**Chapter 10 Fundamentals**

10.1 Application

10.1.1

The basic functions of a complete fire alarm and/or signaling system shall comply with the requirements of this chapter.

10.1.2

The requirements of this chapter shall apply to systems, equipment, and components addressed in Chapters 12, 14, 17, 18, 21, 23, 24, 26, and 27.

10.1.3

The requirements of Chapter 7 shall apply where referenced in Chapter 10.

10.2 Purpose

The purpose of fire alarm and signaling systems shall be primarily to provide notification of alarm, supervisory, and trouble conditions; to alert the occupants; to summon aid; and to control emergency control functions.

10.3 Equipment

10.3.1

Equipment constructed and installed in conformity with this Code shall be listed for the purpose for which it is used.

10.3.2

System components shall be installed, tested, inspected, and maintained in accordance with the manufacturer's published instructions and this Code.

10.3.3\*

All devices and appliances that receive their power from the initiating device circuit or signaling line circuit of a control unit shall be listed for use with the control unit.

10.3.4

All apparatus requiring rewinding or resetting to maintain normal operation shall be restored to normal after each abnormal condition.

10.3.5

Equipment shall be designed so that it is capable of performing its intended functions under the following conditions:

\*At 85 percent and at 110 percent of the nameplate primary (main) and secondary (standby) input voltage(s)

At ambient temperatures of 32°F (0°C) and 120°F (49°C)

At a relative humidity of 85 percent and an ambient temperature of 86°F (30°C)

10.4 Design and Installation

10.4.1\*

All systems shall be installed in accordance with the plans, specifications, and standards approved by the authority having jurisdiction.

10.4.2

Devices and appliances shall be located and mounted so that accidental operation or failure is not caused by vibration or jarring.

10.4.3

Equipment shall be installed in locations where conditions do not exceed the voltage, temperature, and humidity limits specified in the manufacturer's published instructions.

10.4.4\*

Unless otherwise permitted by the authority having jurisdiction, control unit displays, visible indicators, or controls shall be mounted such that the distance to the highest switch, lamp, or textual display does not exceed 6 ft (1.8 m) above the finished floor, and the lowest switch, lamp, or textual display shall not be less than 15 in. (375 mm) above the finished floor.

10.4.5\*

Unless otherwise permitted by 10.4.6, in areas that are not continuously occupied, early warning fire detection shall be at the location of each control unit(s), notification appliance circuit power extender(s), and supervising station transmitting equipment to provide notification of fire at that location by one of the following means:

An automatic smoke detector at the location of each control unit(s), notification appliance circuit power extender(s), and supervising station transmitting equipment

An automatic heat detector where ambient conditions prohibit installation of an automatic smoke detector

10.4.6

Smoke or heat detector(s) shall not be required to be installed at the location of dedicated function(s) fire alarm control unit(s) that are not required to provide local or supervising station notification signals.

10.4.7 Initiating Devices

10.4.7.1

Initiating devices of the manual or automatic type shall be selected and installed to minimize unwanted alarms.

10.4.7.2

Initiating devices shall comply with the requirements of Chapter 17 and Chapter 23.

10.4.7.3

Manual alarms shall be initiated by one of the following ways:

A listed manual fire alarm box

A key operated means

A means contained within a locked cabinet or arranged to provide equivalent protection against unauthorized use

10.5 Personnel Qualifications

10.5.1 System Designer

10.5.1.1

Plans and specifications shall be developed in accordance with this Code by persons who are experienced in the design, application, installation, and testing of the systems.

10.5.1.2

State or local licensure regulations shall be followed to determine qualified personnel.

10.5.1.3

Personnel shall provide documentation of their qualification by one or more of the following:

Registration, licensing, or certification by a state or local authority

Certification by an organization acceptable to the authority having jurisdiction

Manufacturer's certification for the specific type and brand of system provided

10.5.1.4

The system designer shall be identified on the system design documents.

10.5.1.5

System design trainees shall be under the supervision of a qualified system designer.

10.5.1.6

The system designer shall provide evidence of their qualifications and/or certifications when required by the authority having jurisdiction.

10.5.2 System Installer

10.5.2.1

Installation personnel shall be qualified or shall be supervised by persons who are qualified in the installation, inspection, and testing of the systems.

10.5.2.2

State or local licensure regulations shall be followed to determine qualified personnel.

10.5.2.3

Personnel shall provide documentation of their qualification by one or more of the following:

Registration, licensing, or certification by a state or local authority

Certification by an organization acceptable to the authority having jurisdiction

Manufacturer's certification for the specific type and brand of system provided

10.5.2.4

System installation trainees shall be under the supervision of a qualified system installer.

10.5.2.5

The system installer shall provide evidence of their qualifications and/or certifications when requested by the authority having jurisdiction.

10.5.3\* Inspection, Testing, and Service Personnel. (SIG-TMS)

10.5.3.1\* Inspection Personnel

Inspections shall be performed by personnel who have developed competence through training and experience that are acceptable to the authority having jurisdiction or meet the requirement of 10.5.3.4.

10.5.3.2\* Testing Personnel

Testing personnel shall have knowledge and experience of the testing requirements contained in this Code, of the equipment being tested, and of the test methods. That knowledge and experience shall be acceptable to the authority having jurisdiction or meet the requirement of 10.5.3.4.

10.5.3.3 Service Personnel

Service personnel shall have knowledge and experience of the maintenance and servicing requirements contained in this Code, of the equipment being serviced or maintained, and of the servicing or maintenance methods. That knowledge and experience shall be acceptable to the authority having jurisdiction or meet the requirement of 10.5.3.4.

10.5.3.4 Means of Qualification

Qualified personnel shall include, but not be limited to, one or more of the following:

\*Personnel who are factory trained and certified for the specific type and brand of system being serviced

\*Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction

\*Personnel who are registered, licensed, or certified by a state or local authority to perform service on systems addressed within the scope of this Code, either individually or through their affiliation with an organization

Personnel who are employed and qualified by an organization listed by a nationally recognized testing laboratory for the servicing of systems within the scope of this Code

10.5.3.5\* Programming Personnel

10.5.3.5.1

Personnel programming a system shall be certified by the system manufacturer.

10.5.3.5.2

System installation personnel shall be permitted to configure systems in the field per manufacturers' published instructions.

10.5.3.5.3

System end users shall be permitted to manage system operation per manufacturers' published instructions or training.

10.5.3.6 Evidence of Qualification

Evidence of qualifications shall be provided to the authority having jurisdiction upon request.

10.5.4 Plans Examiners and Inspectors

10.5.4.1

Plans and specifications submitted for review and approval shall be reviewed by personnel who are qualified to review such plans and specifications.

10.5.4.2

System installations shall be inspected by personnel who are qualified to perform such inspections.

10.5.4.3

State or local licensure regulations shall be followed to determine qualified personnel.

10.5.4.4

Personnel shall provide documentation of their qualifications by one or more of the following:

Registration, licensing, or certification by a state or local authority

Meeting the requirements of NFPA 1031

Assignment by the authority having jurisdiction to personnel having equivalent competency with 10.5.4.4(1) or 10.5.4.4(2)

10.5.5 Supervising Station Operators. (SIG-SSS)

10.5.5.1

All operators in the supervising station shall demonstrate competence in all tasks required of them in Chapter 26 by one or more of the following:

Certified by the manufacturer of the receiving system or equipment or the alarm-monitoring automation system

\*Certified by an organization acceptable to the authority having jurisdiction

Licensed or certified by a state or local authority

Other training or certification approved by the authority having jurisdiction

10.5.5.2

Evidence of qualifications and/or certification shall be provided when requested by the authority having jurisdiction. A license or qualification listing shall be current in accordance with the requirements of the issuing authority or organization.

10.5.5.3

Operator trainees shall be under the direct supervision of a qualified operator until qualified as required by 10.5.5.1.

10.5.6 Public Emergency Alarm Reporting System Personnel Qualification. (SIG-PRS)

10.5.6.1 System Designer

10.5.6.1.1

Public emergency alarm reporting system plans and specifications shall be developed in accordance with this Code by persons who are qualified in the proper design, application, installation, and testing of public emergency alarm reporting systems.

10.5.6.1.2

The system design documents shall include the name and contact information of the system designer.

10.5.6.2 System Installer

Installation personnel shall be qualified in the installation, inspection, and testing of public emergency alarm reporting systems.

10.5.6.3 Service Personnel

Service personnel shall be qualified in the service, inspection, maintenance, and testing of public emergency alarm reporting systems.

10.5.6.4 Qualification

10.5.6.4.1

Personnel shall demonstrate qualification by being trained and certified in public emergency alarm reporting system design, installation, or service (as appropriate).

10.5.6.4.2

Personnel who are trained and certified for the specific type of public emergency alarm reporting system and comply with one the following shall be considered qualified:

Personnel who are licensed or certified by a state or local authority, if applicable

\* Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction

Personnel who are employed and qualified by an organization listed by a nationally recognized testing laboratory for the design, installation, or servicing of systems within the scope of this chapter

\* Personnel who are employed and certified by an equipment manufacturer for the specific type of system

10.5.6.4.3

Evidence of qualifications and/or certification shall be provided when requested by the authority having jurisdiction. A license or qualification listing shall be current in accordance with the requirements of the issuing authority or organization.

10.6 Power Supplies

10.6.1\* Scope

The provisions of this section shall apply to power supplies.

10.6.2 Code Conformance

All power supplies shall be installed in accordance with applicable requirements of NFPA 70.

10.6.3 Power Supply Sources

10.6.3.1

Power shall be supplied in accordance with either 10.6.3.2 or 10.6.4.

10.6.3.2

Unless configured in compliance with 10.6.4, at least two independent and reliable power supplies shall be provided, one primary and one secondary.

10.6.3.3

Each power supply shall be of adequate capacity for the application.

10.6.3.4

Monitoring the integrity of power supplies shall be in accordance with 10.6.9.

10.6.4\* Energy Storage Systems (ESS)

10.6.4.1

The ESS device shall be configured in compliance with NFPA 111 for a Type O, Class 24, Level 1 system.

10.6.4.2

Where connected to an engine-driven generator arranged in accordance with 10.6.11.3.1, the ESS device shall be permitted to be configured in compliance with NFPA 111 for a Type O, Class 4, Level 1 system.

10.6.4.3

The ESS device shall comply with the requirements of 10.6.5.

10.6.4.4

Failure of the ESS shall result in the initiation of a trouble signal in accordance with Section 10.15.

10.6.5 Primary Power Supply

10.6.5.1 Branch Circuit

10.6.5.1.1

The branch circuit supplying the equipment shall be supplied by one of the following:

Electric utility

An engine-driven generator or equivalent in accordance with 10.6.11.2, where a person trained in its operation is on duty at all times

An engine-driven generator or equivalent arranged for cogeneration with an electric utility in accordance with 10.6.11.2, where a person trained in its operation is on duty at all times

10.6.5.1.2\*

The branch circuit supplying the equipment shall supply no other loads.

10.6.5.2 Circuit Identification and Accessibility

10.6.5.2.1

The location of the branch circuit disconnecting means shall be permanently identified at the control unit.

10.6.5.2.2\*

The system circuit disconnecting means shall be marked to identify the system or equipment that it serves.

10.6.5.2.3

For fire alarm and/or signaling systems, the circuit disconnecting means shall have a red marking.

10.6.5.2.4

The red marking shall not damage the overcurrent protective devices or obscure the manufacturer's markings.

10.6.5.2.5

The circuit disconnecting means shall be accessible only to authorized personnel.

10.6.5.3 Mechanical Protection

The branch circuit(s) and connections shall be protected against physical damage.

10.6.5.4 Circuit Breaker Lock

Where a circuit breaker is the disconnecting means, an approved breaker locking device shall be installed.

10.6.5.5 Overcurrent Protection

An overcurrent protective device shall be provided in accordance with NFPA 70.

10.6.6\* Continuity of Power Supplies

10.6.6.1

The secondary power supply shall automatically provide power to the protected premises system within 10 seconds whenever the primary power supply voltage is insufficient for required system operation.

10.6.6.2

The secondary power supply shall automatically provide power to the supervising station facility and equipment within 60 seconds whenever the primary power supply voltage is insufficient for required system operation.

10.6.6.3

Required signals shall not be lost, interrupted, or delayed by more than 10 seconds as a result of the primary power failure.

10.6.6.3.1

Storage batteries dedicated to the system or ESS arranged in accordance with the provisions of NFPA 111 shall be permitted to supplement the secondary power supply to ensure required operation during the transfer period.

10.6.6.3.2

Where an ESS is employed in 10.6.6.3.1, a positive means for disconnecting the input and output of the ESS system while maintaining continuity of power supply to the load shall be provided.

10.6.7 Secondary Power Supply

10.6.7.1 Secondary Power Operation

10.6.7.1.1

Operation on secondary power shall not affect the required performance of a system or supervising station facility, including alarm, supervisory, and trouble signals and indications.

Exception: While operating on secondary power, audio amplifier monitoring shall be required only when an alarm is present.

10.6.7.2\* Capacity

10.6.7.2.1

The secondary power supply shall have sufficient capacity to operate the system under quiescent load (system operating in a nonalarm condition) for a minimum of 24 hours and, at the end of that period, shall be capable of operating all alarm notification appliances used for evacuation or to direct aid to the location of an emergency for 5 minutes, unless otherwise permitted or required by 10.6.7.2.1.1 through 10.6.7.2.2.

10.6.7.2.1.1\*

Battery calculations shall include a minimum 20 percent safety margin above the calculated amp-hour capacity required.

10.6.7.2.1.2

The secondary power supply for in-building fire emergency voice/alarm communications service shall be capable of operating the system under quiescent load for a minimum of 24 hours and then shall be capable of operating the system during a fire or other emergency condition for a period of 15 minutes at maximum connected load.

10.6.7.2.1.3

The secondary power supply capacity for supervising station facilities and equipment shall be capable of supporting operations for a minimum of 24 hours.

10.6.7.2.1.4

The secondary power supply for high-power loudspeaker arrays used for wide-area mass notification systems shall be in accordance with 24.6.5.2.

10.6.7.2.1.5

The secondary power supply for textual visual notification appliances shall be in accordance with 24.6.10.1.

10.6.7.2.1.6

The secondary power supply capacity for emergency command centers of a wide-area mass notification systems shall be capable of supporting operations for a minimum of 24 hours.

10.6.7.2.1.7

The secondary power supply for in-building mass notification systems shall be capable of operating the system under quiescent load for a minimum of 24 hours and then shall be capable of operating the system during emergency conditions for a period of 15 minutes at maximum connected load.

10.6.7.2.2

The secondary power supply capacity required shall include all power supply loads that are not automatically disconnected upon the transfer to secondary power supply.

10.6.7.2.3\*

Where carbon monoxide detection is not monitored by a supervising station, the secondary power supply shall have sufficient capacity to operate the carbon monoxide detection system under quiescent load (system operating in a nonalarm condition) for a minimum of 24 hours and, at the end of that period, shall be capable of operating the carbon monoxide detection system and all carbon monoxide notification appliances for 12 hours.

10.6.7.2.4

Where carbon monoxide detection is monitored by a supervising station, the secondary power supply shall have sufficient capacity to operate the carbon monoxide detection system under quiescent load (system operating in a nonalarm condition) for a minimum of 24 hours and, at the end of that period, shall be capable of operating the carbon monoxide detection system and all notification appliances for 5 minutes.

10.6.7.3\* Secondary Power Supply for Protected Premises Fire Alarm Systems and Emergency Communications Systems

10.6.7.3.1

The secondary power supply shall consist of one of the following:

A storage battery dedicated to the system arranged in accordance with 10.6.10

An automatic-starting, engine-driven generator serving the branch circuit specified in 10.6.5.1 and arranged in accordance with 10.6.11.3.1, and storage batteries dedicated to the system with 4 hours of capacity arranged in accordance with 10.6.10

10.6.7.3.2

Secondary circuits that provide power to the control unit and are not integral to the unit shall be protected against physical damage.

10.6.7.4 Secondary Power Supply for Supervising Station Facilities

10.6.7.4.1

The secondary power supply shall consist of one of the following:

Storage batteries dedicated to the supervising station equipment arranged in accordance with 10.6.10

A branch circuit of an automatic-starting, engine-driven generator arranged in accordance with 10.6.11.3.2.1 and 10.6.11.3.2.2, and storage batteries dedicated to the supervising station equipment with 4 hours of capacity arranged in accordance with 10.6.10

A branch circuit of multiple engine-driven generators, at least one of which is arranged for automatic starting in accordance with 10.6.11.3.2.1 and 10.6.11.3.2.2

10.6.7.4.2

Where a secondary power supply for supervising station facilities in accordance with 10.6.7.4.1(3) is used, the following shall apply:

Each generator shall be capable of supplying the energy required.

Generators that are started manually shall be arranged in accordance with 10.6.11.3.2.3 and 10.6.11.3.2.4.

When manual-start generators are employed, a person trained in the procedure of starting the generator shall be on duty at all times.

10.6.8 Power Supply for Remotely Located Control Equipment

10.6.8.1\*

Additional power supplies required for system operation shall comply with 10.6.1 through 10.6.6 and with 10.6.9.

10.6.8.2

The location of remotely located power supplies shall be identified at the master control unit.

10.6.8.3

The master control unit display shall be permitted to satisfy the requirement of 10.6.8.2.

10.6.8.4

The location of remotely located power supplies shall be identified on the record drawings.

10.6.9 Monitoring Integrity of Power Supplies

10.6.9.1

Unless otherwise permitted or required by 10.6.9.1.3 and 10.6.9.1.6, all primary and secondary power supplies shall be monitored for the presence of voltage at the point of connection to the system.

10.6.9.1.1

Failure of either the primary or secondary power supply shall result in a trouble signal in accordance with Section 10.15.

10.6.9.1.2

Power failure indication for a digital alarm communicator transmitter (DACT) powered from a protected premises fire alarm system control unit shall be in accordance with 10.6.9.1.

10.6.9.1.3

Monitoring shall not be required for a power supply for supplementary equipment.

10.6.9.1.4

Monitoring shall not be required for the neutral of a three-, four-, or five-wire ac or dc supply source.

10.6.9.1.5

Monitoring shall not be required for the main power supply in a supervising station if its failure is otherwise indicated and obvious to the operator on duty.

10.6.9.1.6

Monitoring shall not be required for the output of an engine-driven generator that is part of the secondary power supply, provided the generator is tested weekly in accordance with Chapter 14.

10.6.9.2\*

Power supply sources and electrical supervision for digital alarm communications systems shall be in accordance with Section 10.6, 10.6.9, Section 10.19, and Section 12.6.

10.6.9.3\*

Supervising station alarm systems shall be arranged to delay transmission of primary power failure signals for 60 minutes to 180 minutes unless a delay is not permitted by the authority having jurisdiction.

10.6.9.4

Power supervisory devices used to monitor the integrity of power supplies shall not impair the receipt of fire alarm or supervisory signals.

10.6.10\* Storage Batteries

10.6.10.1 Marking

10.6.10.1.1

Batteries shall be marked with the month and year of manufacture using the month/year format.

10.6.10.1.2

Where the battery is not marked with the month/year by the manufacturer, the installer shall obtain the datecode and mark the battery with the month/year of battery manufacture.

10.6.10.2 Arrangement

10.6.10.2.1

Storage batteries shall comply with the requirements of Article 480 of NFPA 70.

10.6.10.2.2

Storage batteries shall be located so that the equipment, including overcurrent devices, is not adversely affected by battery gases.

10.6.10.2.3

Batteries shall be insulated against ground faults.

10.6.10.2.4

Batteries shall be insulated to prevent short circuits between multiple cells.

10.6.10.2.5

Batteries shall be protected from physical damage.

10.6.10.2.6

Battery racks shall be protected against corrosion.

10.6.10.2.7

If not located in or adjacent to the control unit, the batteries and their charger location shall be permanently identified at the control unit.

10.6.10.3 Battery Charging

10.6.10.3.1

Battery charging equipment shall be provided to keep the battery fully charged under normal conditions.

10.6.10.3.2

Battery charging equipment shall be provided to recharge batteries within 48 hours after fully charged batteries have been subject to a single discharge cycle as specified in 10.6.7.2.

10.6.10.3.3

The battery charging equipment operation shall not damage the battery.

10.6.10.3.4\*

Batteries shall be charged by listed means.

10.6.10.3.5

Provisions for repair or replacement of failed battery charger equipment shall be maintained at supervising stations and used to restore operation prior to depletion of one-half of the battery capacity.

10.6.10.4 Overcurrent Protection

Overcurrent devices shall be provided to protect the batteries from excessive load current.

10.6.10.5 Metering

The battery charging equipment shall include integral meters or readily accessible terminals so that portable meters can be used to determine battery voltage and charging current.

10.6.10.6 Monitoring Integrity of Battery Charging Equipment

10.6.10.6.1

Means shall be provided to detect the failure of a battery charger.

10.6.10.6.2

Failure of the battery charger shall result in a trouble signal in accordance with Section 10.15.

10.6.11 Engine-Driven Generators

10.6.11.1 Application and Installation

The application and installation of engine-driven generators shall be as specified in 10.6.11.2 through 10.6.11.7.

10.6.11.2 Primary Power Supply

10.6.11.2.1

Engine-driven generators arranged as the primary supply shall be designed in an approved manner.

10.6.11.2.2

Engine-driven generators arranged as the primary supply shall be installed in an approved manner.

10.6.11.3 Secondary Power Supplies

10.6.11.3.1 Protected Premises

10.6.11.3.1.1

Engine-driven generators used to provide secondary power for a protected premises fire alarm system or an emergency communications system shall comply with NFPA 110 Chapter 4, requirements for a Type 10, Class 24, Level 1 system.

10.6.11.3.1.2

Installation of engine-driven generators used to provide secondary power for a protected premises fire alarm system or an emergency communications system shall be in accordance with NFPA 70, Article 700.

10.6.11.3.1.3

Where survivability of circuits is required by another section of the Code, equal protection shall be provided for power supply circuits.

10.6.11.3.2 Supervising Station

10.6.11.3.2.1

Automatic-starting, engine-driven generators used to provide secondary power for a supervising station shall comply with NFPA 110 Chapter 4, requirements for a Type 60, Class 24, Level 2 system.

10.6.11.3.2.2

Installation of automatic-starting, engine-driven generators used to provide secondary power for a supervising station shall be in accordance with NFPA 70 Article 701.

10.6.11.3.2.3

Manual-starting, engine-driven generators used to provide secondary power for a supervising station shall comply with NFPA 110 Chapter 10, requirements for a Type M, Class 24, Level 2 system.

10.6.11.3.2.4

Installation of manual-starting, engine-driven generators used to provide secondary power for a supervising station shall be in accordance with NFPA 70, Article 702.

10.6.11.4 Performance, Operation, Testing, and Maintenance

The requirements for performance, operation, testing, and maintenance of engine-driven generators shall conform to the applicable provisions of NFPA 110.

10.6.11.5 Capacity

The unit shall be of a capacity that is sufficient to operate the system under the maximum normal load conditions in addition to all other demands placed upon the unit.

10.6.11.6 Fuel

Unless otherwise required or permitted in 10.6.11.6.1 through 10.6.11.6.3, fuel shall be available in storage sufficient for 6 months of testing plus the capacity specified in 10.6.7.

10.6.11.6.1

For public emergency alarm reporting systems, the requirements of Chapter 27 shall apply.

10.6.11.6.2

If a reliable source of supply is available at any time on a 2-hour notice, it shall be permitted to have fuel in storage sufficient for 12 hours of operation at full load.

10.6.11.6.3

Fuel systems using natural or manufactured gas supplied through reliable utility mains shall not be required to have fuel storage tanks unless located in seismic risk zone 3 or greater as defined in ANSI A-58.1, Building Code Requirements for Minimum Design Loads in Buildings and Other Structures.

10.6.11.7 Battery and Charger

10.6.11.7.1

A separate storage battery and separate automatic charger shall be provided for starting the engine-driven generator and shall not be used for any other purpose.

10.6.11.7.2

The battery shall be sized in accordance with 5.6.4 of NFPA 110.

10.7 Signal Priority

The priority of signals shall be in accordance with this section.

10.7.1

ECS priority signals when evaluated by stakeholders through a risk analysis in accordance with 24.3.12 shall be permitted to take precedence over all other signals.

10.7.2

Fire alarm signals shall take precedence over all other signals, except as permitted by 10.7.1 or 10.7.3.

10.7.3\*

Emergency mass notification signals and messages shall be permitted to have priority over fire alarm notification signals in accordance with the requirements of Chapter 24.

10.7.4

Emergency mass notification signals and messages shall have priority over supervisory and trouble signals in accordance with the requirements of Chapter 24.

10.7.5

Carbon monoxide signals shall be permitted to take precedence over supervisory and trouble signals.

10.7.6

Pre-alarm signals shall take precedence over supervisory and trouble signals.

10.7.7

Supervisory signals shall take precedence over trouble signals.

10.7.8

Hold-up alarms or other life-threatening signals shall be permitted to take precedence over supervisory and trouble signals where acceptable to the authority having jurisdiction.

10.7.9\*

Where separate systems are installed, they shall be permitted to achieve the priority of signals in accordance with Section 10.7.

10.8 Detection and Signaling of Conditions

10.8.1 Abnormal Condition Detection

Where required by this Code, the system shall be provided with means to detect and signal abnormal conditions.

10.8.2 Alarm Condition Detection

Where required by this Code, the system shall be provided with means to detect and signal alarm conditions.

10.8.2.1 Pre-Alarm Condition Detection

Where required by this Code, the system shall be provided with means to detect and signal pre-alarm conditions.

10.8.2.2 Supervisory Condition Detection

Where required by this Code, the system shall be provided with means to detect and signal supervisory conditions.

10.8.2.3 Trouble Condition Detection

Where required by this Code, the system shall be provided with means to detect and signal trouble conditions.

10.8.2.4 Normal Condition Detection

Where required by this Code, the system shall generate a restoration signal when the device or signaling system returns to normal.

10.9 Responses

10.9.1 Alarm

The response to an alarm signal shall be in accordance with this Code.

10.9.2 Pre-Alarm

The response to a pre-alarm signal shall be in accordance with this Code.

10.9.3 Supervisory

The response to a supervisory signal shall be in accordance with this Code.

10.9.4 Trouble

The response to trouble signal shall be in accordance with this Code.

10.10 Distinctive Signals

10.10.1

Priority alarm signals, fire alarm signals, carbon monoxide alarm signals, supervisory signals, pre-alarm signals, and trouble signals shall be distinctively and descriptively annunciated.

10.10.2

Audible alarm notification appliances for a fire alarm system shall produce signals that are distinctive from other similar appliances used for other purposes in the same area that are not part of the fire alarm or emergency communications system.

10.10.3

Audible alarm notification appliances for a carbon monoxide alarm system shall produce signals that are distinctive from other similar appliances used for other purposes in the same area that are not part of the carbon monoxide, fire alarm, or emergency communications system.

10.10.4\*

An audible notification appliance on a control unit, on multiple control units that are interconnected to form a system, or at a remote location, shall be permitted to have the same audible characteristics for all alerting functions including, but not limited to, alarm, trouble, and supervisory, provided that the distinction between signals shall be by other means.

10.10.5\*

Supervisory signals shall be distinctive in sound from other signals, and their sound shall not be used for any other purpose except as permitted in 10.10.4.

10.10.6

Trouble signals required to indicate at the protected premises shall be indicated by distinctive audible signals, which shall be distinctive from alarm signals except as permitted in 10.10.4.

10.10.7

Alarm evacuation signals shall be distinctive in sound from other signals, shall comply with the requirements of 18.4.2, and their sound shall not be used for any other purpose.

10.10.8

Pre-alarm signals shall be distinctive in sound from other signals, and their sound shall not be used for any other purpose except as permitted in 10.10.4.

10.10.9

Carbon monoxide alarm signals shall comply with 18.4.4.2.

10.11 Alarm Signals

10.11.1\*

Actuation of alarm notification appliances or emergency voice communications, emergency control function interface devices, and annunciation at the protected premises shall occur within 10 seconds after the activation of an initiating device.

10.11.2\*

Visual notification appliances, textual visual notification appliances, and loudspeaker notification appliances located in the same area shall be activated and deactivated as a group unless otherwise required by an ECS emergency response plan. (SIG-ECS)

10.11.3

Visual alarm notification appliances shall not be activated when loudspeaker notification appliances are used as permitted by 24.3.5 for non-emergency paging. (SIG-ECS)

10.11.4\*

A coded alarm signal shall consist of not less than three complete rounds of the number transmitted.

10.11.5

Each round of a coded alarm signal shall consist of not less than three impulses.

10.11.6\*

Resetting of alarm signals shall comply with 23.8.2.2.

10.11.7

The subsequent occurrence of a fault on an initiating device circuit or a signaling line circuit used for other than the interconnection of control units shall not affect previously transmitted unacknowledged alarm signals.

10.11.8

An alarm signal that has been deactivated at the protected premises shall comply with 10.11.8.1 and 10.11.8.2.

10.11.8.1

The audible and visible alarm signal at the control unit only shall automatically reactivate every 24 hours or less until alarm signal conditions are restored to normal.

10.11.8.2

The audible and visible alarm signal shall operate until it is manually silenced or acknowledged.

10.12\* Fire Alarm Notification Appliance Deactivation

10.12.1

A means for turning off activated alarm notification appliance(s) shall be permitted.

10.12.2\*

When an occupant notification alarm signal deactivation means is actuated, both audible and visual notification appliances shall be simultaneously deactivated.

10.12.3

The fire alarm notification deactivation means shall be key-operated or located within a locked cabinet, or arranged to provide equivalent protection against unauthorized use.

10.12.4

The means shall comply with the requirements of 10.18.1.

10.12.5 Subsequent Activation of Initiating Devices

10.12.5.1

Subsequent activation of nonaddressable initiating devices on other initiating device circuits shall cause the notification appliances to reactivate.

10.12.5.2

Subsequent activation of addressable alarm initiating devices of a different type in the same room or addressable alarm initiating devices in a different room on signaling line circuits shall cause the notification appliances to reactivate.

10.12.6

A fire alarm notification deactivation means that remains in the deactivated position when there is no alarm condition shall operate an audible trouble notification appliance until the means is restored to normal.

10.13 Carbon Monoxide (CO) Notification Appliance Deactivation

A CO initiating device with an integral sounder shall be permitted to be silenced locally if the CO alarm or supervisory status continues to be displayed at the control unit.

10.14 Supervisory Signals

10.14.1 Self-Restoring Supervisory Signal Indication

Visible and audible indication of self-restoring supervisory signals and visible indication of their restoration to normal shall be automatically indicated within 90 seconds at the following locations:

Fire alarm control unit for local fire alarm systems

Building fire command center for in-building fire emergency voice/alarm communications systems

Supervising station location for systems installed in compliance with Chapter 26

10.14.2 Latching Supervisory Signal Indication

10.14.2.1

Visible and audible indication of latching supervisory signals shall be indicated within 90 seconds at the locations specified in 10.14.1.

10.14.2.2

Restoration of latching supervisory signals shall be indicated within 90 seconds at the locations specified in 10.14.1.

10.14.3 Coded Supervisory Signal

10.14.3.1

A coded supervisory signal shall be permitted to consist of two rounds of the number transmitted to indicate a supervisory off-normal condition.

10.14.3.2

A coded supervisory signal shall be permitted to consist of one round of the number transmitted to indicate the restoration of the supervisory condition to normal.

10.14.4 Combined Coded Alarm and Supervisory Signal Circuits

Where both coded sprinkler supervisory signals and coded fire or waterflow alarm signals are transmitted over the same signaling line circuit, provision shall be made to obtain either alarm signal precedence or sufficient repetition of the alarm signal to prevent the loss of an alarm signal.

10.14.5 Supervisory Notification Appliance Location

The audible supervisory notification appliances shall be located in an area where they are to be heard.

10.14.6 Supervisory Signal Reactivation

A supervisory signal that has been deactivated at the protected premises shall comply with 10.14.6.1 and 10.14.6.2.

10.14.6.1

The audible and visible supervisory signal at the control unit only shall automatically reactivate every 24 hours or less until supervisory signal conditions are restored to normal.

10.14.6.2

The audible and visible supervisory signal shall operate until it is manually silenced or acknowledged.

10.14.7 Supervisory Notification Appliance Deactivation

10.14.7.1

A means for deactivating supervisory notification appliances shall be permitted.

10.14.7.2

The means shall be key-operated or located within a locked cabinet, or arranged to provide equivalent protection against unauthorized use.

10.14.7.3

The means for deactivating supervisory notification appliances shall comply with the requirements of 10.18.2.

10.14.7.4

Subsequent activation of supervisory initiating devices in other building zones shall cause supervisory notification appliances to activate as required by the system input/output matrix.

10.14.7.5

A means for deactivating supervisory notification appliances that remains in the deactivated position when there is no supervisory condition shall operate an audible trouble notification appliance until the means is restored to normal.

10.15 Trouble Signals

10.15.1

Trouble signals and their restoration to normal shall be indicated within 200 seconds at the locations identified in 10.15.7 and 10.15.8.

10.15.2

Indication of primary power failure trouble signals transmitted to a supervising station shall be in accordance with 10.6.9.3.

10.15.3

An audible trouble signal shall be permitted to be intermittent provided it sounds at least once every 10 seconds, with a minimum duration of 1/2 second.

10.15.4

A single audible trouble signal shall be permitted to annunciate multiple fault conditions.

10.15.5

The audible trouble notification appliances shall be located in an area where they are to be heard.

10.15.6

Activated notification appliances at the protected premises shall continue to operate unless they are manually silenced as permitted by 10.15.10.1.

10.15.7

Visible and audible trouble signals and visible indication of their restoration to normal shall be indicated at the following locations:

Fire alarm control unit for protected premises alarm systems

Building fire command center for in-building fire emergency voice/alarm communications systems

Central station or remote station location for systems installed in compliance with Chapter 26

10.15.8

Trouble signals and their restoration to normal shall be visibly and audibly indicated at the proprietary supervising station for systems installed in compliance with Chapter 26.

10.15.9\*

A trouble signal that has been deactivated at the protected premises shall comply with 10.15.9.1 and 10.15.9.2.

10.15.9.1

The audible and visible trouble signal shall automatically reactivate at the control unit every 24 hours or less until trouble signal conditions are restored to normal.

10.15.9.2

The audible and visible trouble signal associated with signaling the depletion or failure of the primary battery of a wireless system as required by 23.16.2(3) and (4) shall automatically resound every 4 hours or less until the depletion signal is restored to normal.

10.15.10 Trouble Notification Appliance Deactivation

10.15.10.1

A means for deactivating trouble notification appliances shall be permitted.

10.15.10.2

The means shall be key-operated or located within a locked cabinet, or arranged to provide equivalent protection against unauthorized use.

10.15.10.3

The means for deactivating trouble notification appliances shall comply with the requirements of 10.18.2.

10.15.10.4

If an audible trouble notification appliance is also used to indicate a supervisory condition, as permitted by 10.10.4, a trouble notification appliance deactivation means shall not prevent subsequent actuation of supervisory notification appliances.

10.15.10.5

Subsequent trouble signals shall cause trouble notification appliances to activate as required by the system input/output matrix.

10.15.10.6

A means for deactivating trouble notification appliances that remains in the deactivated position when there is no trouble condition shall operate an audible trouble notification appliance until the means is restored to normal.

10.15.10.7\*

Unless otherwise permitted by the authority having jurisdiction, trouble notification appliances at the protected premises of a supervising station fire alarm system arranged in accordance with Chapter 26, that have been silenced at the protected premises shall automatically reactivate every 24 hours or less until fault conditions are restored to normal.

10.16 Emergency Control Function Status Indicators

10.16.1

All controls provided specifically for the purpose of manually overriding any automatic emergency control function shall provide visible indication of the status of the associated control circuits.

10.16.2\*

Where status indicators are provided for emergency equipment or control functions, they shall be arranged to reflect the actual status of the associated equipment or function.

10.17 Notification Appliance Circuits and Control Circuits

10.17.1

An open, ground-fault, or short-circuit fault on the installation conductors of one alarm notification appliance circuit shall not affect the operation of any other alarm notification appliance circuit for more than 200 seconds regardless of whether the short-circuit fault is present during the normal or activated circuit state.

10.17.2\*

Notification appliance circuits that do not have notification appliances connected directly to the circuit shall be considered control circuits.

10.17.3

Control circuits used for the purpose of controlling NAC extender panels shall comply with all of the following:

The NAC extender panel(s) connected to the control circuit shall not serve more than one notification zone

The control circuit shall be monitored for integrity in accordance with Section 12.6.

A fault in the control circuit installation conductors shall result in a trouble signal in accordance with Section 10.15.

10.18 Annunciation and Annunciation Zoning

10.18.1 Alarm Annunciation

10.18.1.1

Where required by other governing laws, codes, or standards, the location of an operated initiating device shall be annunciated by visible means.

10.18.1.1.1

Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout, or other approved means.

10.18.1.1.2

The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances.

10.18.2 Supervisory and Trouble Annunciation

10.18.2.1

Where required by other governing laws, codes, or standards, supervisory and/or trouble conditions shall be annunciated by visible means.

10.18.2.1.1

Visible annunciation shall be by an indicator lamp, an alphanumeric display, a printout, or other means.

10.18.2.1.2

The visible annunciation of supervisory and/or trouble conditions shall not be canceled by the means used to deactivate supervisory or trouble notification appliances.

10.18.3\* Annunciator Access and Location

10.18.3.1

All required annunciation means shall be readily accessible to responding personnel.

10.18.3.2

All required annunciation means shall be located as required by the authority having jurisdiction to facilitate an efficient response to the situation.

10.18.4 Alarm Annunciation Display

Visible annunciators shall be capable of displaying all zones in alarm.

10.18.4.1

If all zones in alarm are not displayed simultaneously, the zone of origin shall be displayed.

10.18.4.2

If all zones in alarm are not displayed simultaneously, there shall be an indication that other zones are in alarm.

10.18.5\* Annunciation Zoning

10.18.5.1

For the purpose of alarm annunciation, each floor of the building shall be considered as a separate zone.

10.18.5.2

For the purposes of alarm annunciation, if a floor of the building is subdivided into multiple zones by fire or smoke barriers and the fire plan for the protected premises allows relocation of occupants from the zone of origin to another zone on the same floor, each zone on the floor shall be annunciated separately.

10.18.5.3

Where the system serves more than one building, each building shall be annunciated separately.

10.19 Monitoring Integrity of In-Building Fire Emergency Voice/Alarm Communications Systems

10.19.1\* Audio Amplifier and Tone-Generating Equipment

If loudspeakers are used to produce audible fire alarm signals, the required trouble signal for 10.19.1.1 through 10.19.1.3 shall be in accordance with Section 10.15.

10.19.1.1

When primary power is available, failure of any audio amplifier shall result in a trouble signal.

10.19.1.2

When an alarm is present and primary power is not available (i.e., system is operating from the secondary power source), failure of any audio amplifier shall result in a trouble signal.

10.19.1.3

Failure of any tone-generating equipment shall result in a trouble signal, unless the tone-generating and amplifying equipment are enclosed as integral parts and serve only a single, listed loudspeaker.

10.19.2 Two-Way Telephone Communications Circuits

10.19.2.1

Two-way telephone communications circuit installation conductors shall be monitored for open circuit fault conditions that would cause the telephone communications circuit to become fully or partially inoperative.

10.19.2.2

Two-way telephone communications circuit installation conductors shall be monitored for short circuit fault conditions that would cause the telephone communications circuit to become fully or partially inoperative.

10.19.2.3

Two-way telephone communications circuit fault conditions shall result in a trouble signal in accordance with Section 10.15.

10.20 Documentation and Notification

10.20.1

Documentation shall be in accordance with Chapter 7.

10.20.2

The authority having jurisdiction shall be notified prior to installation or alteration of equipment or wiring.

10.21\* Impairments

10.21.1

The system owner or the owner's designated representative shall be notified when a system or part thereof is impaired. Impairments to systems shall include out-of-service events.

10.21.2

A record of the impairments shall be maintained by the system owner or the owner's designated representative for a period of 1 year from the date the impairment is corrected.

10.21.3

The supervising station shall report to the authority having jurisdiction any system for which required monitoring has been terminated.

10.21.4\*

The service provider shall report to the authority having jurisdiction any system that is out of service for more than 8 hours.

10.21.5\*

Where required by the authority having jurisdiction, mitigating measures shall be implemented for the period that the system is impaired.

10.21.6

The system owner or the owner's designated representative and the authority having jurisdiction shall be notified when an period ends.

For the purpose of reporting, alarm signals that are not the result of hazardous conditions shall be classified as Unwanted and subclassified as one of the following:

Malicious alarm

Nuisance alarm

Unintentional alarm

Unknown alarm