.
Before the Onset of Freezing Weather	1. Tank Fill Valve Enclosure Heating	1. Verify operability at the beginning of the heating season (annually for constant cold areas).
	2. Low Temperature Alarm	1. Verify initiation and receipt of alarm at the beginning of the heating season.
Annually	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. 3. Verify valve supervisory switches detect a change in valve position.
	2. Water Level Alarms and Level Indicators	1. Test water level alarms to verify operability and set points.

Frequency	Component	Tasks
	3. Automatic Fill Valve	1. Actuate valve automatically by lowering the water level in the tank. 2. Measure refill rate and record data.
	4. 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 or replace gauges.
	3. Check Valves	1. Inspect interior of valves.
	4. Level Indicator Test	1. Calibrate level indicator.
	5. Automatic Fill Valve	1. Perform internal inspection of automatic fill valve.

2-2.8 Fire Pumps.

Technical guidance on these tasks is contained in NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection,* and NFPA 25. When generators are installed specifically to meet fire protection requirements, or generators are used to provide standby power for fire pumps, conduct all the requirements related to the engine drives on the generator engines. These requirements must not supersede requirements for generators serving demands other than fire protection. Generators serving both fire protection and other demands must conform to the most stringent guidance.

WARNING

Fire pump systems with redundant pumps must have all pumps and pump drivers in-service to meet redundancy requirements. Redundant pumps are not spare or stand-by pumps. Redundant pumps ensure the minimum number pumps will start if any minimum required pump fails to start. A redundant pump out-of-service means the pumping capacity is degraded/impaired and any supported fire protection features downstream are degraded/impaired. Two or more pumps out-of-service where there is redundancy means the pumping system is out-of-service as are all the supported fire protection features downstream. (Table 2-7, Tasks Monthly 6.1)

WARNING

Fire pump stations without redundant pumps must have all pumps and pump drivers in-service. A pump or pump driver out-of-service means the pumping capacity is out-of-service and any supported fire protection features downstream are out-of-service. (Table 2-7, Tasks Monthly 6.1)

Table 2-7 Fire Pump ITM Tasks

Frequency	Component	Tasks
Monthly	1. Pump House	1. Inspect for proper condition, ventilation, and heating. 2. Check packing leakage for proper water lubrication. 3. Verify proper drainage.
	2. Control Valves and Isolation Valves (without seals, locks, or electric supervision)	1. Verify proper valve position.
	3. Pressure Gauges	1. Check reading and verify gauge operability.
	4. Controllers	1. Verify automatic controllers are in the automatic (AUTO) setting. 2. Inspect electric connections. 3. Operate manual and automatic starting methods. 4. Resolve all trouble indications.
	5. Batteries	1. Verify proper charge. (Replace batteries in accordance with the driver manufacturer's recommendations or when the full recharged battery voltage or current falls below either the driver or battery manufacturer's recommendations.)
	6. Pumps	1. Start and churn to verify operability. (Where equipment permits, allow water to flow back to the source.) [Operate electric pumps for 10 minutes and operate engine-driven pumps for 30 minutes.] 2. Verify operation of relief valves. 3. Verify fuel 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.)

Frequency	Component	Tasks
Semi-Annually	1. Fuel (**\1** combustion engine-drivers **/1/**)	1. **\1** Verify fuel level if not supervised. **/1/**
Annually	1. Control Valves (sealed, locked, and electrically supervised)	1. Verify proper valve position.
	2. **\1** Combustion Engine Drivers **/1/**	1. **\1** Change all fluids per manufacturer's guidance. 2. Change all filters per manufacturer's guidance. **/1/**
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
	2. Controllers	1. Calibrate pressure switches. 2. Exercise circuit breakers and switches to verify operability. 3. Inspect fuses.
	3. Pumps	1. Check coupling alignment to ensure the shaft is aligned. 2. Check pump shaft endplay. 3. Lubricate bearings. 4. Lubricate couplings. 5. Lubricate right-angle drives.
	4. Relief Valves	1. Calibrate valves.
	5. Emergency Power Supply	1. Test to verify availability and capacity for pump motor.
	6. **\1** Fuel (combustion engine-drivers) **/1/**	1. **\1** Sample fuel and test to verify quality. **/1/**
5 Years	1. Pump	1. Conduct flow test to verify pump output. Test **\1** will **/1/** 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. 2. Verify the results are within acceptable limits or identify corrective measures.
	2. Gauges and Flow Meters	1. Calibrate or replace flow meter prior to fire pump flow test.
\1 As Required **/1/**	1. **\1** Generators Providing Emergency	1. **\1** Follow Service-specific generator maintenance guidance for

Frequency	Component	Tasks
	Power to Electric Fire Pumps When Required. **/1/**	emergency/standby generators. **/1/**

2-2.9 Backflow Prevention Devices.

Technical guidance on the tasks is contained in UFC 3-230-02 and AWWA Manual 14 (M14). Backflow prevention and cross-connection devices are considered part of the water distribution system; however, their maintenance and full operation is critical to the function of fire suppression systems supplied by the potable distribution system. UFC 3-230-02 requires each installation to have a backflow prevention and cross-connection maintenance program. All backflow prevention devices are required to have a test connection downstream of the backflow device capable of flowing the fire protection system's maximum fire flow demand. Reduced pressure backflow prevention devices have a specific approved friction loss operating range; full flow testing is required to demonstrate the device is operating within the manufacturer's listed friction loss curves.

Table 2-8 Backflow Prevention Device ITM Tasks

Frequency	Component	Tasks
Annually	1. All Backflow Prevention Devices	1. Conduct full flow test to ensure flow and pressure meet or exceed system demand.
5 years	1. All Backflow Prevention Devices	1. Conduct internal inspection of backflow prevention assembly to verify all components operate correctly, move freely, and are in good condition.

2-2.10 Standpipe Systems.

Detection devices for actuation, where provided, are addressed in Section 2-2.2, "Fire Detection and Alarm Systems." Technical guidance on the tasks is contained in NFPA 14, *Standard for the Installation of Standpipes and Hose Systems,* and NFPA 25.

Table 2-9 Standpipe Systems ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seals, locks, or electric supervision)	1. Verify proper valve position.
Semi-Annually	1. Hose Connection and Pressure Reducing Valves	1. Inspect for damage, leaking, missing caps, and obstructions.

Frequency	Component	Tasks
Annually	1. Fire Department Connections	1. Verify accessibility and condition. 2. If caps are removed or missing, check for obstructions. 3. Verify system check valve is not leaking. 4. Verify gaskets are present. 5. Lubricate if swivels do not rotate smoothly. 6. Verify proper operation of ball drip drain prior to the cold season.
2 Years	1. Piping	1. Inspect for damage to piping and pipe supports.
	2. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate stem. 3. Verify valve supervisory switches detect a change in valve position. 4. Verify proper valve position
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).
	2. Pressure Reducing Hose Valves	1. Conduct flow test to verify operation of pressure reducing hose valves (test to confirm pressure and flow). 2. Confirm setting of pressure reducing hose valves.
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. Compare results with results from previous main drain tests and original acceptance test. 3. Verify results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers b. connections for obstruction c. piping for leaks d. riser condition

2-2.11 Wet Pipe Automatic Sprinkler Systems.

Technical guidance on the tasks is contained in NFPA 25. Residential sprinkler systems are addressed in Chapter 3.

WARNING

Main drain static or residual test pressures that have decreased more than 20 percent from the original acceptance readings or the previous test readings indicate an **\1\ /1/** emergency situation. In this case, 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. (Table 2-10, Task Annual 4.3)

CAUTION

Main drain static or residual test pressures that have decreased more than 10 percent from the previous test readings require immediate evaluation to determine the cause. (Table 2-10, Task Annual 4.3)

Table 2-10 Wet Pipe Sprinkler System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify proper valve position.
Annually	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
	2. Water Flow Alarm Devices	1. Verify initiation and receipt of alarm (alternate use of alarm test line and inspector's test connection annually). 2. Verify operation of exterior water flow alarm (if present). 3. 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.

Frequency	Component	Tasks
	4. Main Drain	1. Conduct a main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3-inch by 5-inch 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 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 **\1** and replace missing caps/covers **/1/**. 3. Verify system check valve is not leaking. 4. Verify gaskets are present. 5. Lubricate if swivels do not rotate smoothly. 6. Verify proper operation of ball drip drain prior to the cold season.
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
5 Years	1. Alarm Valve	1. Clean and inspect internally to verify condition.
	2. Anti-freeze Loops	1. Determine solution type. If solution type is no longer permitted or cannot be positively identified, drain system completely and replace with an acceptable solution. 2. Confirm correct solution mixture.
	3. Strainers	1. Inspect internally and clean to good condition.
	4. Automatic Air Release Valve	1. Confirm proper operation.
10 Years	1. Gauges	1. Calibrate or replace gauges.
	2. Dry Barrel Sprinklers	1. Replace all sprinklers. **\1**[1]**/1/**
20 Years **\1** and Every 10 Years Thereafter **/1/**	1. **\1** Fast-Response Sprinklers and Extra High Temperature Sprinklers **/1/**	1. Replace all **\1** sprinklers or test a sample of sprinklers to verify response characteristics.[1] **/1/**
50 Years and Every 20 Years Thereafter	1. Standard Sprinklers	1. Replace all sprinklers or test a sample of sprinklers to verify response characteristics. **\1**[1]**/1/**

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). 2. Compare results with results from previous main drain tests and original acceptance test. 3. Verify results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers and seismic bracing b. sprinklers for obstruction c. piping for leaks d. riser condition e. verify sprinkler spares

\1[1]**/1/** A representative sample of sprinklers for testing must consist of one (1) percent of the sprinklers installed of the same type, with a minimum of four (4) sprinklers sampled. Submit sprinklers to a **\1** nationally **/1/** recognized testing laboratory for these tests.

2-2.12 Dry Pipe Automatic Sprinkler Systems.

Technical guidance for these tasks is contained in NFPA 25.

WARNING

Main drain static or residual test pressures that have decreased more than 20 percent from the original acceptance readings or the previous test readings indicate an **\1\ /1/** emergency situation. In this case, 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. (Table 2-11, Task Annual 4.3)

CAUTION

Main drain static or residual test pressures that have decreased more than 10 percent from the previous test readings require immediate evaluation to determine the cause. (Table 2-11, Task Annual 4.3)

Table 2-11 Dry Pipe Automatic Sprinkler System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify proper valve position.
Before the Onset of Freezing Weather	1. Low Point Drains	1. Drain all low points to remove condensation prior to the cold season.
	2. Dry Pipe Alarm Valve Enclosure Heating	1. Verify operability at the beginning of the heating season (annually for constant cold areas).
	3. Low Temperature Alarm	1. Verify initiation and receipt of alarm at the beginning of the heating season.
Annually	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
	2. Water Flow Alarm Devices	1. Operate alarm test valve 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. 3. Verify valve position of provided quick opening devices are in the normal position.
	4. Main Drain	1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3-inch by 5-inch 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 results are within acceptable limits or identify corrective measures.

Frequency	Component	Tasks
	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps are removed or missing, check for obstructions. 3. Verify system check valve is not leaking. 4. Verify gaskets are present. 5. Lubricate if swivels do not rotate smoothly. 6. Verify proper operation of ball drip drain prior to the cold season.
	6. 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 valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
	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/High Air Pressure Alarms	1. Test to verify initiation and receipt of supervisory alarms.
	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. Calibrate or replace gauges.
10 Years	1. Dry Barrel Sprinklers	1. Replace all.[1]
20 Years **\1** and Every 10 Years Thereafter **/1/**	1. **\1** Fast-Response Sprinklers and Extra High Temperature Sprinklers **/1/**	1. Replace all **\1** sprinklers or test a sample of sprinklers to verify response characteristics.[1] **/1/**
50 Years and Every 20 Years Thereafter	1. Standard Sprinkler	1. Replace all sprinklers or test a sample of sprinklers to verify response characteristics. **\1**[1]**/1/**
Following System Modification or	1. Main Drain (following maintenance or repair	1. Conduct main drain test to verify supply (valve position).

Frequency	Component	Tasks
Repair	action requiring the water supply to be shut off)	2. Compare results with results from previous main drain tests and original acceptance test. 3. Verify the results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch x 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers and seismic bracing b. sprinklers for obstruction c. piping for leaks d. riser condition e. sprinkler spares

\1[1]**/1/** A representative sample of sprinklers for testing must consist of one (1) percent of the sprinklers installed of the same type, with a minimum of four (4) sprinklers sampled. The sprinklers must be submitted to a **\1** nationally **/1/** recognized testing laboratory for these tests.

2-2.13 Deluge Sprinkler Systems.

Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 25 and NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*.

WARNING

Main drain static or residual test pressures that have decreased more than 20 percent from the original acceptance readings or the previous test readings indicate a **\1\ /1/** emergency situation. In this case, 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. (Table 2-12, Task Annual 4.3)

CAUTION

Main drain static or residual test pressures that have decreased more than 10 percent from the previous test readings require immediate evaluation to determine the cause. (Table 2-12, Task Annual 4.3)

Table 2-12 Deluge Sprinkler System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify proper valve position.
Before the Onset of Freezing Weather	1. Valve and Riser Heated Enclosure (if provided)	1. Verify operability at the beginning of the heating season.
	2. Low Temperature Alarm	1. Verify initiation and receipt of alarm at the beginning of the heating season.
	3. Low Point Drains	1. Drain all low points after deluge valve test and before cold weather.
Annually	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
	2. Water Flow Alarm Devices	1. Operate alarm test valve 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 exterior of valves, gauges, trim alignment. 2. Verify valve pressure and legibility of 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-inch by 5-inch 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 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. 3. Verify system check valve is not leaking. 4. Verify gaskets are present. 5. Lubricate if swivels do not rotate smoothly. 6. Verify proper operation of ball drip drain prior to the cold season.

Frequency	Component	Tasks
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
	2. Deluge Valve	1. Trip to verify operability. 2. Verify manual actuators are operable. 3. Inspect internal condition and clean valve seat before resetting.
	3. Low Point Drains	1. Drain all low points after each valve trip.
5 Years	1. Strainers	1. Inspect internally and clean to verify condition.
10 Years	1. Gauges	1. Calibrate or replace.
	2. Deluge Valve	1. Conduct full flow test.
	1. Distribution System	1. Verify nozzle (sprinkler) coverage during flow test. 2. Inspect piping and nozzles for condition and location.
Following System Modification or Repair	1. Main Drain (following maintenance or repair action requiring water supply to be shut off)	1. Conduct main drain test to verify supply (valve position). 2. Compare results with results from previous main drain tests and original acceptance test. 3. Verify results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers and seismic bracing b. sprinklers/nozzles for obstruction c. piping for leaks d. riser condition e. sprinkler spares 2. Ensure: a. manual stations are in place and unobstructed. b. detectors are unblocked/uncovered. c. panels are secured and indicator lamps functional. d. notification appliances are in place.

2-2.14 Pre-Action Automatic Sprinkler Systems.

Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 25.

WARNING

Main drain static or residual test pressures that have decreased more than 20 percent from the original acceptance readings or the previous test readings indicate an **\1\ /1/** emergency situation. In this case, immediate distribution system flow is indicated. Immediately conduct main drain tests on all adjacent sprinkler testing systems to determine the extent to which the sprinkler systems are compromised. (Table 2-13, Task Annual 4.3)

CAUTION

Main drain static or residual test pressures that have decreased more than 10 percent from the previous test readings require immediate evaluation to determine the cause. (Table 2-13, Task Annual 4.3)

Table 2-13 Pre-Action Automatic Sprinkler System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify proper valve position.
Before the Onset of Freezing Weather	1. Valve and Riser Heated Enclosure (if provided)	1. Verify operability at beginning of heating season.
	2. Low Temperature Alarm	1. Verify initiation and receipt of alarm at the beginning of the heating season.
	3. Low Point Drains	1. Drain all low points before cold weather (if unheated area).
Annually	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
	2. Water Flow Alarm Devices	1. Operate alarm test valve 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 exterior of valves, gauges, trim alignment. 2. Verify valve pressure and legibility of hydraulic nameplate.

Frequency	Component	Tasks
	4. Main Drain	1. Conduct a main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3-inch by 5-inch 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 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. 3. Verify system check valve is not leaking. 4. Verify gaskets are present. 5. Lubricate if swivels do not rotate smoothly. 6. Verify proper operation of ball drip drain prior to the cold season.
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
	2. Pre-Action Valve	1. Trip to verify proper operation. 2. Verify function of manual actuators (if provided). 3. Inspect internal condition and clean valve seat before resetting.
	3. Low Point Drains	1. Drain all low points after pre-action valve trip test.
	4. Air Supply (if present)	1. Test automatic air pressure maintenance device. 2. Test low/high air supply alarms.
5 Years	1. Strainers	1. Clean and inspect interior to verify condition.
10 Years	1. Gauges	1. Calibrate or replace gauges.

Frequency	Component	Tasks
10 Years, and Every 10 Years Thereafter	1. Dry Sprinklers	1. Replace all sprinklers or test a sample of sprinklers to verify response characteristics.[1]
20 Years, and Every 10 Years Thereafter	1. Fast-Response Sprinklers and Extra High Temperature Sprinklers	1. Replace all sprinklers or test a sample of sprinklers to verify response characteristics. **\1**[1]**/1/**
50 Years, and Every 10 Years Thereafter	1. Standard Sprinklers	1. Replace all sprinklers or test sample closed-head sprinklers to verify response characteristics. **\1**[1]**/1/**
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. Compare results with results from previous main drain tests and original acceptance test. 3. Verify results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers and seismic bracing b. sprinklers for obstruction c. piping for leaks d. riser condition e. sprinkler spares 2. Ensure: a. manual stations are in place and unobstructed. b. detectors are unblocked/uncovered. c. panels are secured and indicator lamps functional. d. notification appliances are in place.

\1[1]**/1/** A representative sample of sprinklers for testing must consist of one (1) percent of the sprinklers installed of the same type, with a minimum of four (4) sprinklers sampled. The sprinklers must be submitted to a **\1** nationally **/1/** recognized testing laboratory for these tests.

2-2.15 Nitrogen Generation Systems.

Technical guidance for these tasks is contained in NFPA 25 and the manufacturer's recommendations.

Table 2-14 Nitrogen Generation System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Generation System	1. Verify generation system is free of physical damage. 2. Verify proper valve positions. 3. Verify generation system is in **\1** automatic **/1/** operating condition. 4. Verify the power wiring to the generation system is free of physical damage. 5. Verify piping from generation system to system served is intact and free of physical damage.
Annually	1. Filter Elements	1. Replace the activated carbon and coalescing filter elements.
	2. Intake Filters	1. Clean the air compressor intake filter elements, replace intake filters if necessary.
	3. Strainer Screens	1. Clean air tank blow-down strainer screens.
	4. System Concentration	1. Verify the generation system is maintaining a nitrogen composition of 98% in the system served. Verify nitrogen composition at remote test locations.
2 Years	1. System Operation	1. Verify generation system operates on the proper pressure drop and ceases operation at the proper set point. 2. Verify generation system does not overheat or present any unusual noise or vibration during operation. 3. Verify the means of anchoring the generation system to the structure is secure, tight, and free of physical damage.
	2. Safety Relief Valves	1. Manually test safety relief valves.
5 Years	1. Leakage Test	1. Inspect system served by generation system for leaks by conducting a pressure loss test.
	2. System Performance	1. Verify generation system restores **\1\ /1/**gas pressure and concentration in the system served within the required timeframe.

2-2.16 Water Spray Systems.

Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 25.

WARNING

Main drain static or residual test pressures that have decreased more than 20 percent from the original acceptance readings or the previous test readings indicate an **\1\ /1/** emergency situation. In this case, immediate distribution system flow testing is indicated. Immediately conduct main drain tests on all adjacent sprinkler systems to determine the extent the sprinkler systems are compromised. (Table 2-15, Task Annual 4.3)

CAUTION

Main drain static or residual test pressures that have decreased more than 10 percent from the previous test readings require immediate evaluation to determine the cause. (Table 2-15, Task Annual 4.3)

Table 2-15 Water Spray System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify proper valve position.
Before the Onset of Freezing Weather	1. Valve and Riser Enclosure Heater	1. Verify operability at the beginning of the heating season.
	2. Low Temperature Alarm	1. Verify initiation and receipt of alarm at the beginning of the heating season.
	3. Low Point Drains	1. Drain all low points before cold weather.
Annually	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
	2. Water Flow 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 Valve and Trim	1. Inspect exterior of valves, gauges, trim alignment. 2. Verify valve pressure and legibility of hydraulic nameplate.

Frequency	Component	Tasks
	4. Main Drain	1. Conduct a main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3-inch by 5-inch 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 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. 3. Verify system check valve is not leaking. 4. Verify gaskets are present. 5. Lubricate if swivels do not rotate smoothly. 6. Verify proper operation of ball drip drain prior to the cold season.
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
	2. Water Spray Valve	1. Trip to verify operability. 2. Verify manual actuators (if provided). 3. Inspect interior of valve and clean valve seat before resetting.
	3. Low Point Drains	1. Drain all low points after pre-action valve trip test.
	4. Distribution System	1. Verify nozzle (sprinkler) coverage during flow test. 2. Verify spray pattern. (If experience shows nozzles are not moved, this can be extended to 10 years or after modifications.) 3. Inspect piping hangers, sprinklers, and nozzles for condition and location.

Frequency	Component	Tasks
5 Years	1. Strainers	1. Clean and inspect interior to verify condition.
10 Years	1. Gauges	1. Calibrate or replace.
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. Compare results with results from previous main drain tests and original acceptance test. 3. Verify results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers and seismic bracing b. sprinklers for obstruction c. piping for leaks d. riser condition e. sprinkler spares 2. Ensure: a. manual stations are in place and unobstructed. b. detectors are unblocked/uncovered. c. panels are secured and indicator lamps functional. d. notification appliances are in place.

2-2.17 Water Mist Systems.

Table 2-16 lists required ITM tasks for high-pressure water mist systems. Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 25 and NFPA 750, *Standard on Water Mist Fire Protection Systems*.

Table 2-1 contains required ITM tasks for low-pressure water mist systems.

For hybrid water mist systems, use the specific manufacturer’s ITM frequencies and procedures.

Table 2-16 High Pressure Water Mist System ITM Tasks

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-annually	1. Pumps	1. Complete churn test to ensure operability.
	2. Air Compressors	1. Start to ensure operability.
	3. System Operating Components	1. Inspect to verify valve is aligned and free of damage.
Annually	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. Water Flow 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. Drain and refill tank. 2. Inspect tanks for structural integrity (interior and exterior) prior to refilling.
	5. Water Mist Nozzles Subject to Harsh Environments	1. Replace all nozzles or test a sample of nozzles to verify response characteristics.[1]

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.
20 Years	1. Water Mist Nozzles in Areas Other Than Harsh Environments	1. Replace all nozzles or test a sample of nozzles to verify response characteristics.[1]
As Part of Other Building Inspection (not part of ITM requirements)	1. 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. manual stations are in place and unobstructed. b. detectors are unblocked/ uncovered. c. panels are secured and indicator lamps functional. d. notification appliances are in place.

\1[1]**/1/** A representative sample of nozzles for testing must consist of one (1) percent of the nozzles installed of the same type, with a minimum of four (4) nozzles sampled. The nozzles must be submitted to a **\1** nationally **/1/** recognized testing laboratory for these tests.

2-2.18 Foam and Foam-Water Systems.

WARNING

Use of any fire suppression foam concentrate or solution containing per- or poly-fluorinated alkylated substances (PFAS) for inspection, test, and maintenance is not permitted

WARNING

Release of any fire suppression foam concentrate, **\1** solution, or testing surrogates, **/1/** regardless of chemical composition, during inspection, test, and maintenance to the environment, is not permitted.

CAUTION

Release of any non-PFAS foam concentrate, solution, or testing surrogates to a regulated waste stream including industrial or sanitary treatment facilities must be fully permitted and authorized by the system operator and by appropriate regulatory authorities.

Table 2-17 addresses low-expansion foam systems for **\1** ignitable **/1/** liquid tanks as covered in NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam.* Table 2-18 addresses low-expansion foam spray and sprinkler systems, including AFFF, as covered in NFPA **\1** 11 **/1/**. Table 2-19 addresses low-expansion foam monitor nozzle systems for multiple applications as covered in NFPA 11. Table 2-20 addresses low-expansion grate nozzle foam systems for aircraft hangar applications as covered in NFPA 11. Table 2-21 addresses high-expansion foam systems as covered in NFPA 11.

Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.”

\1

2-2.18.1 Disposal of Foam Concentrates.

All foam concentrates, foam-water solutions, or testing surrogates discharged during ITM processes must be contained, collected, and disposed of in accordance with current environmental guidance (Title 15 United States Code (U.S.C.) Chapter 115, *Perfluoroalkyl and Polyfluoroalkyl Substances and Emerging Contaminants*).

Fluorine surfactant-based foam (commercial or military specification AFFF concentrate or solution waste) must be disposed of using approved methods. Removed parts including bladders and tanks contaminated with fluorine-based foams must be disposed of using approved methods.

2-2.18.2 PFAS-Containing Concentrates.

Replace all PFAS-containing foam concentrates with DoD- or Component-approved fluorine free foam concentrates not later than by 2024 unless extended by the Secretary of Defense to 2026.

The 2020 National Defense Authorization Act requires DoD to stop any non-emergency release of per- and polyfluoroalky (PFAS) substances, a broad group of chemicals including PFOA, PFOS, GenX, and others. The 2020 NDAA requires DoD to phase out the use PFAS substances by 2024 (SecDef extendable until 2026). AFFF (military specification and commercial products) and FFFP are PFAS-containing substances and will be phased out. Non-PFAS containing foam concentrates include high expansion foams (Hi-Ex), fluorine free foams (FFF), and testing surrogates, and are not affected by the 2020 NDAA phase-out. At the date Change 1 of this UFC, some Components have issued specific phase-out guidance; others are still developing guidance. Consult with the appropriate CFPE for additional/evolving information and guidance.

2-2.18.3 Maintenance of Locked Out/Tagged Out Systems.

Foam concentrate systems locked out/tagged out by Service/Agency specific direction do not require maintenance actions. Other system components remaining in service require maintenance appropriate the in-service components.

2-2.18.4 Systems Converting from AFFF to FFF.

Systems converted from Military Specification aqueous film forming foam (AFFF) to Military Specification fluorine free foam (FFF) MIL-PRF 72325 will continue to provide the maintenance actions for FFF as required for AFFF. FFF foam concentrate, and solution will require the same containment and mitigation action as AFFF. Release to ground, storm, or surface water is not permitted. Reporting of FFF releases/discharges will conform to Service specific environmental guidance.
/1/

Table 2-17 Low-Expansion Foam System for Ignitable Liquid Tank ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seals, locks, or electric supervision)	1. Verify proper valve position.
Annually	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. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
	3. System Actuators	1. Confirm function of all manual and automatic actuation functions.
	4. Foam Concentrate Strainers	1. Inspect and clean if necessary.
	5. Distribution Piping/Discharge Devices	1. Ensure discharge devices are free of damage. 2. Inspect pipe and hangers to verify support and pitch.

Frequency	Component	Tasks
	6. Main Drain	1. Conduct main drain test to verify supply (valve position). 2 Document static and residual pressure readings on a 3-inch by 5-inch 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 results are within acceptable limits or identify corrective measures.
	7. Fire Department Connection	1. Verify accessibility and condition. 2. If caps are removed or missing, check for obstructions. 3. Verify system check valve is not leaking. 4. Verify gaskets are present. 5. Lubricate if swivels do not rotate smoothly. 6. Verify proper operation of ball drip drain prior to the cold season.
2 Years	1. Foam Proportioning System/ Foam Pumps	1. Test to verify operability and proper proportioning (concentration must be within 10 percent of original acceptance test results, but no more than 10 percent below minimum design standard). 2. Flush pumps after operation.
	2. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
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.
	3. Fire Department Connection	1. Hydrostatically test piping from the fire department connection to the fire department check valve at 150 psi (10 bar) for 2 hours.
10 Years	1. Foam Concentrate Tank	1. Drain, flush, and perform internal inspection for corrosion. If pressure vessel, perform hydrostatic test.

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). 2. Compare results with results from previous main drain tests and original acceptance test. 3. Verify results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers and seismic bracing 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 are secured and indicator lamps functional. b. notification appliances are in place. c. manual stations are in place and unobstructed.

Table 2-18 Low Expansion Foam Spray and Sprinkler System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seal, lock, or electric supervision)	1. Verify proper valve position.
Semi-Annually	1. Foam Concentrate	1. Inspect for quality and evidence of sludge or deterioration. 2. Verify adequate supply.
	2. Foam Proportioning System/ Foam Pumps (if provided)	1. Test pump to ensure operability. 2. Inspect proportioning system for proper valve alignment and system condition. 3. Flush pumps after operation.
Annually	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.

Frequency	Component	Tasks
	2. Foam Concentrate	1. Take sample and test in accordance with manufacturer's instructions.
	3. Foam Concentrate Strainers	1. Inspect exterior to ensure blow down valve is closed.
	4. Main Drain	1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3-inch by 5-inch 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 **1*\ /**1**/ 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. 3. Verify system check valve is not leaking. 4. Verify gaskets are present. 5. Lubricate if swivels do not rotate smoothly. 6. Verify proper operation of ball drip drain prior to the cold season.
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
	2. Foam Proportioning System	1. Conduct full flow test to ensure proper system function. 2. Verify proper concentration (concentration must be within 10 percent of original acceptance test results, but no more than 10 percent below minimum design standard).
	3. Actuators	1. Verify operability of manual and automatic actuators.

Frequency	Component	Tasks
	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.
20 Years, and Every 10 Years Thereafter	1. Fast-Response Sprinklers and Extra High Temperature Sprinklers	1. Replace all sprinklers or test a sample of sprinklers to verify response characteristics.[1]
50 Years, and Every 10 Years Thereafter	1. Standard Sprinklers	1. Replace all sprinklers or test sample closed head sprinklers to verify response characteristics.[1]
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. Compare results with results from previous main drain tests and original acceptance test. 3. Verify the results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.

Frequency	Component	Tasks
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers b. sprinklers/nozzles for obstruction c. piping for leaks d. riser condition e. sprinkler spares 2. Ensure: a. detectors are unblocked/uncovered. b. panels are secured and indicator lamps functional. c. notification appliances are in place. d. manual stations are in place and unobstructed.

\1[1]**/1/** A representative sample of sprinklers for testing must consist of one (1) percent of the sprinklers installed of the same type, with a minimum of four (4) sprinklers sampled. The sprinklers must be submitted to a **\1** nationally **/1/** recognized testing laboratory for these tests.

Table 2-19 Low Expansion Foam Monitor Nozzle System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seals, locks, or electric supervision)	1. Verify proper valve position.
Annually	1. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
	2. Foam Concentrate	1. Inspect for quality and evidence of sludge or deterioration. 2. Inspect to verify adequate supply. 3. Take sample and test in accordance with manufacturer's instructions.
	3. Foam Concentrate Strainers	1. Inspect exterior to ensure blow down valve is closed.
	4. Nozzle and Nozzle Driver	1. Lubricate in accordance with manufacturer's directions. 2. Ensure nozzle elevation is set to not apply foam on aircraft surfaces. 3. Manually operate oscillation with garden hose to ensure proper movement and pattern.

Frequency	Component	Tasks
	5. Main Drain	1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3-inch by 5-inch 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 the results are within acceptable limits or identify corrective measures.
2 Years	1. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify the valve supervisory switches detect a change in valve position.
	2. Foam Proportioning System/Foam Pumps (if provided)	1. Conduct full flow test to ensure proper system function. (**\1** Perform test **/1/** using a test connection or through the foam nozzles. Discharge only until full foam flow appears from each nozzle; then end foam injection.) 2. Verify proper concentration. (Concentration must be within 10 percent of original acceptance test results, but no more than 10 percent below minimum design standard). 3. Flush pumps after operation.
	3. Actuators	1. Verify operability of manual and automatic actuators.
	4. Distribution System	1. Verify nozzle coverage during flow test (water only). 2. Inspect piping hangers 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.

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). 2. Compare results with results from previous main drain tests and original acceptance test. 3. Verify results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers and seismic bracing b. nozzle for obstruction c. piping for leaks d. riser condition 2. Ensure: a. detectors are unblocked/ uncovered. b. panels are secured and indicator lamps functional. c. notification appliances are in place. d. manual stations are in place and unobstructed.

Table 2-20 Low Expansion Grate Nozzle Foam System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seals, locks, or electric supervision)	1. Verify proper valve position.
Annually	1. Foam Concentrate	1. Inspect for quality and evidence of sludge or deterioration. 2. Inspect to verify adequate supply. 3. Take sample and test in accordance with manufacturer's instructions.
	2. Foam Nozzles	1. Inspect to verify condition.
	3. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.

Frequency	Component	Tasks
2 Years	1. Foam Nozzles	1. Conduct test to verify operability. (Test **\1\ /1/** with water only.)
	2. Actuators	1. Verify all manual and automatic actuator function.
	3. Foam Proportioning System/Foam Pumps (if provided)	1. Conduct full flow test to ensure proper system function. (**\1** Perform test using **/1/** a test connection or through the foam nozzles. Discharge only until full foam flow appears from each nozzle, then end foam injection.) 2. Verify proper concentration. (Concentration **\1** must **/1/** be within 10 percent of original acceptance test results, but no more than 10 percent below minimum design standard). 3. Flush pumps after operation.
	4. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
10 Years	1. Foam Concentrate Tanks	1. Drain, flush, and perform internal inspection for corrosion. If pressure vessel, perform hydrostatic test.
After Activation	1. Strainers	1. Inspect and clean after system actuation or flow test.
	2. Manual Pull Stations	1. Visually Inspect NEMA 4 pull stations to confirm seals prevented foam **\1** -water **/1/** from entering device. 2. Internally inspect all non-NEMA 4 pull stations for damage.
	3. Flushing	1. Flush system upon completion of any testing where foam concentrate has been introduced to the system.
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. Compare results with results from previous main drain tests and original acceptance test. 3. Verify results are within acceptable limits or identify corrective measures. 4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.

Frequency	Component	Tasks
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually Check: a. Pipe hangers, seismic bracing, and mounts. 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.

Table 2-21 High-Expansion Foam System ITM Tasks

Frequency	Component	Tasks
Monthly	1. Control Valves (without seals, locks, or electric supervision)	1. Verify proper valve position.
Annually	1. Foam Concentrate	1. Inspect for quality and evidence of sludge or deterioration. 2. Inspect to verify adequate supply. 3. Take sample and test in accordance with manufacturer's instructions.
	2. Foam Generator	1. Inspect to verify condition from ground level and proper valve alignment.
	3. Main Drain	1. Conduct main drain test to verify supply (valve position). 2. Document static and residual pressure readings on a 3-inch by 5-inch 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 results are within acceptable limits or identify corrective measures.
	4. Control Valves (sealed, locked, or electrically supervised)	1. Verify proper valve position.
2 Years	1. Foam Generator	1. Conduct test to verify operability. (Water-powered **\1** must be accomplished **/1/** with water only.)

Frequency	Component	Tasks
	2. Actuators	1. Verify all manual and automatic actuators function.
	3. Foam Proportioning Systems/Foam Pumps (if provided)	1. Conduct full flow test to ensure proper system function. (**\1** Perform test **/1/** using a test connection. **\1\ /1/** 2. Verify proper concentration. (Concentration **\1** must **/1/** be within 10 percent of original acceptance test results, but no more than 10 percent below minimum design standard.) 3. Flush pumps after operation.
	4. Control Valves	1. Operate valve through entire travel to verify function. 2. Lubricate valves and stems to ensure operability. 3. Verify valve supervisory switches detect a change in valve position.
After Water-only Test and Foam Flow Test	1. Strainers	1. Inspect and clean after flow test.
After System Activation	1. Strainers	1. Inspect and clean after system activation.
	2. Manual Pull Stations	1. Visually inspect NEMA 4 pull stations to confirm seals prevented foam from entering device. 2. Internally inspect all non-NEMA 4 pull stations for damage **\1** or foam or moisture incursion. 3. Replace all pull stations indicating foam or moisture incursion. **/1/**
	3. Control Panels	1. Internally inspect all system control units exposed to foam.
	4. Flushing	1. Flush system upon the completion of any testing where foam concentrate has been introduced to the system.
10 Years	1. Foam Concentrate Tank	1. Drain, flush, and perform internal inspection. 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)	1. Conduct main drain test to verify supply (valve position). 2. Compare results with results from previous main drain tests and original acceptance test. 3. Verify the results are within acceptable limits or identify corrective measures.

Frequency	Component	Tasks
		4. Document static and residual pressure readings on a 3-inch by 5-inch tag and secure it to the system pressure gauge.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers and seismic bracing 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 are unblocked/uncovered. b. panels are secured and indicator lamps functional. c. notification appliances are in place. d. manual stations are in place and unobstructed.

2-2.19 Dry Chemical Systems.

Automatic initiating devices (for example, heat detectors, smoke detectors) used for system actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance for these tasks is contained in NFPA 17, *Standard for Dry Chemical Extinguishing Systems*.

There is no requirement to replace existing dry chemical systems protecting cooking surfaces, hoods, and ducts. These existing systems passing 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 **\1** meet the requirements of UFC 3-600-01 **/1/**.

Table 2-22 Dry Chemical System ITM Tasks

Frequency	Component	Tasks
Semi-Annually	1. Hazard	1. Verify the hazard has not changed.
	2. Piping	1. Inspect piping for obstructions and proper support. 2. Verify presence of required blow-off caps. 3. Verify nozzles are appropriately aimed at the hazard.
	3. Storage Vessels	1. Inspect agent container for condition. 2. Verify storage pressure of propellant.
	4. Agent	1. Verify quantity of agent through ultrasonic measuring.
	5. 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 interfaces (gas shutoff, power shutoff) operate properly. 5. 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 Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers b. nozzles for obstruction c. pipe condition 2. Ensure: a. detectors are unblocked/uncovered. b. panels are secured and indicator lamps are functional. c. notification appliances are in place. d. manual stations are in place and unobstructed. e. nozzle covers (blow-off caps) are in place. f. pressure gauge is within operating range.

2-2.20 Wet Chemical Systems.

Automatic initiating devices (for example, heat detectors, smoke detectors) used for system actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*.

Table 2-23 Wet Chemical System ITM Tasks

Frequency	Component	Tasks
Semi-Annually	1. Hazard	1. Verify hazard has not changed.
	2. Piping	1. Inspect piping for obstructions and proper support. 2. Verify presence of required blow-off caps. 3. Verify nozzles are appropriately aimed at the hazard.
	3. Storage Vessels	1. Inspect agent container for condition. 2. Verify storage pressure of the propellant.
	4. Agent	1. Verify quantity of agent using ultrasonic measuring.
	5. Actuators	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. 4. Verify interfaces (gas shutoff, power shutoff) operate properly.
		5. Replace fixed temperature-sensing elements (fusible link metal alloy type and automatic sprinkler 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 Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers b. nozzles for obstruction and proper alignment c. riser condition 2. Ensure: a. detectors are unblocked/uncovered. b. panels are secured and indicator lamps functional. c. notification appliances are in place.

Frequency	Component	Tasks
		d. manual stations are in place and unobstructed. e. nozzle covers (blow-off caps) are in place. f. pressure gauge is within operating range.

2-2.21 Halon Systems.

Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*.

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. Use only liquid level methods to determine agent quantity. (Table 2-24, Task Annual 5.1)

Table 2-24 Halon System ITM Tasks

Frequency	Component	Tasks
Annually	1. Hazard	1. Verify hazard has not changed.
	2. Piping	1. Inspect piping and nozzles for condition and orientation.
	3. Flexible Hoses	1. Inspect for damage.
	4. Storage Vessels	1. Inspect exterior of storage containers (tanks, spheres, cylinders).
	5. Agent and Propellant	1. Verify quantity of the agent is sufficient. Use ultra-sound or level sensing technology. Do not disconnect and weigh tanks. 2. Verify pressure of the agent/propellant is sufficient and pressure gauge is within operating range.
	6. Actuators	1. Inspect manual actuators for accessibility. 2. Test actuation without agent release.
	7. Auxiliary Equipment	1. Test to verify interfaces (equipment shutdown, dampers, and door closures)

Frequency	Component	Tasks
		operate properly and are activated by the system actuation.
	8. Valves	1. Verify valves are in proper alignment.
2 Years	1. Protected Enclosure/Room	1. Inspect 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.
After Modification to Compartment/ Protected Enclosure	1. Protected Enclosure/Room	1. Inspect enclosure to verify integrity and ability to maintain agent concentration. 2. If uncertainty exists, follow enclosure procedures in NFPA 12A.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers b. nozzles for obstruction c. piping for leaks d. riser condition 2. Ensure: a. detectors are unblocked/uncovered. b. panels are secured and indicator lamps functional. c. notification appliances are in place. d. manual stations are in place and unobstructed. e. nozzle covers are in place. f. pressure gauge is within operating range.

2-2.22 Clean Agent Systems.

Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*.

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. Use only liquid level methods to determine agent quantity. (Table 2-25, Task Annual 5.1)

Table 2-25 Clean Agent System ITM Tasks

Frequency	Component	Tasks
Annually	1. Hazard	1. Verify hazard has not changed.
	2. Piping	1. Inspect piping and nozzles for condition and orientation.
	3. Flexible Hoses	1. Inspect for damage.
	4. Storage Vessels	1. Inspect the exterior of storage containers (tanks, spheres, cylinders).
	5. Agent and Propellant	1. Verify adequate quantity of agent. Use ultra-sound or liquid level sensing. Do not disconnect and weigh tanks. 2. Verify adequate pressure of agent/propellant and pressure gauge within operating range.
	6. Actuators	1. Inspect manual actuators for accessibility. 2. Test actuation without agent release.
	7. Auxiliary Equipment	1. Test to verify interfaces (equipment shutdown, dampers, and door closures) operate properly and are activated by the system actuation.
	8. Valves	1. Verify valves are in proper alignment.
2 Years	1. Protected Enclosure or Room	1. Inspect 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.

Frequency	Component	Tasks
After Modification to Compartment/ Protected Enclosure	1. Protected Enclosure/Room	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration. 2. If uncertainty exists, follow the enclosure procedures in NFPA 2001.
As Part of Other Building Inspection (not part of ITM requirements)	1. Entire System	1. Visually check: a. pipe hangers b. nozzle for obstruction c. piping for leaks d. riser condition 2. Ensure: a. detectors are unblocked/uncovered. b. panels are secured and indicator lamps functional. c. notification appliances are in place. d. manual stations are in place and unobstructed. e. nozzle covers are in place. f. pressure gauge is within operating range.

2-2.23 Carbon Dioxide Systems.

Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems.*

Table 2-26 Carbon Dioxide System ITM Tasks

Frequency	Component	Tasks
Semi-Annually	1. Liquid Level (low pressure carbon dioxide [CO_2])	1. Verify adequate liquid level with tank level gauge.
Annually	1. Hazard	1. Verify hazard has not changed.
	2. Piping and Nozzles	1. Inspect piping for condition and proper support. 2. Check nozzles for obstruction and alignment.
	3. Flexible Hoses	1. Inspect for damage.
	4. Low Pressure Tanks	1. Check level and pressure gauges. 2. Verify valve alignment.
	5. High Pressure Cylinders	1. Inspect for condition and securing.

Frequency	Component	Tasks
	6. 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).
	7. Auxiliary Equipment	1. Test to verify 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.
After Modification to Compartment/ Protected Enclosure	1. Protected Enclosure/Room	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration. 2. If uncertainty exists, follow the enclosure procedures in NFPA 2001.
As Part of Other Building Inspection (not part of the ITM requirements)	1. 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.

2-2.24 Emergency Lighting Systems.

Emergency lighting systems include individual battery-powered lighting units, central battery-powered units, and standby generator-powered lighting systems. Technical guidance on the task is located in NFPA 101, *Life Safety Code;* NFPA 110, *Standard for Emergency and Standby Power Systems;* and NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*. Figure 2-2 shows typical systems.

CAUTION

Battery-powered emergency lights generally require from 1 to 7 days to initially charge or to re-charge following a 90-minute discharge or activation. (Table 2-27, Task Annual 2.1)

Table 2-27 Emergency Lighting System ITM Tasks

Frequency	Component	Tasks
Annually	1. Individual Battery-Powered Lighting Units	1. Activate for not less than 90 minutes to verify battery voltage and capacity.
	2. Central Battery-Powered Lighting Systems	1. Activate for not less than 90 minutes to verify battery voltage and capacity.
	3. Emergency Generator-Powered Lighting Systems	1. During regularly scheduled generator and transfer switch maintenance, visually check operation of each emergency generator-powered fixture.
5 to 10 Years	1. Individual Fixtures' Replaceable Batteries or Unitized Fixtures	1. Replace battery or complete unitized fixture in accordance with manufacturer's **\1\ /1/** service life **\1** guidance **/1/**.

Figure 2-1 Typical Emergency Lighting Systems

Typical Emergency Light Units with a 5-year Manufacturer's Estimated Service Life Battery

Typical Emergency Light Units and Florescent Fixture Ballasts with a 10-year Manufacturer's Estimated Service Life Battery

Typical Central Emergency Power Sources with a 10-year Manufacturer's Estimated Service Life Battery

2-2.25 Egress Marking Systems.

Egress lighting systems include individual battery-powered lighting units, central battery-powered units, and standby generator-powered lighting systems. Figures 2-2 and 2-3 show typical units.

\1 New and replacement internally illuminated egress marking fixtures must be Energy Star® compliant. **/1/**

CAUTION

Battery-powered emergency egress marking generally requires from 1 to 7 days to initially charge or to re-charge following a 90-minute discharge or activation. (Table 2-28, Task Annual 4.3)

Table 2-28 Egress Marking System ITM Tasks

Frequency	Component	Tasks
Annually	1. Externally Illuminated and Non-illuminated Marking Fixtures	1. Inspect fixture condition and mounting. 2. Ensure emergency light source, if required, is functional.
	2. Photo-luminescent Marking Fixtures	1. Inspect fixture condition and mounting. 2. Inspect charging light source and mounting. 3. Ensure charging light source is functional (unswitched 5 foot-candles fluorescent or greater). Charging light must be on at all times the building is occupied.
	3. Internally Illuminated Marking Fixtures	1. Inspect fixture condition and mounting. 2. Ensure the bulb or light source is functional. 3. For electroluminescent marking, ensure the power source is operational.
	4. Internally Illuminated Marking Fixtures with Standby Battery Backup	1. Inspect fixture condition and mounting. 2. Ensure the bulb or light source is functional. 3. Activate on battery power for not less than 90 minutes to verify battery voltage and capacity. 4. **\1** Replace any fixtures or battery, if replaceable, that fails to remain illuminated for 90 minutes. **/1/**
	5. Internally Illuminated Marking with Emergency Generator	1. Inspect fixture condition and mounting. 2. Ensure the bulb or light source is functional.

	Backup	3. During regularly scheduled generator and transfer switch maintenance, visually check the operation of each emergency generator-powered fixture.
5 to 10 years	1. Internally Illuminated Marking with Standby Battery Backup	1. Replace battery or fixture if battery is not replaceable (unitized fixture) in accordance with manufacturer's service life **\1** guidance **/1/**.

Figure 2-2 Typical Egress Marking Units with a 10-year Manufacturer's Estimated Service Life Battery

Figure 2-3 Typical Combination Egress Marking and Emergency Light Units with a 5-year Manufacturer's Estimated Service Life Battery (Not Energy Star® Compliant)1

[1]LED egress marking devices without battery backup are **\1\ /1/** considered to have a 25-year **\1\ /1/** service life. (Consult the manufacturer's technical materials for specific guidance.)

2-2.26 Fire and Smoke Barrier Opening-.

Detection devices for actuation are addressed in Section 2-2.2, "Fire Detection and Alarm Systems." Electric hold-open devices are tested as part of the fire alarm system in "Fire Detection and Alarm Systems." Technical guidance on these tasks is contained in NFPA 80, *Standard for Fire Doors and Other Opening Protectives,* and NFPA 105, *Standard for Smoke Door Assemblies and Other Opening Protectives*.

Table 2-29 Fire and Smoke Barrier Opening Protection ITM Tasks

Frequency	Component	Tasks
Annually	1. Hinged Fire Doors	1. Test magnetic hold-open devices for release on activation of fire alarm. 2. Inspect closers for proper operation. 3. Verify door closes and latches.
	2. Sliding Doors	1. Test magnetic hold-open devices for release on activation of fire alarm. 2. Ensure weights have a free and unobstructed path of travel. 3. Verify door closes and latches
	3. Rolling or Sliding Fire Shutters	1. Test magnetic hold-open and other mechanical latches or actuators for release on activation of fire alarm. 2. Operate the shutter through its entire travel.
1 Year after Construction and Every 6 Years Thereafter	1. Fire and Smoke Dampers	1. Test electric (magnetic) hold-open and other mechanical latches or actuators for release on activation of fire alarm. 2. Inspect travel path for anything obstructing or interfering with free operation.
As Part of Other Building Inspection (not part of ITM requirements)	1. Hinged Fire Doors	1. Inspect door condition, gaskets, and mounting hardware. Ensure proper lubrication. 2. Inspect fusible links, if present, for paint or other accumulations that slow thermal response.
	2. Sliding Doors	1. Inspect door condition and mounting hardware. Ensure proper lubrication. 2. Inspect fusible links, if present, for paint or other accumulations slowing thermal response. 3. Inspect travel path for anything obstructing or interfering with free operation.
	3. Rolling or Sliding Fire Shutters	1. Inspect door condition and mounting hardware. Ensure proper lubrication. 2. Inspect fusible links, if present, for paint or other accumulations slowing thermal response. 3. Inspect travel path for anything obstructing or interfering with free operation.
	4. Fire and Smoke Dampers	1. Inspect fixture condition and mounting. 2. Inspect fusible links, if present, for paint or other accumulations that slow thermal response.

Frequency	Component	Tasks
	5. Installed Fire Stopping, Listed Sleeves, Penetrations, Seal Bags, and Other Fire Stopping Material	1. Inspect fire-resistive barriers for new or other unprotected penetrations of rated walls, floors, or ceilings.

2-2.27 Smoke Control Systems.

Detection devices for actuation are addressed in Section 2-2.2, “Fire Detection and Alarm Systems.” Technical guidance on these tasks is contained in NFPA 92, *Standard for Smoke Control Systems*.

Table 2-30 Smoke Control ITM Tasks

Frequency	Component	Tasks
Semi-Annually	1. Dedicated Systems	1. Operate the smoke control system through each operational sequence provided for in the original system design. 2. Verify the operation of the correct output for each given input. 3. If applicable, conduct tests under standby power.
Annually	1. Fans, Fire and Smoke Dampers, and System Controls	1. Operate the smoke control system through each operational sequence provided for in the original system design. 2. Verify the operation of the correct output for each given input. 3. If applicable, conduct tests under standby power. Testing must determine and document airflow quantities and pressure differences across smoke barrier openings, at the air make-up locations, and at smoke exhaust fans for comparison to original acceptance testing results.

Frequency	Component	Tasks
Upon System Modification or Building Renovations or Additions	1. All Systems	1. Operate the smoke control system through each operational sequence provided for in the original system design. 2. Verify the operation of the correct output for each given input. 3. If applicable, conduct tests under standby power. Testing must determine and document airflow quantities and pressure differences across smoke barrier openings, at the air make-up locations, and at smoke exhaust fans for comparison to original acceptance testing results.

2-2.28 Heat and Combustion Product Removal/Venting Systems.

Technical guidance on these tasks is contained in NFPA 204, *Standard for Smoke and Heat Venting*.

Table 2-31 Heat and Combustion Product Removal/Venting System ITM Tasks

Frequency	Component	Tasks
Annually	1. Mechanically Opened Vents	1. Inspect for changes in appearance, damage to any components, fastener security, weather tightness, presence of foreign objects, and changes in roof flashing condition.
	2. Thermoplastic Drop-out Vents	1. Inspect for changes in appearance, damage to any components, fastener security, weather tightness, and changes in roof flashing condition.
	3. Mechanical Smoke Exhaust Systems	1. Inspect for damage to any components. 2. Verify exhaust outlets and air inlets are unobstructed. 3. Verify power sources. 4. Test system to verify equipment is operational and functions as intended.
5 Years	1. Mechanically Opened Vents	1. Test vents by releasing the restraining cable at the heat-responsive device, releasing the restraint, and allowing the trigger or latching mechanism to operate. 2. Test manual releases to verify vents operate as designed. 3. Verify correct temperature of fusible link.

\1

2-2.29 Ignitable Liquid Floor Drainage Assembly.

Required ITM tasks for are contained in Table 2-32.

a. Internal drainage channel inspection is accomplished using a sewer/drain inspection endoscope (pipe inspection camera).

b. Internal drainage channel cleaning is accomplished using a sewer/drain high pressure (1500 – 3000 psi) jetting hose and nozzle. Rotating nozzles are recommended. Nozzles are inserted from the drainage trench end and travel up to the flushing header and pulled back to clean each channel.

c. Section 2-2.8, “Fire Pumps,” provides guidance for maintenance of fire pumps. Maintenance for industrial trash pumps must comply with Section 2-2.8 since these pumps perform a similar critical function to a fire pump for a suppression system.

Table 2-32 Ignitable Liquid Floor Drainage Assembly ITM Tasks

Frequency	Component	Task
Weekly	1. Water Supply Tanks (without electric remote supervision of water level)	1. Check level.
	2. Effluent Collection/Retention Tanks (without electric remote supervision of water level)	1. Check level.
	3. Air Compressor/Receiver/ Cylinders (without electric remote supervision of air pressure) [if present]	1. Check air pressure.
Semi-Annually	1. System	1. Operate full system in maintenance flushing for not less than 5 minutes. Ensure visually equal flow in every channel. 2. Visually inspect the hangar floor for any indication of obstruction or blockage in the deck channels while flushing.
	2. Air Compressors (if present)	1. Start to ensure operability.
	3. System Operating Components	1. Inspect to verify valve alignment and valves are free of damage.
Annually	1. Water/Effluent Tanks (remote electrically supervised and monitored)	1. Check water level detection device and supervisory controls.

Frequency	Component	Task
	2. Air Compressors/Receivers/ Cylinders (electric remote supervision of air pressure) [if present]	1. Check air pressure and supervisory pressure switch.
	3. Liquid Sensors	1. Operate to verify initiation and receipt of alarm. 2. Verify effluent pump start. 3. Verify flushing water valve opens.
	4. Pressure Relief Devices	1. Manually operate to ensure operability.
	5. Manual Actuators	2. Verify operability.
	6. Deck Channels	1. Verify operability, flow, in all channels, and ensure no blockage/ restriction forcing water to backflow through drainage holes. 2. Pressure-wash any channels in the deck indicating blockage or restriction.
	7. Decking and Ramps	1. Visually inspect deck and ramps for missing screws and replace any missing screws with manufacturer's recommended replacements.
	8. Exercise Manual and Automatic Valves.	1. Operate each valve through its full operating range for not less than 2 full cycles. 2. Ensure each valve is reset to the operating position.
5 Years	1. Deck Channels	1. Visually inspect 20% of floor channels using sewer endoscope. 2. If debris is in half or more of channels inspected, conduct 5-10 year deck channel cleaning.
	2. Water Tanks When Used to Supply the Flushing System	1. Drain and refill tank. 2. Inspect tanks for structural integrity (interior and exterior) prior to refilling.
5-20 Years	1. Floor Channels	1. Pressure-wash each channel in the floor deck.
As Part of Other Building Inspection (not part of the ITM requirements)	1. Entire System	1. Ensure: a. manual stations are in place and unobstructed. c. panels are secured and indicator lamps functional.

/1/

CHAPTER 3 MILITARY FAMILY HOUSING SYSTEMS

3-1 SCOPE.

\1

3-1.1 DoD Military Family Housing.

/1/

The maintenance concepts for MFH fire protection systems are based on the management and controls unique to the MFH program. In the civilian sector, an owner or tenant makes a personal choice to occupy a dwelling unit and is responsible for its maintenance and repair and any associated fire protection devices. In MFH, occupants are assigned housing units, and the housing management activity is responsible for the maintenance and repair of units and associated fire protection devices. All MFH occupants are required to attend a briefing on their responsibilities as MFH occupants prior to occupying an MFH dwelling. These briefings include the occupant's responsibilities for conducting tests and cleaning installed fire protection features. On average, MFH maintenance teams conduct change of occupancy maintenance every one to two years; therefore, scheduled maintenance performed by the housing management activity is centered on this change of occupancy.

\1

3-1.2 Privatized Military Family Housing.

Privatized military family housing contractors are responsible for developing their own maintenance programs in accordance with their lease agreement and national consensus codes and standards. Contractors are permitted to adopt requirements of this UFC chapter in meeting their maintenance and safety goals. (Chapter 1, Section 1-3).

/1/

3-2 RESIDENTIAL SMOKE ALARMS.

MFH units are required to have hard-wired, interconnected smoke alarms. Each installation develops programs to train occupants in testing and maintenance actions for installed smoke alarms. Actions required as part of change of occupancy maintenance by the housing management activity are listed **\1** (Table 3-1) **/1/**.

3-3 RESIDENTIAL SPRINKLER SYSTEMS.

New MFH units are required to have sprinkler systems **\1**(UFC 3-600-01, Chapter 4).**/1/**

3-3.1 Multi-Family Residential Buildings.

Residential sprinkler systems in multi-family buildings up to four stories are **\1\ /1/** constructed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems,* or NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Residential Occupancies* **\1** (UFC 3-600-01, Chapter 4). **/1/** Maintain these systems in

accordance with the tables in Chapter 2 of this UFC. Building occupants are not expected to conduct **\1** sprinkler **/1/** system tests or maintenance actions.

3-3.2 One- and Two-family Residences and Townhouse-style Units.

Residential sprinkler systems in one- and two-family dwellings and townhouse-style units are **\1** installed **/1/** in accordance with NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, or NFPA 13R. **\1** (UFC 3-600-01 Chapter 4) **/1/** Installations develop their own programs to train occupants in the testing and maintenance actions required. Actions required as part of change of occupancy maintenance by the housing management activity are listed **\1** (Table 3-1) **/1/**.

3-4 CARBON MONOXIDE ALARMS.

MFH units **\1** must **/1/** have carbon monoxide detectors connected to the building fire alarm system, or they **\1** must **/1/** have single station carbon monoxide alarms. Carbon monoxide detectors connected to the fire alarm system are addressed in Section 2-2.2 in Chapter 2 of this UFC. For single station carbon monoxide alarms, actions required as part of change of occupancy maintenance by the housing management activity are listed in Table 3-3.

3-5 ITM TASK DESCRIPTIONS.

ITM tasks **\1** must **/1/** be part of the housing maintenance conducted between occupancies.

CAUTION

Battery-powered smoke alarms are not permitted, and when found, must be replaced with interconnected hardwired smoke alarms on change of occupancy. Air Force allows hardwired **\1** and **/1/** wireless interconnected smoke alarms for use within single-family and duplex housing. (Table 3-1, Change of Occupancy, Task 3.1)

Table 3-1 MFH Residential Smoke Alarm ITM Tasks

Frequency	Component	Tasks
Change of Occupancy	1. Smoke Alarms (hardwired single-station and multi-station smoke alarms)	1. Activate each smoke alarm with an approved smoke simulant. 2. Remove cover and inspect for grease buildup; replace and relocate smoke alarms with evidence of grease buildup in the smoke alarm. 3. Vacuum smoke alarm and replace cover. 4. Activate each smoke alarm with the installed test button. 5. Replace any smoke alarm failing to activate on either the smoke simulant or the test button.
	2. Backup Battery (if present)	1. Replace battery.
	3. Battery-only powered smoke alarms **\1** if present. **/1/**	1. Replace with hardwired smoke alarms complying with requirements in UFC 3-600-01 for new construction.
10 Years	1. Smoke Alarms (hardwired single-station and multi-station smoke alarms)	1. Replace smoke alarm. If replacing existing smoke alarms without an interconnection feature, replacement smoke alarms must include interconnection, **\1** hardwired or wireless, **/1/** between all smoke alarms in the dwelling unit.

Table 3-2 MFH Residential Sprinkler System ITM Tasks

Frequency	Component	Tasks
Change of Occupancy	1. Sprinklers	1. Inspect all sprinklers. 2. Clean or replace sprinklers as necessary. Sprinklers that have been painted must be replaced; cleaning is not permitted. 3. Inspect ceilings or wall at sprinkler for signs of leakage or water stains.

Frequency	Component	Tasks
	2. Valves	1. Inspect valves to ensure they are open and sealed.
	3. Water Flow and Alarm Devices	1. Test to verify operability.
20 Years and Every 10 Years Thereafter	1. Fast-Response Sprinklers	1. Replace all sprinklers or test a sample of sprinklers to verify response characteristics.[1]

\1[1]**/1/** A representative sample of sprinklers for testing must consist of one (1) percent of the sprinklers installed of the same type, with a minimum of four (4) sprinklers sampled. The sprinklers must be submitted to a **\1** nationally **/1/** recognized testing laboratory for these tests.

Table 3-3 Carbon Monoxide Alarm ITM Tasks

Frequency	Component	Tasks
Change of Occupancy	1. Carbon Monoxide Alarm (hardwired single-station and multi-station alarms)	1. Activate each alarm device with an approved CO simulant. 2. Activate each alarm device with the installed test button. 3. Replace any alarm device failing to activate on either the CO simulant or the test button.
	2. Backup Battery (if present)	1. Replace battery.
10 Years, or Upon End-of-Life Signal from Detector, Whichever Is Less.	1. Combination Smoke/Carbon Monoxide Alarms (hardwired single-station and multi-station alarms)	1. Replace alarm devices. If replacing existing alarm devices without an interconnection feature, replacement alarm devices must include interconnection between all smoke alarms in the dwelling unit.
\1 10 years or **/1/** Upon End-of-Life Signal from Detector **\1** Whichever Is Less. **/1/**	1. Carbon Monoxide Alarms (hardwired single-station and multi-station alarms)	1. Replace alarm device.

APPENDIX A NAVY CONTRACT TECHNICIAN QUALIFICATIONS

A-1 INTRODUCTION.

Contract fire protection inspection, test, and maintenance (ITM) services must be managed by a qualified individual who is NICET Level III certified in fire alarm or NICET Level III certified in special hazards systems. The fire protection services manager provides daily supervision over all fire protection services.

Personnel executing ITM tasks on fire protection systems must be certified in accordance with requirements **\1** in paragraphs A-2 through A-4. **/1/**

A-2 FIRE ALARM SYSTEMS.

- Fire Alarm detection, supervision, and notification controls and devices: NICET Level II certification in Fire Alarm Systems.
- Detection and releasing systems for Special Hazard Systems **\1** including **/1/** those found in aircraft hangars and computer server rooms: NICET Level II certification in Special Hazard Systems.

A-3 WATER BASED SUPPRESSION SYSTEMS.

- Wet Pipe and Dry Pipe Sprinklers: - NICET Level II certification in Inspection and Testing of Water Based Systems.
- Pre-Action, Deluge, Foam and Antifreeze Systems: NICET Level III certification in Inspection and Testing of Water Based Systems.

A-4 SPECIAL HAZARD SYSTEMS.

- Clean Agent, CO_2 and Combination Detection/Releasing Systems: NICET Level II certification in Special Hazard Systems.
- Pre-Engineered Kitchen Fire Extinguishing Systems: NICET Level II certification in Special Hazards Suppression Systems or certified by ICC/NAFED in Pre-Engineered Kitchen Fire Extinguishing Systems.

Personnel without NICET certification **\1** are permitted to **/1/** assist NICET Levels II and III certified personnel in the execution of inspection, testing, maintenance and repair tasks. At no time are uncertified personnel allowed to execute inspection, testing, maintenance and repair tasks without a qualified NICET Level II or III certified person physically present within the same facility where the inspection, testing, maintenance and repair tasks are being executed.

This Page Intentionally Left Blank

APPENDIX B GLOSSARY

B-1 ACRONYMS

AFCEC/CO	Air Force Civil Engineer Center, Operations Directorate
AFFF	aqueous film-forming foam
AHJ	authority having jurisdiction
ANSI	American National Standards Institute
AWWA	American Water Works Association
CFPE	Component Fire Protection Engineer
CFR	Code of Federal Regulations
CO_2	carbon dioxide
DFPE	Designated Fire Protection Engineer
DoD	Department of Defense
DOT	U.S. Department of Transportation
FACP	fire alarm control panel
FFF	fluorine free foam
FFFP	film-forming fluoroprotien foam
FMCP	fire alarm control panel with integrated mass notification
HQ USACE	Headquarters U.S. Army Corps of Engineers
Hi-Ex	high expansion foam
ILDFA	ignitable liquid floor drainage assembly
ITM	inspection, testing, and maintenance
LED	light-emitting diode
LOC	local operating console
MFH	Military Family Housing
MS&O/ESO	Management Services and Operations, Environmental Safety Office

NDAA	National Defense Authorization Act
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRTL	nationally recognized testing laboratory
OSHA	Occupational Safety and Health Administration
PFAS	per- and poly-fluorinated alkylated substances
PFOA	perfluorooctanic acid
PFOS	perfluorooctane sulfonic acid
RCM	reliability-centered maintenance
\1 SAF/IE	Assistant Secretary of the Air Force for Installations and the Environment **/1/**
SecDef	Secretary of Defense
U.S.	United States
UFC	Unified Facilities Criteria
U.S.C.	United States Code

\1

B-2 DEFINITION OF TERMS

Nationally Recognized Test Laboratory (NRTL): CONUS including all states, territories, and possessions; an independent third-party organization that certifies products for the North American market. These organizations are recognized as meeting the legal requirement in 29 CFR 1910.7 to perform testing and certification of products using consensus based test standards. (https://www.osha.gov/nationally-recoganized-test-laboratory-program/current-list-of nrtls)

Nationally Recognized Test Laboratory (NRTL): OCONUS; any organization on the OSHA approved list or an independent third-party organization or governmental organization in a country that certifies products for the country or location market. Some countries allow manufacturer self-certification to government standards under government oversight. See specific country guidance or consult with the CFPE.

/1/

APPENDIX C REFERENCES

AIR FORCE

AFCESA/CES Technical Report 01-10, *Risk Based Reliability Centered Maintenance of DoD Fire Protection Systems*, Jan 1999, DTIC ADA392898 (https://apps.dtic.mil/dtic/tr/fulltext/u2/a392898.pdf)

HQ USAF/A7C Memorandum, "Excess Fire Protection Features," 17 June 2008, (https://usaf.dps.mil/teams/CEDASH/Shared%20Documents/Fire%20Protection%20Engineering/Excess%20Fire%20Protection%20Features%2017%20Jun%2008.pdf CAC AFNet access required)

AMERICAN NATIONAL STANDARDS INSTITUTE

https://webstore.ansi.org/

ANSI Z535.1-2017, *Safety Colors*

ANSI Z535.2-2011, *Environmental and Facility Safety Signs*

AMERICAN WATER WORKS ASSOCIATION

https://www.awwa.org/Publications/Manuals-of-Practice/Manuals-List

AWWA M17, Fire Hydrants: *Installation, Field Testing, and Maintenance*

CODE OF FEDERAL REGULATIONS

https://www.govinfo.gov/app/collection/cfr/

CFR Title 29, Part 1910 Subpart L App A, *Fire Protection*

CFR Title 29, Part 1910.160(b)(2) and 1910.160(b)(6), *Fixed Extinguishing Systems, General*

CFR Title 29, Part 1960.26(b)(5), *Conduct of Inspections*

MILITARY STANDARDS

https://www.wbdg.org/dod/fedmil/mil-std-3007

MIL-STD-3007G, *Standard Practice for Unified Facilities Criteria and Unified Facilities Guide Specifications*

NATIONAL FIRE PROTECTION ASSOCIATION

https://www.nfpa.org or

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*

NFPA 13, *Standard for the Installation of Sprinkler Systems*

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

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*

NFPA 14, *Standard for the Installation of Standpipes and Hose Systems*

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

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

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*

NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*

NFPA 22, *Standard for Water Tanks for Private Fire Protection*

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*

NFPA 72, *National Fire Alarm and Signaling Code®*

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*

NFPA 92, *Standard for Smoke Control Systems*

NFPA 101, *Life Safety Code*

NFPA 105, *Standard for Smoke Door Assemblies and Other Opening Protectives*

NFPA 110, *Standard for Emergency and Standby Power Systems*

NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*

NFPA 204, *Standard for Smoke and Heat Venting*

NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants*

NFPA 750, *Standard on Water Mist Fire Protection Systems*

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*

UNIFIED FACILITIES CRITERIA

https://www.wbdg.org/dod/ufc

UFC 3-230-02, *Operation and Maintenance: Water Supply Systems*

UFC 3-600-01, *Fire Protection Engineering for Facilities*

UNITED STATES CODE

https://www.govinfo.gov/app/collection/uscode/

Title 10 United States Code (U.S.C.) Section 1794, *Child abuse prevention and safety at facilities*

Title 15 United States Code (U.S.C.) Section 272, *Establishment, functions, and activities (NIST)*

Title 15 United States Code (U.S.C.) Section 2227, *Fire safety systems in federally assisted buildings (Fire Administration Authorization Act)*

Title 15 United States Code (U.S.C.) Chapter 115, *Perfuoroalkyl and Polyfluoroalkyl Substances and Emerging Contaminants*

Title 29 United States Code (U.S.C.) Section 1910, Subpart L, *Fire Protection*

Title 29 United States Code (U.S.C.) Section 1960, *Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters*