First Revision No. 5236-NFPA 72-2019 [New Section after 3.3.185]

3.3.193* Observation.

A suggested correction, improvement, or enhancement to the fire alarm or signaling system that is not considered to be an impairment or deficiency. (SIG-TMS)

A.3.3.193 Observation.

Examples of observations could include, but are not limited to, manufacturer's suggested device replacement, executive software updates, corroded electrical component replacement, and other similar items not directly impacting a system's ability to complete its intended function at the point in time when the observation is made.

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Thu Jul 25 14:28:00 EDT 2019

Committee Statement

Committee Statement: A definition of observation is added to support the new text in 14.2.2.3, which addresses instances where the service technician notes issues that do not rise to the level of an impairment or deficiency.

Response Message: FR-5236-NFPA 72-2019

Public Input No. 634-NFPA 72-2019 [New Section after 3.3.240]

First Revision No. 5244-NFPA 72-2019 [Section No. 7.5.7]

7.5.7 Site-Specific Software. (SIG-TMS)

7.5.7.1

For software-based systems, a copy of the site-specific software shall be provided to the system owner or owner's designated representative.

7.5.7.1.1*

For all software that connects to and is part of the building life safety network components, the software security access or the means of obtaining the software security access shall be provided to the owner or the owner's designated representative.

A.7.5.7.1.1

The intent is for the building owner to be able to obtain the software security access to their equipment and not be placed in a position that other qualified vendors could not be utilized. The software would be the fire alarm control unit, DACTs wireless transmitters, MNS components, and so forth.

7.5.7.1.2

The site-specific software documentation shall include both the user passcode and either the system programming password or specific instructions on how to obtain the programming password from the system manufacturer.

7.5.7.1.3

The passwords provided shall enable currently certified qualified programming personnel to access, edit, modify, and add to the existing system's site-specific software.

7.5.7.2

A copy of the site-specific software shall be stored on-site in nonvolatile~~, nonerasable, nonrewritable~~ memory.

Supplemental Information

File Name	Description Approved
72_SIG-TMS_FR5244_7.5.7.docx	STAFF USE

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Thu Jul 25 15:05:30 EDT 2019

Committee Statement

Committee Statement: The building owner should be able to obtain the software security access to their equipment and not be placed in a position that other qualified vendors could not be utilized.

Response Message: FR-5244-NFPA 72-2019

Public Input No. 491-NFPA 72-2019 [Section No. 7.5.7]

Public Input No. 59-NFPA 72-2019 [Section No. 7.5.7.2]

Public Input No. 360-NFPA 72-2019 [New Section after 7.5.7.1.2]

First Revision No. 5235-NFPA 72-2019 [New Section after 14.2.2.2]

14.2.2.4 Observations.

14.2.2.4.1

If observations are noted, they shall be permitted to be communicated to the system owner.

14.2.2.4.2

The system owner shall not be required to address such observations unless the observations become an impairment or deficiency.

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Thu Jul 25 14:11:24 EDT 2019

Committee Statement

Committee Statement: The new text clarifies that owners are not required to address observations that are not impairments or deficiencies.

Response Message: FR-5235-NFPA 72-2019

Public Input No. 639-NFPA 72-2019 [New Section after 14.2.3]

First Revision No. 5278-NFPA 72-2019 [Section No. 14.2.2.2]

14.2.2.2 Impairments~~/Deficiencies~~ .

Where an automatic function of a fire alarm or signaling system is taken out of service for performance testing in accordance with Table 14.4.3.2 and a manual means or other compensatory measures are unavailable, the system or portion thereof shall be impaired in accordance with the requirements of Section 10.22 until the automatic function is restored.

~~**14.2.2.2.1**~~

~~The requirements of Section 10.21 shall be applicable when a system is impaired.~~

14.2.2.3 Deficiencies.

14.2.2.3.1

System deficiencies shall be corrected.

14.2.2.3.2

If a deficiency is not corrected at the conclusion of system inspection, testing, or maintenance, the system owner or the owner's designated representative shall be informed of the deficiency in writing within 24 hours.

14.2.2.3.3

In the event that any equipment is observed to be part of a recall program, the system owner or the system owner's designated representative shall be notified in writing.

Supplemental Information

File Name	Description Approved
72_SIG-TMS_FR5278_14.2.2.2.docx	STAFF USE

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Thu Jul 25 17:18:25 EDT 2019

Committee Statement

Committee Statement: Impairments and deficiencies are defined separately in Chapter 3, and impairments are addressed separately in Chapter 10. Therefore, they should be treated separately in Chapter 14 and not categorized together in one section.

The revision clarifies when periodic testing is considered to cause an impairment and eliminates needless impairments for minor out-of-service events.

Response Message: FR-5278-NFPA 72-2019

Public Input No. 6-NFPA 72-2018 [Section No. 14.2.2.2]

Public Input No. 585-NFPA 72-2019 [Section No. 14.2.2.2.1]

Public Input No. 591-NFPA 72-2019 [New Section after A.14.2.2.1.2]

First Revision No. 5219-NFPA 72-2019 [Section No. 14.3.1]

14.3.1*

Unless otherwise permitted by 14.3.2, visual inspections shall be performed in accordance with the schedules in Table 14.3.1 or more often if required by the authority having jurisdiction.

Table 14.3.1 Visual Inspection

Component	Initial Acceptance	Periodic Frequency	Method	Reference
1. All equipment	X	Annual	Ensure there are no changes that affect equipment performance. Inspect for building modifications, occupancy changes, changes in environmental conditions, device location, physical obstructions, device orientation, physical damage, and degree of cleanliness.	14.3.4; 14.3.5
2. Control ~~equipment~~ unit :				
(1) Fire alarm systems monitored for alarm, supervisory, and trouble signals			Verify a system normal condition.	
(a) Fuses	X	Annual		
(b) Interfaced equipment	X	Annual		
(c) Lamps and LEDs	X	Annual		
(d) Primary (main) power supply	X	Annual		
(e) Trouble signals	X	Semiannual		
(2) Fire alarm systems unmonitored for alarm, supervisory, and trouble signals			Verify a system normal condition.	
(a) Fuses	X	Weekly		
(b) Interfaced equipment	X	Weekly		
(c) Lamps and LEDs	X	Weekly		
(d) Primary (main) power supply	X	Weekly		
(e) Trouble signals	X	Weekly		
3. Reserved				
4. Supervising station alarm systems — transmitters			Verify location, physical condition, and a system normal condition.	
(1) Digital alarm communicator transmitter (DACT)	X	Annual		
(2) Digital alarm radio transmitter (DART)	X	Annual		
(3) McCulloh	X	Annual		

Component	Initial Acceptance	Periodic Frequency	Method	Reference
(4) Radio alarm transmitter (RAT)	X	Annual		
(5) All other types of communicators	X	Annual		
5. In-building fire emergency voice/alarm communications equipment	X	Semiannual	Verify location and condition.	
6. Reserved				
7. Reserved				
8. Reserved				
9.* Batteries				10.6.10
(1) Valve-regulated lead-acid (VRLA) batteries				
(a) General	X	N/A	Ensure month and year of manufacture is marked in the month/year format on each battery cell/unit. Verify tightness of battery connections. Inspect terminals for corrosion, excessive container/cover distortion, cracks in cell/unit or leakage of electrolyte. Replace any battery cell/unit if corrosion, distortion, or leakage is observed.	
(b) Marking	N/A	Semiannual	Verify marking of the month/year of manufacture on each battery cell/unit. Replace any cell/unit if alarm equipment manufacturer's replacement date has been exceeded.	
(2) Primary (dry cell) other than those used in low-power radio (wireless) systems in accordance with Chapter 23	X	Semiannual	Verify marking of the month/year of manufacture. Replace if alarm equipment/battery manufacturer's replacement date has been exceeded. Replacement date not to exceed 12 months. Verify tightness of connections. Inspect for corrosion or leakage. Replace any battery cell/unit if corrosion or leakage is observed.	
10. Reserved				
11. Remote annunciators	X	Semiannual	Verify location and condition.	
12. Notification appliance circuit power extenders	X	Annual	Verify proper fuse ratings, if any. Verify that lamps and LEDs indicate normal operating status of the equipment.	10.6

Component	Initial Acceptance	Periodic Frequency	Method	Reference
13. Remote power supplies	X	Annual	Verify proper fuse ratings, if any. Verify that lamps and LEDs indicate normal operating status of the equipment.	10.6
14. ~~Transient suppressors~~ Surge protective devices	X	Semiannual	Verify location and condition.	
15. Reserved				
16. Fiber-optic cable connections	X	Annual	Verify location and condition.	
17. Initiating devices			Verify location and condition (all devices).	
(1) Air sampling				
(a) General	X	Semiannual	Verify that in-line filters, if any, are clean.	17.7.3.6
(b) Sampling system piping and sampling ports	X	N/A	Verify that sampling system piping and fittings are installed properly, appear airtight, and are permanently fixed. Confirm that sampling pipe is conspicuously identified. Verify that sample ports or points are not obstructed.	17.7.3.6
(2) Duct detectors				
(a) General	X	Semiannual	Verify that detector is rigidly mounted. Confirm that no penetrations in a return air duct exist in the vicinity of the detector. Confirm the detector is installed so as to sample the airstream at the proper location in the duct.	17.7.5.5
(b) Sampling tube	X	Annual	Verify proper orientation. Confirm the sampling tube protrudes into the duct in accordance with system design.	17.7.5.5
(3) Electromechanical releasing devices	X	Semiannual		
(4) Fire extinguishing system(s) or suppression system(s) switches	X	Semiannual		
(5) Manual fire alarm boxes	X	Semiannual		
(6) Heat detectors	X	Semiannual		
(7) Radiant energy fire detectors	X	Quarterly	Verify no point requiring detection is obstructed or outside the detector's field of view.	17.8
(8) Video image smoke and fire detectors	X	Quarterly	Verify no point requiring detection is obstructed or outside the detector's field of view.	17.7.7; 17.11.5

	Component	Initial Acceptance	Periodic Frequency	Method	Reference
	(9) Smoke detectors (excluding one- and two-family dwellings)	X	Semiannual		
	(10) Projected beam smoke detectors	X	Semiannual	Verify beam path is unobstructed.	
	(11) Supervisory signal devices	X	~~Quarterly~~ Semiannual		
	(12) Waterflow devices	X	~~Quarterly~~ Semiannual		
18.	Reserved				
19.	Combination systems			Verify location and condition (all types).	
	(1) Fire extinguisher electronic monitoring devices/systems	X	Semiannual		
	(2) Carbon monoxide detectors/systems	X	Semiannual		
20.	Alarm control interface and emergency control function interface	X	Semiannual	Verify location and condition.	
21.	Guard's tour equipment	X	Semiannual	Verify location and condition.	
22.	Notification appliances			Verify location and condition (all appliances).	
	(1) Audible appliances	X	Semiannual		
	(2) Loudspeakers	X	Semiannual		
	(3) Visual appliances				
	(a) General	X	Semiannual		18.5.5
	(b) Candela rating	X	N/A	Verify the appliance candela rating marking or the FACU controlled candela rating agrees with the approved drawings.	18.5.5
23.	Exit marking audible notification appliances	X	Semiannual	Verify location and condition.	
24.	Reserved				
25.	Two-way emergency communications systems	X	Annual	Verify location and condition.	
26.	Reserved				
27.	Supervising station alarm systems — receivers				
	(1) Signal receipt	X	Daily	Verify receipt of signal.	
	(2) Receivers	X	Annual	Verify location and normal condition.	

Component	Initial Acceptance	Periodic Frequency	Method	Reference
28. Public emergency alarm reporting system transmission equipment			Verify location and condition.	
(1) Publicly accessible alarm box	X	Semiannual		
(2) Auxiliary box	X	Annual		
(3) Master box				
(a) Manual operation	X	Semiannual		
(b) Auxiliary operation	X	Annual		
29. Reserved				
30. Mass notification system				
(1) Monitored for integrity			Verify a system normal condition.	
(a) Control equipment				
(i) Fuses	X	Annual		
(ii) Interfaces	X	Annual		
(iii) Lamps/LED	X	Annual		
(iv) Primary (main) power supply	X	Annual		
(b) Secondary power batteries	X	Annual		
(c) Initiating devices	X	Annual		
(d) Notification appliances	X	Annual		
(2) Not monitored for integrity; installed prior to adoption of the 2010 edition			Verify a system normal condition.	
(a) Control equipment				
(i) Fuses	X	Semiannual		
(ii) Interfaces	X	Semiannual		
(iii) Lamps/LED	X	Semiannual		
(iv) Primary (main) power supply	X	Semiannual		
(b) Secondary power batteries	X	Semiannual		
(c) Initiating devices	X	Semiannual		
(d) Notification appliances	X	Semiannual		
(3) Antenna	X	Annual	Verify location and condition.	
(4) Transceivers	X	Annual	Verify location and condition.	

Note: N/A = not applicable, no minimum requirement established.

*For other than VRLA or primary (dry) cell batteries, refer to the battery manufacturer's published

instructions or IEEE 450, *Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications*, for vented lead-acid batteries, and IEEE 1106, *Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications*, for nickel-cadmium batteries.

Supplemental Information

File Name	Description Approved
72_SIG-TMS_FR5219_14.3.1.docx	STAFF USE

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Thu Jul 25 11:17:35 EDT 2019

Committee Statement

Committee Statement: The Technical Committee revises the text in Table 14.3.1 Item (1) by adding a reference to 14.3.5, as it provides the criteria for periodic inspections.

The Technical Committee revises the text in Table 14.3.1 Item (2) from control equipment to control unit to clarify that the requirement applies to control units.

The Technical Committee revises the text in Table 14.3.1 Item (14) to change "transient suppressors" to "surge protective devices" in accordance with the terminology used in Chapter 27 and the NEC and the request of SIG-TMS (see CI-5187).

The Technical Committee revises the text in Table 14.3.1 Item (17)(11) and (17)(12) from “quarterly” to “semiannual.” This aligns the frequency of inspection for condition and location of tamper switches and waterflow switches with the frequency for all other equipment, except for flame detectors and video smoke detectors.

Response Message: FR-5219-NFPA 72-2019

Public Input No. 543-NFPA 72-2019 [Section No. 14.3.1]

Public Input No. 493-NFPA 72-2019 [Section No. 14.3.1]

Public Input No. 290-NFPA 72-2019 [Section No. 14.3.1]

Public Input No. 69-NFPA 72-2019 [Section No. 14.3.1]

First Revision No. 5286-NFPA 72-2019 [Section No. 14.4.2.3]

14.4.2.3

When modifications or repairs to control ~~equipment~~ unit hardware are made, the control ~~equipment~~ unit shall be tested in accordance with Table 14.4.3.2, items 2~~(a)~~ (1) and 2~~(d)~~ (4) .

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Fri Jul 26 08:06:58 EDT 2019

Committee Statement

Committee Statement: The term "control equipment" is not defined in the standard. The term "control unit" is defined in the standard and is the term that is appropriate to convey the intended meaning.

The correct reference is Table 14.4.3.2, Item 2 with components 1 and 4 being applicable.

Response Message: FR-5286-NFPA 72-2019

Public Input No. 499-NFPA 72-2019 [Section No. 14.4.2.3]

Public Input No. 542-NFPA 72-2019 [Section No. 14.4.2.3]

First Revision No. 5288-NFPA 72-2019 [New Section after 14.4.2.5]

14.4.2.6

Where changes are made to system executive software or site-specific software for control equipment or transmitting equipment from a remote location not on the protected premises, such changes shall not be made without an individual, meeting the qualifications of 10.6.3.2 , 10.6.3.3 , or 10.6.3.5 , being at the protected premises to verify that testing is accomplished in accordance with 14.4.2 .

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Fri Jul 26 08:22:12 EDT 2019

Committee Statement

Committee Statement: Remote (off-site) programming of control equipment at a protected premises is being developed. In order to meet the requirements of 14.4.2 for reacceptance testing, language is added to state that remote programming must be verified by a qualified person in accordance with 14.4.2.

Response Message: FR-5288-NFPA 72-2019

Public Input No. 182-NFPA 72-2019 [New Section after 14.4.2.5]

First Revision No. 5328-NFPA 72-2019 [Section No. 14.4.3.2]

14.4.3.2*

Systems and associated equipment shall be tested according to Table 14.4.3.2.

Table 14.4.3.2 Testing

	Component	Initial Acceptance	Periodic Frequency	Method
1.	All equipment	X		See Table 14.3.1.
2.	Control ~~equipment and transponder~~ unit			
	(1) Functions	X	Annually	Verify correct receipt of alarm, supervisory, and trouble signals (inputs); operation of evacuation signals and auxiliary functions (outputs); circuit supervision, including detection of open circuits and ground faults; and power supply supervision for detection of loss of ac power and disconnection of secondary batteries.
	(2) Fuses	X	Annually	Verify rating and supervision.
	(3) Interfaced equipment	X	Annually	Verify integrity of single or multiple circuits providing interface between two or more control units. Test interfaced equipment connections by operating or simulating operation of the equipment being supervised. Verify signals required to be transmitted at the control unit.
	(4) Lamps and LEDs	X	Annually	Illuminate lamps and LEDs.
	(5) Primary (main) power supply	X	Annually	Disconnect all secondary (standby) power and test under maximum load, including all alarm appliances requiring simultaneous operation. Reconnect all secondary (standby) power at end of test. Test redundant power supplies separately.
3.	Alarm control unit trouble signals			
	(1) Audible and visual	X	Annually	Verify operation of control unit trouble signals. Verify ring-back feature for systems using a trouble-silencing switch that requires resetting.
	(2) Disconnect switches	X	Annually	If control unit has disconnect or isolating switches, verify performance of intended function of each switch. Verify receipt of trouble signal when a supervised function is disconnected.
	(3) Ground-fault monitoring circuit	X	Annually	If the system has a ground detection feature, verify the occurrence of ground-fault indication whenever any installation conductor is grounded.
	(4) Transmission of signals to off-premises location	X	Annually	Actuate an initiating device and verify receipt of alarm signal at the off-premises location. Create a trouble condition and verify receipt of a trouble signal at the off-premises location. Actuate a supervisory device and verify receipt of a supervisory signal at the off-premises location. If a transmission carrier is capable of operation under a single- or multiple-fault condition, actuate an initiating device during such fault condition and verify receipt of an alarm signal and a trouble signal at the off-premises location.

	Component	Initial Acceptance	Periodic Frequency	Method
4.	Supervising station alarm systems — transmission equipment			

Component	Initial Acceptance	Periodic Frequency	Method
(1) All equipment	X	Annually	[a]Test all system functions and features in accordance with the equipment manufacturer's published instructions for correct operation in conformance with the applicable sections of Chapter 26. Except for DACT, actuate initiating device and verify receipt of the correct initiating device signal at the supervising station within 90 seconds. Upon completion of the test, restore the system to its functional operating condition. If test jacks are used, conduct the first and last tests without the use of the test jack.
(2) Digital alarm communicator transmitter (DACT)	X	Annually	Except for DACTs installed prior to adoption of the 2013 edition of NFPA 72 that are connected to a telephone line (number) that is also supervised for adverse conditions by a derived local channel, ensure connection of the DACT to two separate means of transmission. Test DACT for line seizure capability by initiating a signal while using the telephone line (primary line for DACTs using two telephone lines) for a telephone call. Ensure that the call is interrupted and that the communicator connects to the digital alarm receiver. Verify receipt of the correct signal at the supervising station. Verify each transmission attempt is completed within 90 seconds from going off-hook to on-hook. Disconnect the telephone line (primary line for DACTs using two telephone lines) from the DACT. Verify indication of the DACT trouble signal occurs at the premises fire alarm control unit within 4 minutes of detection of the fault. Verify receipt of the telephone line trouble signal at the supervising station. Restore the telephone line (primary line for DACTs using two telephone lines), reset the fire alarm control unit, and verify that the telephone line fault trouble signal returns to normal. Verify that the supervising station receives the restoral signal from the DACT. Disconnect the secondary means of transmission from the DACT. Verify indication of the DACT trouble signal occurs at the premises fire alarm control unit within 4 minutes of detection of the fault. Verify receipt of the secondary means trouble signal at the supervising station. Restore the secondary means of transmission, reset the fire alarm control unit, and verify that the trouble signal returns to normal. Verify that the supervising station receives the restoral signal from the secondary transmitter. Cause the DACT to transmit a signal to the DACR while a fault in the telephone line (number) (primary line for DACTs using two telephone lines) is simulated. Verify utilization of the secondary communications path by the DACT to complete the transmission to the DACR.
(3) Digital alarm radio transmitter (DART)	X	Annually	Disconnect the primary telephone line. Verify transmission of a trouble signal to the supervising station by the DART occurs within 4 minutes.

Component	Initial Acceptance	Periodic Frequency	Method
(4) McCulloh transmitter	X	Annually	Actuate initiating device. Verify production of not less than three complete rounds of not less than three signal impulses each by the McCulloh transmitter. If end-to-end metallic continuity is present and with a balanced circuit, cause each of the following four transmission channel fault conditions in turn, and verify receipt of correct signals at the supervising station: (1) Open (2) Ground (3) Wire-to-wire short (4) Open and ground If end-to-end metallic continuity is not present and with a properly balanced circuit, cause each of the following three transmission channel fault conditions in turn, and verify receipt of correct signals at the supervising station: (1) Open (2) Ground (3) Wire-to-wire short
(5) Radio alarm transmitter (RAT)	X	Annually	Cause a fault between elements of the transmitting equipment. Verify indication of the fault at the protected premises, or transmission of trouble signal to the supervising station.
(6) Performance-based technologies	X	Annually	Perform tests to ensure the monitoring of integrity of the transmission technology and technology path. Where shared communications equipment is used as permitted by 26.6.3.1.14, provided secondary (standby) power sources shall be tested in accordance with Table 14.4.3.2, item 7, 8, or 9, as applicable. Where a single communications path is used, disconnect the communication path. Manually initiate an alarm signal transmission or allow the check-in (handshake) signal to be transmitted automatically. [b]Verify the premises unit annunciates the failure within 200 seconds of the transmission failure. Restore the communication path. Where multiple communication paths are used, disconnect both communication paths. Manually initiate an alarm signal transmission. Verify the premises control unit annunciates the failure within 200 seconds of the transmission failure. Restore both communication paths.
5. Emergency communications equipment			
(1) Amplifier/tone generators	X	Annually	Verify correct switching and operation of backup equipment.
(2) Call-in signal silence	X	Annually	Operate/function and verify receipt of correct visual and audible signals at control unit.
(3) Off-hook indicator (ring down)	X	Annually	Install phone set or remove phone from hook and verify receipt of signal at control unit.
(4) Phone jacks	X	Annually	Visually inspect phone jack and initiate communications path through jack.

	Component	Initial Acceptance	Periodic Frequency	Method
	(5) Phone set	X	Annually	Actuate each phone set and verify correct operation.
	(6) System performance	X	Annually	Operate the system with a minimum of any five handsets simultaneously. Verify voice quality and clarity.
6.	Engine-driven generator	X	Monthly	If an engine-driven generator dedicated to the system is used as a required power source, verify operation of the generator and transfer switch in accordance with NFPA 110 by the building owner.
7.	Energy storage systems (ESS)	X	Annually	If an ESS system dedicated to the system is used as a required power source, verify by the building owner operation of the ESS system in accordance with NFPA 111.
8.	Secondary (standby) power supply[c]	X	Annually	Disconnect all primary (main) power supplies and verify the occurrence of required trouble indication for loss of primary power. Measure or verify the system's standby and alarm current demand using the equipment manufacturer's data and verify the battery's rated capacity exceeds the system's power demand, including the safety margin. Operate general alarm systems a minimum of 5 minutes and emergency voice communications systems for a minimum of 15 minutes. Reconnect primary (main) power supply at end of test.
9.	VRLA battery and charger[d]			Prior to conducting any battery testing, verify by the person conducting the test, that all system software stored in volatile memory is protected from loss.
	(1) Temperature test	X	Semiannually	Upon initially opening the cabinet door, measure ~~and record~~ the internal ambient temperature of the enclosure. Measure the temperature of each battery cell/unit at the negative terminal with an infrared thermometer. Replace any battery cell/unit if ~~the~~ its temperature is greater than 18°F (10°C) above the measured internal ambient temperature of the enclosure .
	(2) Charger test[f e]	X	Semiannually	With the battery fully charged and connected to the charger, measure the voltage across the battery with a voltmeter. Verify the voltage is within the battery/alarm equipment manufacturer's recommendations. If the voltage is outside of the specified limits, either adjust the charger to within limits or replace the charger.
	(3) Cell/Unit voltage test	X	Semiannually	With the battery fully charged and connected to the charger, measure the voltage of each cell/unit with a voltmeter. Replace the battery when any cell/unit measures a voltage less than 13.26 volts.
	(4) Ohmic test[g f]	X	N/A	When the battery is installed, establish a baseline ohmic value for each battery cell/unit or where available use baseline ohmic values provided by the battery or test equipment manufacturer. In either case record the base line ohmic value on each battery cell/unit.
			Semiannually	With the battery fully charged ~~and connected to the charger~~ , measure the internal ohmic value of each battery cell/unit. Record the test date and ohmic value on each cell/unit. Replace the battery when the ohmic measurement of any

Component	Initial Acceptance	Periodic Frequency	Method
			cell/unit deviates from the established baseline by 30% or more for conductance ~~and~~ , or 40% or more for resistance or impedance. Where the battery or test equipment manufacturer's baseline ohmic values are used, replace the battery when any cell/unit has an internal ohmic value outside of the acceptable range. Replace the battery or conduct a load test of the battery capacity. Load test the battery based on the manufacturer's specifications for a discharge rate of 3 hours or more by applying the current indicated for the selected hourly discharge rate continuously, until the terminal voltage decreases to the end voltage specified by the manufacturer. Record the test duration and calculate the battery capacity including adjustment for ambient temperature. Replace the battery if capacity is less than or equal to 80% or at the next scheduled test interval if battery capacity is less than 85%.
(5) Replacement/Load test~~h g~~		3 years	
10. Public emergency alarm reporting system — wired system	X	Daily	Manual tests of the power supply for public reporting circuits shall be made and recorded at least once during each 24-hour period. Such tests shall include the following: (1) Current strength of each circuit. Changes in current of any circuit exceeding 10 percent shall be investigated immediately. (2) Voltage across terminals of each circuit inside of terminals of protective devices. Changes in voltage of any circuit exceeding 10 percent shall be investigated immediately. (3)~~i~~ h Voltage between ground and circuits. If this test shows a reading in excess of 50 percent of that shown in the test specified in (2), the trouble shall be immediately located and cleared. Readings in excess of 25 percent shall be given early attention. These readings shall be taken with a calibrated voltmeter of not more than 100 ohms resistance per volt. Systems in which each circuit is supplied by an independent current source (Forms 3 and 4) require tests between ground and each side of each circuit. Common current source systems (Form 2) require voltage tests between ground and each terminal of each battery and other current source. (4) Ground current reading shall be permitted in lieu of (3). If this method of testing is used, all grounds showing a current reading in excess of 5 percent of the supplied line current shall be given immediate attention. (5) Voltage across terminals of common battery on switchboard side of fuses. (6) Voltage between common battery terminals and ground. Abnormal ground readings shall be investigated immediately. Tests specified in (5) and (6) shall apply only to those systems using a common battery. If more than one common battery is used, each common battery shall be tested.

Component	Initial Acceptance	Periodic Frequency	Method
11. Remote annunciators	X	Annually	Verify the correct operation and identification of annunciators. If provided, verify the correct operation of annunciator under a fault condition.
12. Reserved			
13. Reserved			
14. ~~Reserved~~ Wireless communications	X	Annually	Test per the manufacturer's published instructions.
15. Conductors — metallic			
(1) Stray voltage	X	N/A	Test all installation conductors with a volt/ohmmeter to verify that there are no stray (unwanted) voltages between installation conductors or between installation conductors and ground. Verify the maximum allowable stray voltage does not exceed 1 volt ac/dc, unless a different threshold is specified in the manufacturer's published instructions for the installed equipment.
(2) Ground faults	X	N/A	Test all installation conductors, other than those intentionally and permanently grounded, for isolation from ground per the installed equipment manufacturer's published instructions.
(3) Short-circuit faults	X	N/A	Test all installation conductors, other than those intentionally connected together, for conductor-to-conductor isolation per the manufacturer's published instructions for the installed equipment. Also test these same circuits conductor-to-ground.
(4) Loop resistance	X	N/A	With each initiating and indicating circuit installation conductor pair short-circuited at the far end, measure and record the resistance of each circuit. Verify that the loop resistance does not exceed the limits specified in the manufacturer's published instructions for the installed equipment.
(5) Circuit integrity	X	N/A	For initial and reacceptance testing, confirm the introduction of a fault in any circuit monitored for integrity results in a trouble indication at the fire alarm control unit. Open one connection at not less than 10 percent of the initiating devices, notification appliances and controlled devices on every initiating device circuit, notification appliance circuit, and signaling line circuit. Confirm all circuits perform as indicated in Sections 23.5, 23.6, and 23.7.
	N/A	Annually	For periodic testing, test each initiating device circuit, notification appliance circuit, and signaling line circuit for correct indication at the control unit. Confirm all circuits perform as indicated in Sections 23.5, 23.6, and 23.7.
16. Conductors — nonmetallic			
(1) Fiber optics	X	N/A	Test the fiber-optic transmission line by the use of an optical power meter or by an optical time domain reflectometer used to measure the relative power loss of the line. Test result data must meet or exceed ANSI/TIA 568-~~C~~ .3, *Optical Fiber Cabling and Components Standard*, related to fiber-optic lines and connection/splice losses and the control unit manufacturer's published

Component	Initial Acceptance	Periodic Frequency	Method
			specifications.
(2) Circuit integrity	X	N/A	For initial and reacceptance testing, confirm the introduction of a fault in any circuit monitored for integrity results in a trouble indication at the fire alarm control unit. Open one connection at not less than 10 percent of the initiating devices, notification appliances, and controlled devices on every initiating device circuit, notification appliance circuit, and signaling line circuit. Confirm all circuits perform as indicated in Sections 23.5, 23.6, and 23.7.
	N/A	Annually	For periodic testing, test each initiating device circuit, notification appliance circuit, and signaling line circuit for correct indication at the control unit. Confirm all circuits perform as indicated in Sections 23.5, 23.6, and 23.7.
17. Initiating devices[j] [i]			
(1) Electromechanical releasing device			
(a) Nonrestorable-type link	X	Annually	Verify correct operation by removal of the fusible link and operation of the associated device.
(b) Restorable-type link[k] [j]	X	Annually	Verify correct operation by removal of the fusible link and operation of the associated device.
(2) Fire extinguishing system(s) or suppression system(s) alarm switch	X	Annually	Operate the switch mechanically or electrically and verify receipt of signal by the fire alarm control unit.
(3) Fire–gas and other detectors	X	Annually	Test fire–gas detectors and other fire detectors as prescribed by the manufacturer and as necessary for the application.
(4) Heat detectors			
(a) Fixed-temperature, rate-of-rise, rate of compensation, restorable line, spot type (excluding pneumatic tube type)	X	Annually (see 14.4.4.5)	Perform heat test with a listed and labeled heat source or in accordance with the manufacturer's published instructions. Assure that the test method for the installed equipment does not damage the nonrestorable fixed-temperature element of a combination rate-of-rise/fixed-temperature element detector.
(b) Fixed-temperature, nonrestorable line type	X	Annually	Do not perform heat test. Test functionality mechanically and electrically. Measure and record loop resistance. Investigate changes from acceptance test.
(c) Fixed-temperature, nonrestorable spot type	X	See Method	After 15 years from initial installation, replace all devices or have 2 detectors per 100 laboratory tested. Replace the 2 detectors with new devices. If a failure occurs on any of the detectors removed, remove and test additional detectors to determine either a general problem involving faulty detectors or a localized problem involving 1 or 2 defective detectors.
			If detectors are tested instead of replaced, repeat tests at intervals of 5 years.
			Do not perform heat tests. Test functionality mechanically and electrically.
~~(d) Nonrestorable (general)~~	~~X~~	~~Annually~~	~~Do not perform heat tests. Test functionality mechanically and electrically.~~

Component	Initial Acceptance	Periodic Frequency	Method
(~~e~~ d) Restorable line type, pneumatic tube only	X	Annually	Perform heat tests (where test chambers are in circuit), with a listed and labeled heat source or in accordance with the manufacturer's published instructions of the detector or conduct a test with pressure pump.
(~~f~~ e) Single- and multiple-station heat alarms	X	Annually	Conduct functional tests according to manufacturer’s published instructions. Do not test nonrestorable heat detectors with heat.
(5) Manual fire alarm boxes	X	Annually	Operate manual fire alarm boxes per the manufacturer’s published instructions. Test both key-operated presignal and general alarm manual fire alarm boxes.
(6) Radiant energy fire detectors	X	Semiannually	Test flame detectors and spark/ember detectors in accordance with the manufacturer’s published instructions to determine that each detector is operative. Determine flame detector and spark/ember detector sensitivity using any of the following: (1) Calibrated test method (2) Manufacturer’s calibrated sensitivity test instrument (3) Listed control unit arranged for the purpose (4) Other approved calibrated sensitivity test method that is directly proportional to the input signal from a fire, consistent with the detector listing or approval If designed to be field adjustable, replace detectors found to be outside of the approved range of sensitivity or adjust to bring them into the approved range. Do not determine flame detector and spark/ember detector sensitivity using a light source that administers an unmeasured quantity of radiation at an undefined distance from the detector.
(7) Smoke detectors — functional test			
(a) In other than one- and two-family dwellings, system detectors	X	Annually	~~i~~ k Test smoke detectors in place to ensure smoke entry into the sensing chamber and an alarm response. Use smoke or a listed and labeled product acceptable to the manufacturer or in accordance with their published instructions. Other methods listed in the manufacturer's published instructions that ensure smoke entry from the protected area, through the vents, into the sensing chamber can be used.
(b) Single- and multiple-station smoke alarms connected to protected premises systems	X	Annually	Perform a functional test on all single- and multiple-station smoke alarms connected to a protected premises fire alarm system by putting the smoke alarm into an alarm condition.
(c) System smoke detectors used in one- and two-family dwellings	X	Annually	Conduct functional tests according to manufacturer’s published instructions.
(d) Air sampling	X	Annually	Test with smoke or a listed and labeled product acceptable to the manufacturer or in accordance with their published instructions. ~~Test~~ In the absence of an automatic, listed airflow

Component	Initial Acceptance	Periodic Frequency	Method
			supervision feature, test from the end sampling port or point on each pipe run. ~~Verify~~ and verify airflow through all other ports or points.
(e) Duct type	X	Annually	In addition to the testing required in Table 14.4.3.2~~(g)(1)~~ (17)(7)(a) and Table 14.4.3.2~~(h)~~ (17)(8) , test duct smoke detectors that use sampling tubes to ensure that they will properly sample the airstream in the duct using a method acceptable to the manufacturer or in accordance with their published instructions.
(f) Projected beam type	X	Annually	Test the detector by introducing smoke, other aerosol, or an optical filter into the beam path.
(g) Smoke detector with built-in thermal element	X	Annually	Operate both portions of the detector independently as described for the respective devices.
(h) Smoke detectors with control output functions	X	Annually	Verify that the control capability remains operable even if all of the initiating devices connected to the same initiating device circuit or signaling line circuit are in an alarm state.
(8) ~~Smoke~~ Single-criteria smoke detectors — sensitivity testing			
In other than one- and two-family dwellings, system detectors	N/A	See 14.4.4.3	~~m~~ l Perform any of the following tests to ensure that each smoke detector is within its listed and marked sensitivity range: (1) Calibrated test method (2) Manufacturer's calibrated sensitivity test instrument (3) Listed control equipment arranged for the purpose (4) Smoke detector/control unit arrangement whereby the detector causes a signal at the control unit when its sensitivity is outside its listed sensitivity range (5) Other calibrated sensitivity test method approved by the authority having jurisdiction
(9) Carbon monoxide detectors/carbon monoxide alarms connected to protected premises systems			
(a) CO entry test	X	Annually	Test the devices in place to ensure CO entry to the sensing chamber by introduction through the vents, to the sensing chamber of listed and labeled product acceptable to the manufacturer or in accordance with manufacturer's published instructions
(b) Air sampling	X	Annually	Per test methods documented in the manufacturer's published instructions, verify detector alarm response through the end sampling port on each pipe run; verify airflow through all other ports as well.

Component	Initial Acceptance	Periodic Frequency	Method
(c) Duct type	X	Annually	Test or inspect air duct detectors to ensure that the device will sample the airstream in accordance with the manufacturer's published instructions.
(d) CO detector with control output functions	X	Annually	Within each protected space, verify that the control capability remains operable even if all of the initiating devices connected to the same initiating device circuit or signaling line circuit are in an alarm state.
(10) Initiating devices, supervisory			
(a) Control valve switch	X	Semiannual	Operate valve and verify signal receipt to be within the first two revolutions of the handwheel or within one-fifth of the travel distance, or per the manufacturer's published instructions. Continue to cycle outside stem and yoke valves and verify switch does not reset during full travel of the valve stem.
(b) High- or low-air pressure switch	X	Annually	Operate switch and verify receipt of signal is obtained where the required pressure is increased or decreased a maximum 10 psi (70 kPa) from the required pressure level or in accordance with manufacturer's published instructions .
(c) Steam pressure	X	Annually	Operate switch and verify receipt of signal is obtained before pressure decreases to 110 percent of the minimum operating pressure of the steam-operated equipment.
(d) Pressure supervisory devices for other sources	X	Annually	Operate switch and verify receipt of signal is obtained where the required pressure is increased or decreased from the normal operating pressure by an amount specified in approved design documents.
(e) Room temperature switch	X	Annually	Operate switch and verify receipt of signal to indicate the decrease in room temperature to 40°F (4.4°C) and its restoration to above 40°F (4.4°C).
(f) Water level switch	X	Annually	Operate switch and verify receipt of signal indicating the water level raised or lowered a maximum 3 in. (70 mm) from the required level within a pressure tank, or a maximum 12 in. (300 mm) from the required level of a nonpressure tank. Also verify its restoral to required level.
(g) Water temperature switch	X	Annually	Operate switch and verify receipt of signal to indicate the decrease in water temperature to 40°F (4.4°C) and its restoration to above 40°F (4.4°C).
(11) Mechanical, electrosonic, or pressure-type waterflow device	X	Semiannually	Water shall be flowed through an inspector's test connection indicating the flow of water equal to that from a single sprinkler of the smallest orifice size installed in the system or other listed and approved waterflow switch test methods for wet-pipe systems, or an alarm test bypass connection for dry-pipe, pre-action, or deluge systems in accordance with NFPA 25.
(12) Multi-sensor fire detector or multi-criteria fire detector or combination fire	X	Annually	1. Test each detector in accordance with the manufacturer's published instructions. Test each of the ~~detection principles~~ sensors present within the detector (e.g., smoke/heat/CO, etc.)

Component	Initial Acceptance	Periodic Frequency	Method
detector			independently for the specific detection principle, regardless of the configuration status at the time of testing~~. Also test each detector in accordance with the manufacturer's published instructions.~~ , or individual sensors together if the technology allows individual sensor responses to be verified, or where sensors cannot be tested individually, test the primary sensor. m ~~Test individual sensors together if the technology allows individual sensor responses to be verified.~~ 2. Perform tests as described for the respective ~~devices~~ sensors by introduction of the physical phenomena to the sensing ~~chamber of~~ element. An electronic check (magnets, analog values, etc.) is not sufficient to comply with this requirement. 3. Verify by using the detector manufacturer's published instructions that the test gas used will not impair the operation of ~~either~~ any sensing chamber of a multi- sensor, multi- criteria, or combination fire detector. 4. Confirm the result of ~~each~~ the sensor(s) test(s) through indication at the detector or control unit. ~~Where individual sensors cannot be tested individually, test the primary sensor.~~ ~~n~~ 5. Record all tests and results.
18. Special hazard equipment			
(1) Abort switch (dead-man type)	X	Annually	Operate abort switch and verify correct sequence and operation.
(2) Abort switch (recycle type)	X	Annually	Operate abort switch and verify development of correct matrix with each sensor operated.
(3) Abort switch (special type)	X	Annually	Operate abort switch and verify correct sequence and operation in accordance with authority having jurisdiction. Observe sequencing as specified on as-built drawings or in system owner's manual.
(4) Cross-zone detection circuit	X	Annually	Operate one sensor or detector on each zone. Verify occurrence of correct sequence with operation of first zone and then with operation of second zone.
(5) Matrix-type circuit	X	Annually	Operate all sensors in system. Verify development of correct matrix with each sensor operated.
(6) Release solenoid circuit~~o~~ n	X	Annually	Verify operation of solenoid.
(7) Squibb release circuit	X	Annually	Use AGI flashbulb or other test light approved by the manufacturer. Verify operation of flashbulb or light.
(8) Verified, sequential, or counting zone circuit	X	Annually	Operate required sensors at a minimum of four locations in circuit. Verify correct sequence with both the first and second detector in alarm.
(9) All above devices or circuits or combinations thereof	X	Annually	Verify supervision of circuits by creating an open circuit.
19. Combination systems			

	Component	Initial Acceptance	Periodic Frequency	Method
	(1) Fire extinguisher electronic monitoring device/system	X	Annually	Test communication between the device connecting the fire extinguisher electronic monitoring device/system and the fire alarm control unit to ensure proper signals are received at the fire alarm control unit and remote annunciator(s) if applicable.
	(2) Carbon monoxide device/system	X	Annually	Test communication between the device connecting the carbon monoxide device/system and the fire alarm control unit to ensure proper signals are received at the fire alarm control unit and remote annunciator(s) if applicable.
20.	Interface equipment~~p~~ o	X	See 14.4.4.4	Test interface equipment connections by operating or simulating the equipment being supervised. Verify signals required to be transmitted are received at the control unit. Test frequency for interface equipment is the same as the frequency required by the applicable NFPA standard(s) for the equipment being supervised.
21.	Guard's tour equipment	X	Annually	Test the device in accordance with the manufacturer's published instructions.
22.	Alarm notification appliances			
	(1) Audible~~q~~ p	X	N/A	For initial and reacceptance testing, measure sound pressure levels for alert tone signals with a sound level meter meeting ANSI S1.4a, *Specifications for Sound Level Meters,* Type 2 requirements. Measure sound pressure levels ~~throughout the protected area to confirm that~~ to determine if they are in compliance with Chapter 18 and the required performance, as documented per 7.3.4 . Set the sound level meter in accordance with ANSI/ASA S3.41, ~~*American National Standard*~~ *Audible Emergency Evacuation (E2) and Evacuation Signals with Relocation Instructions (ESRI),* using the time-weighted characteristic F (FAST).
		N/A	Annually	~~r~~ q For periodic testing, verify the operation of the notification appliances.
	(2) Audible textual notification appliances (loudspeakers and other appliances to convey voice messages)	X	N/A	For initial and reacceptance testing, measure sound pressure levels for signals with a sound level meter meeting ANSI S1.4a, *Specifications for Sound Level Meters,* Type 2 requirements. Measure sound pressure levels throughout the protected area to ~~confirm that~~ determine if they are in compliance with Chapter 18 and the required performance, as documented per 7.3.4 . Set the sound level meter in accordance with ANSI/ASA S3.41, ~~*American National Standard*~~ *Audible Emergency Evacuation (E2) and Evacuation Signals with Relocation Instructions (ESRI),* using the time-weighted characteristic F (FAST). Verify audible information to be intelligible and in compliance with 14.4.11.
		N/A	Annually	~~r~~ q For periodic testing, verify the operation of the notification appliances.
	(3) Visual	X	N/A	Perform initial and reacceptance testing in accordance with the manufacturer's published instructions. Verify appliance locations to be per

	Component	Initial Acceptance	Periodic Frequency	Method
				approved layout and confirm that no floor plan changes affect the approved layout. Verify the candela rating or method of candela control marking on each visual appliance and rating when reported by the FACU agrees with the approved drawings. Confirm that each appliance flashes.
		N/A	Annually	For periodic testing, verify that each appliance flashes.
23.	Exit marking audible notification appliance	X	Annually	Perform tests in accordance with manufacturer's published instructions.
24.	Emergency control functions[s r]	X	Annually	For initial, reacceptance, and periodic testing, verify emergency control function interface device activation. Where an emergency control function interface device is disabled or disconnected during initiating device testing, verify that the disabled or disconnected emergency control function interface device has been properly restored, including electromagnetic devices used for door releasing services as part of a fire alarm system.
25.	Two-way emergency communications systems	X	Annually	Use the manufacturer’s published instructions and the as-built drawings provided by the system supplier to verify correct operation after the initial testing phase has been performed by the supplier or by the supplier’s designated representative. Test the two-way communication system to verify operation and receipt of visual and audible signals at the transmitting unit and the receiving unit, respectively. Operate systems with more than five stations with a minimum of five stations operating simultaneously. Verify voice quality and clarity. Verify directions for the use of the two-way communication system, instructions for summoning assistance via the two-way communication system, and written identification of the location is posted adjacent to the two-way communication system. Verify that all remote stations are readily accessible. Verify the timed automatic communications capability to connect with a constantly attended monitoring location per 24.5.3.4.
26.	Special procedures			
	(1) Alarm verification	X	Annually	Verify time delay and alarm response for smoke detector circuits identified as having alarm verification.
	(2) Multiplex systems	X	Annually	Verify communications between sending and receiving units under both primary and secondary power. Verify communications between sending and receiving units under open-circuit and short-circuit trouble conditions. Verify communications between sending and receiving units in all directions where multiple communications pathways are provided.

Component	Initial Acceptance	Periodic Frequency	Method
			If a redundant ~~central~~ control ~~equipment~~ unit is provided, verify switchover ~~and~~ of all required functions and operations of the secondary control ~~equipment~~ unit .
			Verify all system functions and features in accordance with manufacturer's published instructions.
27. Supervising station alarm systems — receiving equipment			
(1) All equipment	X	Monthly	Perform tests on all system functions and features in accordance with the equipment manufacturer's published instructions for correct operation in conformance with the applicable sections of Chapter 26.
			Actuate initiating device and verify receipt of the correct initiating device signal at the supervising station within 90 seconds. Upon completion of the test, restore the system to its functional operating condition.
			If test jacks are used, perform the first and last tests without the use of the test jack.
(2) Digital alarm communicator receiver (DACR)	X	Monthly	Disconnect each transmission means in turn from the DACR, and verify audible and visual annunciation of a trouble signal in the supervising station.
			Cause a signal to be transmitted on each individual incoming DACR line (path) at least once every 6 hours (24 hours for DACTs installed prior to adoption of the 2013 edition of *NFPA 72*). Verify receipt of these signals.
(3) Digital alarm radio receiver (DARR)	X	Monthly	Cause the following conditions of all DARRs on all subsidiary and repeater station receiving equipment. Verify receipt at the supervising station of correct signals for each of the following conditions:
			(1) AC power failure of the radio equipment
			(2) Receiver malfunction
			(3) Antenna and interconnecting cable failure
			(4) Indication of automatic switchover of the DARR
			(5) Data transmission line failure between the DARR and the supervising or subsidiary station
(4) McCulloh systems	X	Monthly	Test and record the current on each circuit at each supervising and subsidiary station under the following conditions:
			(1) During functional operation
			(2) On each side of the circuit with the receiving equipment conditioned for an open circuit
			Cause a single break or ground condition on each transmission channel. If such a fault prevents the functioning of the circuit, verify receipt of a trouble signal.
			Cause each of the following conditions at each of the supervising or subsidiary stations and all repeater station radio transmitting and receiving equipment; verify receipt of correct signals at the

	Component	Initial Acceptance	Periodic Frequency	Method
				supervising station: (1) RF transmitter in use (radiating) (2) AC power failure supplying the radio equipment (3) RF receiver malfunction (4) Indication of automatic switchover
	(5) Radio alarm supervising station receiver (RASSR) and radio alarm repeater station receiver (RARSR)	X	Monthly	Cause each of the following conditions at each of the supervising or subsidiary stations and all repeater station radio transmitting and receiving equipment; verify receipt of correct signals at the supervising station: (1) AC power failure supplying the radio equipment (2) RF receiver malfunction (3) Indication of automatic switchover, if applicable
	(6) Private microwave radio systems	X	Monthly	Cause each of the following conditions at each of the supervising or subsidiary stations and all repeater station radio transmitting and receiving equipment; verify receipt of correct signals at the supervising station: (1) RF transmitter in use (radiating) (2) AC power failure supplying the radio equipment (3) RF receiver malfunction (4) Indication of automatic switchover
	(7) Performance-based technologies	X	Monthly	Perform tests to ensure the monitoring of integrity of the transmission technology and technology path. Where a single communications path is used, disconnect the communication path. Verify that failure of the path is annunciated at the supervising station within 60 minutes of the failure (within 5 minutes for communication equipment installed prior to adoption of the 2013 edition of *NFPA 72*). Restore the communication path. Where multiple communication paths are used, disconnect both communication paths and confirm that failure of the path is annunciated at the supervising station within not more than 6 hours of the failure (within 24 hours for communication equipment installed prior to adoption of the 2013 edition of *NFPA 72*). Restore both communication paths.
28.	Public emergency alarm reporting system transmission equipment			
	(1) Publicly accessible alarm box	X	Semiannually	Actuate publicly accessible initiating device(s) and verify receipt of not less than three complete rounds of signal impulses. Perform this test under normal circuit conditions. If the device is equipped for open circuit operation (ground return), test it in this condition as one of the semiannual tests.
	(2) Auxiliary box	X	Annually	Test each initiating circuit of the auxiliary box by actuation of a protected premises initiating device connected to that circuit. Verify receipt of not less

	Component	Initial Acceptance	Periodic Frequency	Method
				than three complete rounds of signal impulses.
	(3) Master box			
	(a) Manual operation	X	Semiannually	Perform the tests prescribed for 28(a).
	(b) Auxiliary operation	X	Annually	Perform the tests prescribed for 28(b).
29.	Low-power radio (wireless systems)	X	N/A	The following procedures describe additional acceptance and reacceptance test methods to verify wireless protection system operation: (1) Use the manufacturer's published instructions and the as-built drawings provided by the system supplier to verify correct operation after the initial testing phase has been performed by the supplier or by the supplier's designated representative. (2) Starting from the functional operating condition, initialize the system in accordance with the manufacturer's published instructions. Confirm the alternative communications path exists between the wireless control unit and peripheral devices used to establish initiation, indication, control, and annunciation. Test the system for both alarm and trouble conditions. (3) Check batteries for all components in the system monthly unless the control unit checks all batteries and all components daily.
30.	Mass notification systems			
	(1) Functions	X	Annually	At a minimum, test control ~~equipment~~ unit to verify correct receipt of alarm, supervisory, and trouble signals (inputs); operation of evacuation signals and auxiliary functions (outputs); circuit supervision, including detection of open circuits and ground faults; and power supply supervision for detection of loss of ac power and disconnection of secondary batteries.
	(2) Fuses	X	Annually	Verify the rating and supervision.
	(3) Interfaced equipment	X	Annually	Verify integrity of single or multiple circuits providing interface between two or more control units. Test interfaced equipment connections by operating or simulating operation of the equipment being supervised. Verify signals required to be transmitted at the control unit.
	(4) Lamps and LEDs	X	Annually	Illuminate lamps and LEDs.
	(5) Primary (main) power supply	X	Annually	Disconnect all secondary (standby) power and test under maximum load, including all alarm appliances requiring simultaneous operation. Reconnect all secondary (standby) power at end of test. For redundant power supplies, test each separately.
	(6) Audible textual notification appliances (loudspeakers and other appliances to convey voice messages)	X	Annually	Measure sound pressure level with a sound level meter meeting ANSI S1.4a, *Specifications for Sound Level Meters,* Type 2 requirements. Measure and record levels throughout protected area. Set the sound level meter in accordance with ANSI/ASA S3.41, *American National Standard Audible Emergency Evacuation Signal,* using the time-weighted characteristic F (FAST). Record the maximum output when the audible emergency evacuation signal is on.

Component	Initial Acceptance	Periodic Frequency	Method
			Verify audible information to be distinguishable and understandable.
(7) Visual	X	Annually	Perform test in accordance with manufacturer's published instructions. Verify appliance locations to be per approved layout and confirm that no floor plan changes affect the approved layout. Verify the candela rating or method of candela control marking on each visual appliance and rating when reported by the FACU agrees with the approved drawings. Confirm that each appliance flashes.
(8) Control unit functions and no diagnostic failures are indicated	X	Annually	Review event log file and verify that the correct events were logged. Review system diagnostic log file; correct deficiencies noted in file. Delete unneeded log files. Delete unneeded error files. Verify that sufficient free disk space is available. Verify unobstructed flow of cooling air is available. Change/clean filters, cooling fans, and intake vents.
(9) Control unit reset	X	Annually	Power down the central control unit computer and restart it.
(10) Control unit security	X	Annually	If remote control software is loaded onto the system, verify that it is disabled to prevent unauthorized system access.
(11) Audible/visual functional test	X	Annually	Send out an alert to a diverse set of predesignated receiving devices and confirm receipt. Include at least one of each type of receiving device.
(12) Software backup	X	Annually	Make full system software backup. Rotate backups based on accepted practice at site.
(13) Secondary power test	X	Annually	Disconnect ac power. Verify the ac power failure alarm status on central control ~~equipment~~ unit . With ac power disconnected, verify battery voltage under load.
(14) Wireless signals	X	Annually	Check forward/reflected radio power is within specifications.
(15) Antenna	X	Annually	Check forward/reflected radio power is within specifications. Verify solid electrical connections with no observable corrosion.
(16) Transceivers	X	Annually	Verify proper operation and mounting is not compromised.

[a]Some transmission equipment (such as, but not limited to, cable modems, fiber-optic interface nodes, and VoIP interfaces) are typically powered by the building's electrical system using a secondary (standby) power supply that does not meet the requirements of this Code. This is intended to ensure that the testing authority verifies full secondary (standby) power as required by Chapter 10. Additionally, refer to Table 14.4.3.2, items 7 through 9, for secondary (standby) power supply testing.

[b]The automatic transmission of the check-in (handshake) signal can take up to 60 minutes to occur.

[c]See Table 14.4.3.2, Item 4(1) for the testing of transmission equipment.

[d]The battery tests in Table 14.4.3.2 Item 9 are based on VRLA batteries and it is the intent that the tests specified in (1) through (4) be performed in order. FACU automated testing of VRLA batteries under load with record of enclosure ambient temperature is an acceptable alternative to prescriptive manual methods using test equipment. For other secondary battery types, refer to the battery manufacturer's published instructions or IEEE 450, *Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications*, for vented lead-acid batteries, and IEEE 1106, *Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications*, for nickel-cadmium batteries.

~~e~~ e ~~Example: 4000 mAh × 1/25 = 160 mA charging current at 77°F (25°C).~~

~~f~~ f e If the charger is adjustable, adjust the output voltage to 2.265 volts per cell ±0.015 volts at 77°F (25°C) or as specified by the alarm equipment manufacturer.

~~g~~ g f See A.14.4.3.2 Item 9(4). A load test per Item 9(5) is permitted in lieu of an ohmic test.

~~h~~ h g See A.14.4.3.2 Item 9(5).

~~i~~ i h The voltmeter sensitivity has been changed from 1000 ohms per volt to 100 ohms per volt so that the false ground readings (caused by induced voltages) are minimized.

~~j~~ j i Initiating devices such as smoke detectors used for elevator recall, closing dampers, or releasing doors held in the open position that are permitted by the Code *(see9.6.3 of NFPA 101)* to initiate supervisory signals at the fire alarm control unit (FACU) should be tested at the same frequency (annual) as those devices when they are generating an alarm signal. They are not supervisory devices, but they initiate a supervisory signal at the FACU.

~~k~~ k j Fusible thermal link detectors are commonly used to close fire doors and fire dampers electrically connected to the fire alarm control unit. They are actuated by the presence of external heat, which causes a solder element in the link to fuse, or by an electric thermal device, which, when energized, generates heat within the body of the link, causing the link to fuse and separate.

~~l~~ l k Note, it is customary for the manufacturer of the smoke detector to test a particular product from an aerosol provider to determine acceptability for use in smoke entry testing of their smoke detector/smoke alarm. Magnets are not acceptable for smoke entry tests.

~~m~~ l There are some detectors that use magnets as a manufacturer's calibrated sensitivity test instrument.

~~n~~ m For example, it might not be possible to individually test the heat sensor in a thermally enhanced smoke detector.

~~o~~ n Manufacturer's published instructions should be consulted to ensure a proper operational test. No suppression gas or agent is expected to be discharged during the test of the solenoid. *See Test Plan of 14.2.10*.

~~p~~ o A monitor module installed on an interface device is not considered a supervisory device and therefore not subject to the quarterly testing frequency requirement. Test frequencies for interface devices should be in accordance with the applicable standard. For example, fire pump controller alarms such as phase reversal are required to be tested annually. If a monitor module is installed to identify phase reversal on the fire alarm control unit, it is not necessary to test for phase reversal four times a year.

~~q~~ p Chapter 18 would require 15 dB over average ambient sound for public mode spaces. Sometimes the ambient sound levels are different from what the design was based upon. Private operating mode would require 10 dB over average ambient at the location of the device.

~~r~~ q Where building, system, or occupancy changes have been observed, the owner should be notified of the changes. New devices might need to be installed and tested per the initial acceptance testing criteria.

~~s~~ r See A.14.4.3.2 and Table 14.4.3.2, Item 24.

A.14.4.3.2

Table 14.4.3.2 Item 9(4). Ohmic testing is a means to determine the state of health of a VRLA battery's cells by measuring some form of a cell's internal resistance. Typically, ohmic testing equipment uses one of three techniques — conductance, impedance, or resistance — to make these measurements.

In simplest technical terms, ohmic technology is based on Ohm's ~~Law~~ law , which expresses the relationship between volts, amperes, and ohms in an electrical circuit. Ohmic testing attempts to use voltage and current to determine the resistive characteristic of a battery's cells. As the cells in a battery age and start to lose capacity, the internal components of the battery are undergoing a degradation process. The degradation of these components (plates, grids, internal connection straps) within the battery's cells causes an increased resistance in the conduction paths of the cell, which in turn causes a change in the internal ohmic values. A measured increase in impedance or resistance, or a decrease in conductance, indicates the battery is losing its ability to produce the energy it was designed to deliver when called upon to support the connected loads.

The key to effective application of ohmic testing is the appropriate trending of test results over time compared to a baseline or reference value. Studies have demonstrated that an individual battery produces a unique ohmic "signature" and the use of ohmic testing equipment to trend changes in this signature from installation through the life of the battery is the most effective use of the technology. A program that involves ohmic testing on a regular interval to note changes in the battery is a good maintenance practice.

An ohmic baseline reference value is a benchmark value based on data collected from known good batteries. Reference values can be determined from site-specific measurement, or from testing a sample of new healthy batteries, or by using a generic baseline value to get started.

(1) The best baseline is one established on the installed battery within three to six months after installation and trend accordingly using good record keeping. Ideally the individual ohmic value should be measured at installation and again after the battery has been on float charge for at least 72 hours in order for it to reach a high state of stabilization. These initial "site-specific" values should be recorded and permanently affixed to the battery as a baseline for subsequent tests over the life of the battery. The ohmic value will typically increase for conductance and decrease for resistance and impedance between the initial installation and after being on float-charge for 90 to 180 days (10 percent to 15 percent depending on battery type and size). Six months after installation measure and compare the ohmic readings to the readings taken at installation. Use whichever value is greater for conductance or lower for resistance and impedance as the baseline for that particular battery at that site going forward.

(2) A sample of new healthy batteries in a fully charged state can be tested to obtain a baseline value representative of a new battery. A sample size of at least 30 batteries from one manufacturer with the same make, model, amp-hour rating, age (within 6 months), and manufacturing lot is recommended. Record the following information for the batteries:

(a) Battery manufacturer

(b) Model number

(c) Date of manufacture

(d) Manufacturing lot number (if available)

(e) Battery temperature

(f) Whether or not the battery has had a freshening charge

(g) Battery voltage

(h) Ohmic test value

Calculate the average ohmic value of the batteries. Do not include batteries that deviate more than 30 percent from the average because they could be outside of an acceptable range. Use the average value as a baseline starting point for this model battery.

(3) A generic baseline value for a specific battery model can often be found by contacting the ohmic test equipment manufacturer or from the battery manufacturer. While it is important to note that the use of generic reference values might not be as accurate, it is still possible to identify grossly failed batteries and significant changes in battery condition by applying this method. Generic baseline values are typical averages to be used as general guidelines and should only be used when no other data is available. When testing older batteries for which no initial site-specific ohmic value is available, reference values can be obtained in the following ways:

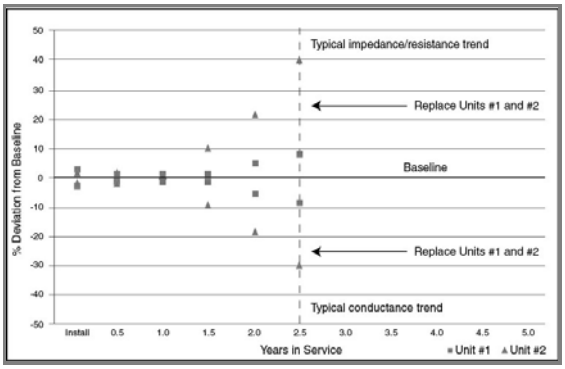
(a) Contact the equipment or battery manufacturer for assistance.

(b) Consult your company documentation to see if reference values were created for the battery you are testing.

(c) Using ohmic readings of recently installed batteries of the same manufacturer and model of the battery, manufacturer and model of the alarm panel/system, charging circuit, and temperature at time of measurements, calculate the average ohmic value of the best 8 to 10 batteries and use this value as a baseline reference.

As a battery ages and loses capacity, the internal ohmic values change. Although the change might not be perfectly consistent over all battery models and sizes, experience and extensive test data shows that a deviation of ohmic values from the established baseline by 30 percent or more for conductance and 40 percent or more for resistance or impedance indicates that the actual battery capacity has dropped to 80 percent or lower. (For lead-acid batteries, capacity drops off rapidly once the 80 percent capacity point is reached in the lifetime curve, so this is known as the “knee” of the capacity vs. lifetime curve). This 80 percent capacity is the level at which battery manufacturers recommend battery replacement. Figure A.14.4.3.2 illustrates an ohmic trend of a 5-year design life battery with an actual expected service life of 3 years. Note that while battery Unit #1 still has good ohmic readings, semiannual measurements show Unit #2 failing prematurely. For this case, it is desirable to replace both units at the same time. If one unit fails at 2½ years, it is likely the second unit will fail in one of the next semiannual tests. Full replacement ensures that all units will “float” together. One exception might be when a unit fails in the first year.

Figure A.14.4.3.2 Example Ohmic Trend Analysis for a 24-Volt Battery Made Up of Two 12-Volt Units.



Ohmic testing can be a safe, simple, accurate, and reliable means of determining the state of health of VRLA batteries. It is important however to understand the following basic guidelines in order to maximize the benefits and avoid possible misleading test results:

(1) Follow safety regulations: wear eye protection and remove metal jewelry, and so forth prior to working with batteries.

(2) Conduct a visual inspection prior to testing. A cracked case, leaking terminal or post, or bulging battery should be replaced, not tested.

(3) Temperature changes affect measured ohmic values and battery capacity. Ohmic measurements should be taken at 77°F (25°C) ±13°F (7°C).

(4) For maximum accuracy and consistency, batteries should be tested when in a fully charged state.

(5) Check the battery charging current prior to test. The charging current should be stable and be within the normal float current recommendations of the battery manufacturer for the battery model. If it is not, it is likely that the batteries have recently been discharged and a test is not appropriate until this float current stabilizes.

(6) Whenever possible, ohmic readings should be taken each time with the same instrument, but as a minimum with the same model. Changing models will skew the data and require re-establishing the baseline.

(7) When test equipment is provided with an alert, set the ohmic baseline and/or thresholds prior to beginning the test to provide an indication of any deviations from baseline.

(8) It is essential to take ohmic measurements at the battery terminal or post. For consistency and accuracy, subsequent tests should always have probes or clamps placed at the same point while avoiding battery hardware such as bolt heads or washers. Connecting on the hardware will influence the readings and could cause replacement of a healthy battery.

(9) Maintain good contact at the test point for the duration of the test. If the probe or clamp slips off during the test, an incorrect reading will result.

(10) For batteries with fully insulated quick disconnect connectors, the battery should be taken offline by removing the quick disconnects from the battery terminals and then measuring and recording the internal ohmic value of the battery.

(11) Do not condemn a battery based upon results of a single test without any trending data or an established baseline for that specific battery.

(12) When one or more units in a battery falls outside the acceptable range from baseline, replace the entire string.

(13) While testing online is the preferred method, it should be noted that the capability of ohmic meters varies. As such, the test equipment manufacturer might provide instructions to disconnect the battery and test offline. A battery tested online can display a different value than when tested offline due to the charger circuit and load being across the battery. Always test the same way, either online or offline, to have consistent and meaningful results. When ohmic testing is performed online, a change in current occurs due to the ohmic test set signal that could impact battery voltage readings. Because battery float voltage is directly tied to float current, the sum of the voltages of each battery cell/unit have to equal the charger float voltage of the battery string. If a load is applied from the ohmic test set that depresses one cell/unit, then the others have to rise somewhat to offset it. As ohmic testing progresses through the battery string, each cell/unit gets pulled down by the ohmic test set somewhat, and the charger must boost the string current to maintain the voltage, raising the voltage of the cells/units that have not yet been tested. For this reason, voltage readings should be taken with a voltmeter prior to performing ohmic testing online.

Table 14.4.3.2 Item 9(5). Battery capacity is determined by the mass of active material contained in the battery and is a measure of the battery's stored energy. The rated capacity of small VRLA batteries used in fire alarm and signaling system applications is typically measured in ampere-hours (Ah) where the ampere-hour rating is based on the battery's capability to provide a constant current at the nominal battery voltage for 20 hours. The rated capacity might vary from manufacturer to manufacturer.

The *actual* battery capacity during service life, often referred to as the state of charge (SOC), can vary significantly from *rated* capacity due to aging, charge and discharge cycles, temperature, and other factors. The unique failure modes of VRLA batteries due to aging and internal degradation are attributed for a high failure rate where the *actual* battery capacity has degraded to 80 percent of the manufacturer's *rated* capacity. As a result, battery manufacturers often recommend replacement much sooner than the rated design life for critical systems.

A test of battery capacity is designed to determine if the battery is capable of continuing to deliver the voltage level specified by the manufacturer. The results of a capacity test can also be used to estimate where the battery is in its service life. A test of capacity is performed by applying a constant current load to the battery based on the manufacturer's published discharge rates until voltage falls to specified levels. Although discharging the battery for capacity testing concerns some, VRLA batteries are designed to handle numerous discharges within the limits established by the battery manufacturer.

The discharge rate selected for testing should be representative of the battery duty cycle. At shorter test times, the test duration has a greater effect on the capacity calculation. For example, a 1-minute difference in actual test time for a 5-minute discharge rate compared to a 3-hour discharge rate will result in a greater deviation of the calculated capacity. The battery is also operating less efficiently at shorter discharge rates and the effects of aging and degradation might not be as prevalent during shorter discharges.

Fire alarm and signaling system loading is typically insufficient for the practical application of a battery load test because the system load cannot be varied to maintain a constant current equal to the battery manufacturer's published discharge rates. The fixed load applied by the system will result in final voltage levels that are deceptively high. Battery sizing is also a factor. The calculated system loads for the battery duty cycle (e.g., 24 hours standby followed by 5 minutes in an alarm) will rarely align with published discharge rates necessary for load testing. In many applications where the battery size is large in comparison to the required system current, the system loading could be too small to accurately determine battery capacity. In these cases, a battery near failure could conceivably satisfy the low discharge rate applied by the fire alarm or signaling system.

In order to satisfy the load test requirements of Table 14.4.3.2, battery capacity testing can be performed in the following manner or in accordance with other methods such as those identified in IEEE ~~Std TM~~ 1188, *Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*:

(1) Referring to the battery manufacturer's specifications, determine the load current for the 3-hour battery rating to the selected end voltage, typically 1.67 volts per cell (10.2 volts for a 12-volt system or 20.4 volts for a 24-volt system).

(2) Record the battery temperature at the negative terminal.

(3) Disconnect the charger and connect a load bank to the battery terminals.

(4) Apply the constant current specified for the 3-hour rate to the battery. Once the constant current is applied, continue the test until the battery terminal voltage decreases to the specified end voltage.

(5) Stop the test when the selected end voltage is reached.

(6) Record the actual test duration in minutes.

(7) Disconnect the load bank and reconnect the charger.

(8) Calculate percent battery capacity as follows:

$$\% \text{ Capacity} = [T_{actual}/(180 \times K_T)] \times 100$$

where:

T_{actual} = the test duration in minutes

K_T = the temperature correction factor for the actual battery temperature at the start of the test from Table 14.4.3.2. Additional temperature correction factors can be obtained from IEEE 1188.

(9) Replace the battery if the battery capacity is less than or equal to 80 percent. Replace the battery at the next scheduled test interval if the battery capacity is less than 85 percent.

Table A.14.4.3.2 Temperature Correction Factors

Temperature		K_T
°F	(°C)	
65	18.3	0.92
66	18.9	0.927
67	19.4	0.935
68	20	0.942
69	20.6	0.948
70	21.1	0.955
71	21.7	0.96
72	22.2	0.97
73	22.8	0.975
74	23.4	0.98
75	23.9	0.985
76	24.5	0.99
77	25	1
78	25.6	1.002
79	26.1	1.007
80	26.7	1.011
81	27.2	1.017
82	27.8	1.023
83	28.3	1.03
84	28.9	1.035
85	29.4	1.04
86	30	1.045
87	30.6	1.05
88	31.1	1.055
89	31.6	1.06
90	32.2	1.065
95	35	1.09
100	37.8	1.112

As a good practice, a new battery should be fully charged and then load tested following the battery manufacturer's recommendations prior to installation. A new fully charged battery should have a capacity of at least 90 percent.

Table 14.4.3.2, Item 17. Where the manufacturer publishes limits of accuracy for the operation of an initiating device, the test method should verify actuation is within the tolerances provided.

Table 14.4.3.2 Item 22(1) and 22(2). If, during the course of the periodic test of audible appliances, it is suspected that alarm sound levels could be lower than the required minimum, the system owner or the system owner's designated representative should be notified in writing. Such notification will allow the building owner or designated building representative to determine whether sound pressure level readings should be taken for the area(s) in question.

Table 14.4.3.2, Item 24. The extent of testing of a fire alarm or signaling system, including devices that were not tested, should be documented in accordance with the test plan in 14.2.10. *NFPA 72* does not require testing of an emergency control function, such as elevator recall, but does require testing of the emergency control function interface device, such as the relay powered by the fire alarm or signaling system. Where the emergency control function is not being tested concurrent with the fire alarm or signaling system testing, measurement of the emergency control function interface device output should be verified using the proper test devices. This might require reading or observing the condition of a relay, a voltage measurement, or the use of another type of test instrument. Once testing is complete, verification that any disabled or disconnected interface devices have been restored to normal is essential, and this verification should be documented in the testing results.

Testing of the emergency control functions themselves is outside of the scope of *NFPA 72*. A complete end-to-end test that demonstrates the performance of emergency control functions actuated by the fire alarm or signaling system might be required by some other governing laws, codes, or standards, or the authority having jurisdiction. In that situation, other applicable installation standards and design documents, not *NFPA 72*, would address testing and performance of the emergency control functions. NFPA 4 provides requirements for integrated (end-to-end) system testing.

It is important to note that the appropriate NFPA standard would provide the acceptance criteria for the overall emergency control function operation requirements, including performance and test methods, while *NFPA 72* covers the required performance and testing of the emergency function interface device.

For instance, if an end-to-end test for a building with an engineered smoke control system is required by some other governing laws, codes, standards, or the authority having jurisdiction, the test protocol would have unique criteria for the smoke control system design, and a special inspector would be responsible for the overall operation and performance of the smoke control system in accordance with the appropriate standard (NFPA 92 and NFPA *101*) during the testing, including measuring pressure differentials and ensuring proper fan and damper operation. Refer to the following extract from NFPA *101* on smoke control:

9.3.2 System Design. The engineer of record shall clearly identify the intent of the system, the design method ~~used~~ , the appropriateness of that method used, and the required means of inspecting, testing, and maintaining the system. [***101*:** 9.3.2]

9.3.3 Acceptance Testing. Acceptance testing shall be performed by a special inspector in accordance with Section 9.13. [***101*:** 9.3.3]

Even though the fire alarm or signaling system initiating device might actuate the smoke control system, the actual testing of the dampers and fan operation would be as required by the smoke control design and not part of the fire alarm or signaling system.

Other emergency control operation requirements might be as follows: For fan shutdown and smoke damper operation, the fan and damper operations would be in accordance with NFPA 90A and NFPA 105 respectively, and those equipment operations would be verified by those responsible for HVAC systems in combination with the fire alarm system personnel. Guidance for elevator inspection and testing can be found in ASME A.17.2, *Guide for Inspection of Elevators, Escalators and Moving Walks*. For elevator systems, the recall function, elevator power shutdown, and hat illumination would be done with the elevator mechanics present during the test. This operational test is often accomplished during routine periodic fire alarm testing. For fire door holder and fire shutter release, it would be expected that the emergency control function operation of the doors/shutters would be verified in accordance with NFPA 80 and NFPA *101* during the test. In some cases, the door manufacturer representative might need to be present to reset the equipment.

Supplemental Information

File Name	Description Approved

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72_SIG-TMS_FR5328_14.4.3.2.docx	STAFF USE

Submitter Information Verification

Committee: SIG-TMS
Submittal Date: Fri Jul 26 11:21:40 EDT 2019

Committee Statement

Committee Statement: In Items 2, 26(2), and 30(13), the term "control equipment" is not defined in the standard. The term "control unit" is defined in the standard and is the term that is appropriate to convey the intended meaning.

[9.]

This revision makes three changes to the battery test methods in (9).

Firstly, with the introduction of a test method for temperature testing of batteries in (9)(1), there has been confusion in the field as to where the ambient temperature should be taken. Some have concluded that the ambient temperature should be taken in the room or area where the FACU cabinet is located. However, the industry standard is for ambient temperature to be taken from inside the cabinet, which is not currently stated. This revision clarifies that language and provides clarification regarding the comparison of the battery cell/unit temperature with the ambient temperature measurement.

Secondly, with regard to the semi-annual Ohmic Test in (9)(4), the phrase "and connected to the charger" has created confusion in the field since the related annex note states that offline testing may also be acceptable. Since Chapter 14's wording appears to indicate that testing online is the only option, the reference to connection to the charger has been deleted, as that may not be the best practice recommendation depending on the manufacture of the ohmic meter being utilized.

Finally, the revision in (9)(4) addresses the Ohmic Test method for VRLA batteries, changing "and" to "or" to better indicate the intent of this test method. Either a conductance test "or" a Resistance/Impedance test is required, not both.

[14.]

Wireless communications is added to Item 14 to address new technology. (See new sections 23.16.4.8 and 23.16.4.9 on Class A and Class B radio pathways.) The Technical Committee requests that the Correlating Committee form a Task Group with members from SIG-TMS, SIG-PRO, SIG-PRS, and SIG-FUN to address the requirements for these systems.

[17.]

Items 17(4)(c) and (d) are revised to minimize confusion with regard to the test method for non-restorable, spot-type heat detectors.

In 17(9), only devices connected to protected premises systems are required to be tested annually. Household CO devices are tested per Sections 14.4.6 or 14.4.8 and are under the scope of the (SIG-HOU) Technical Committee.

Item 17(10)(b) is revised to correlate with 2019 changes made to Paragraph 17.17.2.2, particularly (C) for valves that use lower settings. Also refer to A.17.17.2.2.

The test in 17(7)(d) is revised to permit the use of a listed feature that is capable of supervising airflow to each sampling port, in lieu of a manual test.

The references to other items in the table are corrected in Item 17(7)(e).

The smoke entry test in 17(8) is for single-criteria detectors only. There is a separate entry in the table for multi-criteria detectors.

The multi-sensor/multi-criteria tests in 17(12) are rewritten for clarity.

[22.]

The direction in Chapter 14 regarding test methods for sound level testing for loudspeakers should correlate with Chapter 18, which is to use the meter on alert tone signals only. This provides good guidance for testing personnel, reminding them that audible information is not to be tested with the meter.

The revision also removes "throughout the protected area," as it is unenforceable and undefined. Language referencing the actual required performance metric has been added. Finally, "confirm" is changed to "determine," as it is more reflective of the proper test reason.

[Table note d]

The added text in Table Note d facilitates a technology-based alternative to the current VRLA battery testing procedure.

[Table note e]

Footnote "e" pertains to the charging current for Nickel-Cadmium batteries. However, this battery type was deleted from the table in the 2019 edition, and the footnote was mistakenly retained. Footnote "e " is, therefore, deleted.

[Annex]

With the introduction of new language for ohmic testing of batteries, there has been some confusion in the field as to whether to conduct this test online or offline. While the test method in Chapter 14 states that the test is to be done online (connected to the charger), the related annex material stated that offline testing is also acceptable. This revision clarifies that, while online testing is the preferred method for the Ohmic Test, offline testing may be the recommended practice on the part of certain ohmic meter manufacturers.

Response Message: FR-5328-NFPA 72-2019

Public Input No. 272-NFPA 72-2019 [Section No. A.14.4.3.2]

Public Input No. 544-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 72-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 89-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 94-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 197-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 73-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 139-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 271-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 80-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 474-NFPA 72-2019 [Section No. 14.4.3.2]

Public Input No. 5-NFPA 72-2018 [Section No. 14.4.3.2]

Public Input No. 270-NFPA 72-2019 [Section No. 14.4.3.2]

First Revision No. 5329-NFPA 72-2019 [Section No. 14.4.3.5]

14.4.3.5 Testing of CO System Detectors.

For all carbon monoxide system detectors ~~installed after January 1, 2012,~~ carbon monoxide tests shall be performed at initial acceptance and annually by the introduction of carbon monoxide into the sensing chamber or element.

Submitter Information Verification

Committee: SIG-TMS

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Committee Statement

Committee Statement: The effectivity date is deleted as it is past.

Response Message: FR-5329-NFPA 72-2019

Public Input No. 473-NFPA 72-2019 [Section No. 14.4.3.5]

First Revision No. 5330-NFPA 72-2019 [Section No. 14.4.4.3.3 [Excluding any Sub-Sections]]

After the second required calibration test, if sensitivity tests indicate that the device has remained within its listed and marked sensitivity range, ~~(or 4 percent obscuration light gray smoke, if not marked),~~ the length of time between calibration tests shall be permitted to be extended to a maximum of 5 years.

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Fri Jul 26 11:28:47 EDT 2019

Committee Statement

Committee Statement: Both UL 217 and UL 268 have been updated to eliminate the requirement of a minimum smoke box sensitivity of 4%/ft. The standard now merely requires that the smoke alarm/detector pass the fire tests at whatever sensitivity is it set to. This change will bring NFPA 72 into alignment with UL standards.

Response Message: FR-5330-NFPA 72-2019

Public Input No. 95-NFPA 72-2019 [Section No. 14.4.4.3.3 [Excluding any Sub-Sections]]

First Revision No. 5333-NFPA 72-2019 [Section No. 14.4.8]

14.4.8 Household Carbon Monoxide Detection Systems. (SIG-HOU)

14.4.8.1 Testing of Household Carbon Monoxide Detection Systems.

14.4.8.1.1

Household carbon monoxide detection systems shall be tested by a qualified service technician at least every 3 years according to the methods in line 1 of Table 14.4.3.2.

14.4.8.1.2

Household carbon monoxide detection systems shall be tested in accordance with the manufacturer's published instructions.

14.4.8.1.3*

Notwithstanding other requirements of 14.2.3.6, the occupant of a dwelling unit shall be deemed qualified to perform inspection, testing, and maintenance on an alarm system protecting that dwelling unit when provided with information and training from the manufacturer or a manufacturer's certified representative.

Submitter Information Verification

Committee: SIG-TMS

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Committee Statement

Committee Statement: This section should be the responsibility of the SIG-HOU committee.

Response Message: FR-5333-NFPA 72-2019

Public Input No. 273-NFPA 72-2019 [Section No. 14.4.8]

Public Input No. 497-NFPA 72-2019 [Section No. 14.4.8]

First Revision No. 5271-NFPA 72-2019 [Sections 14.5.5, 14.5.6, 14.5.7]

14.4.4.7

Unless otherwise permitted by 14.4.4.8, the retransmission means as defined in Section 26.3 shall be tested at intervals of not more than 12 hours.

14.4.4.8

When the retransmission means is the public-switched telephone network, testing shall be permitted at weekly intervals to confirm its operation to each communications center.

14.4.4.9

As a part of the testing required in 14.4.4.7, the retransmission signal and the time and date of the retransmission shall be recorded in the central station.

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Thu Jul 25 16:39:55 EDT 2019

Committee Statement

Committee Statement: The revision moves these 3 sections to the Testing Section of Chapter 14, which is a more appropriate location.

Response Message: FR-5271-NFPA 72-2019

Public Input No. 500-NFPA 72-2019 [Sections 14.5.5, 14.5.6, 14.5.7]

First Revision No. 5255-NFPA 72-2019 [Section No. 14.6.2.4]

See FR-5340

14.6.2.4

A record of all inspections, testing, and maintenance shall be provided in accordance with ~~7.8.2~~ 7.6.6 .

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Thu Jul 25 15:45:46 EDT 2019

Committee Statement

Committee Statement: Section 7.6.6 currently refers the reader to this section of Chapter 14. However, this same section in Chapter 14 does not reference back to 7.6.6 reciprocally.

Response Message: FR-5255-NFPA 72-2019

Public Input No. 85-NFPA 72-2019 [Section No. 14.6.2.4]

Public Input No. 87-NFPA 72-2019 [Section No. 14.6.1.1]

First Revision No. 5258-NFPA 72-2019 [Section No. A.14.2.1.2]

A.14.2.1.2

If a system is designed to meet a specific mission or set of goals, then operational testing will assure that the system has mission reliability. For example, during acceptance testing, the design ambient noise level might not be present. Authorities having jurisdiction and technicians should not be trying to achieve the +5/15 dB or +5/10 dB requirements at acceptance, as they might not know what the maximum average or peak noise levels are. They need only measure the system and determine if it meets the required design level. Therefore, the design level needs to be documented and communicated to them.

Acceptance and re-acceptance testing includes proper operation, and non-operation, of the fire alarm or signaling system's ability to properly interface to other systems. The best way to ensure a proper interface operation is to observe the actual operation of the interfaced system. However, exercising an emergency control function every time a related initiating device is actuated might not be desirable or practical, or in some cases ~~may not even~~ might not be permitted. *NFPA 72* permits testing of the fire alarm or signaling system up to the end point connection to the interfaced system or emergency control function. Refer to A.14.4.3.2 Table 14.4.3.2 Item 24.

Submitter Information Verification

Committee: SIG-TMS
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Committee Statement

Committee Statement: This revision eliminates usage of "may" per the MOS.
Response Message: FR-5258-NFPA 72-2019

Public Input No. 478-NFPA 72-2019 [Section No. A.14.2.1.2]

First Revision No. 5285-NFPA 72-2019 [Section No. A.14.4.2]

A.14.4.2

Reacceptance testing is performed to verify the proper operation of added or replaced devices, appliances, emergency control function devices, control ~~equipment~~ units , and so forth. It is not the intent of the committee to unduly burden the system owner with increased costs for repeated testing of devices not directly affected by the replacement of devices with like devices.

For example, if a 2 amp fuse is replaced with another 2 amp fuse in the fire alarm control unit, verification of the circuit(s) served by the fused supply is required, but it would not be necessary to test 10 percent of initiating devices not directly affected by replacing the fuse. Likewise, it is not necessary to test all these initiating devices whenever a smoke detector is replaced with a like smoke detector.

When wiring changes are made to correct improperly supervised circuits, a test of the affected device or appliance is required, but not a test of 10 percent of initiating devices not directly affected.

Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Fri Jul 26 08:05:11 EDT 2019

Committee Statement

Committee Statement: The term "control equipment" is not defined in the standard. The term "control unit" is defined in the standard and is the term that is appropriate to convey the intended meaning.

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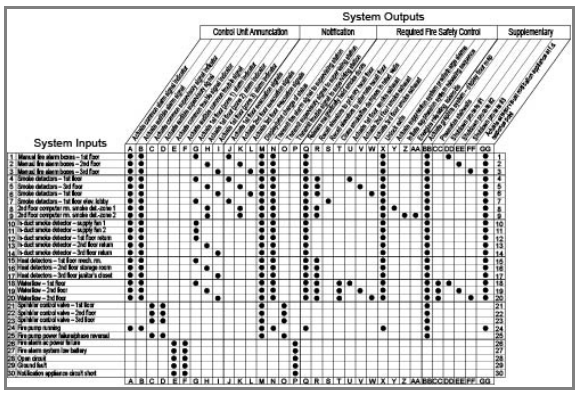
Public Input No. 570-NFPA 72-2019 [Section No. A.14.4.2]

First Revision No. 5340-NFPA 72-2019 [Section No. A.14.6.2.4]

A.14.6.1.1

One method used to define the required sequence of operations and to document the actual sequence of operations is an input/output matrix *(see ~~Figure A.14.6.2.4~~ Figure A.14.6.1.1).*

Figure A.14.6.1.1 Typical Input/Output Matrix.



Submitter Information Verification

Committee: SIG-TMS

Submittal Date: Fri Aug 09 15:42:19 EDT 2019

Committee Statement

Committee Statement: The annex note on sequence of operation has no relevance to this particular section. It is moved to be associated with 14.6.1.1, which is a more appropriate section.

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Public Input No. 86-NFPA 72-2019 [Section No. A.14.6.2.4]

Public Input No. 88-NFPA 72-2019 [New Section after A.14.6.1.2]