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NFPA 72 Installation, Maintenance, and Use of Protective Signaling Systems 1990 Edition

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The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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NFPA 72

Standard for the Installation, Maintenance, and Use of

Protective Signaling Systems

1990 Edition

This edition of NFPA 72, *Standard for the Installation, Maintenance, and Use of Protective Signaling Systems*, was prepared by the Technical Committee on Protective Signaling Systems, released by the Correlating Committee on Signaling Systems, and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 21-24, 1990 in San Antonio, TX. It was issued by the Standards Council on July 20, 1990, with an effective date of August 17, 1990, and supersedes all previous editions.

The 1990 edition of this document has been approved by the American National Standards Institute.

Origin and Development of NFPA 72

This standard is a consolidation of NFPA 72A-1987, NFPA 72B-1986, NFPA 72C-1986, NFPA 72D-1986 and NFPA 72F-1985. Many of the requirements of these standards are the same or very similar. Therefore the common requirements are contained in Chapters 1-5, and the unique requirements are contained in the individual chapters thereafter. Cross-references are provided at the end of each paragraph and at the end of the standard for the user.

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NFPA 72

Standard for

the Installation, Maintenance, and Use of Protective Signaling Systems

1990 Edition

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Information on referenced publications can be found in Chapter 11 and Appendix B.

Chapter 1 Introduction

1-1 Scope. This standard deals with the application, installation, performance, and maintenance of local, auxiliary, remote station, proprietary, and emergency voice/alarm protective signaling systems, and combinations thereof and their components. It is intended to provide that information which will allow a system to perform as required for the preservation of life and property.

(FROM 72A, 72B, 72C, 72D and 72F SCOPE Modified)

1-2 Purpose.

1-2.1* The purpose of this standard is to define the methods of signal initiation, transmission, notification, and annunication, the levels of performance required, and the reliability necessary for the various types of protective signaling systems. This standard defines the characteristics associated with these systems, and also provides the information necessary to modify or upgrade an existing system to meet the requirements of a particular system classification.

It is the intent of this standard to establish the required levels of performance, extent of redundancy, and quality of installation, but not the methods by which these requirements are to be achieved.

1-2.2 Any reference or implied reference to a particular type of hardware is for the purpose of clarity, and shall not be interpreted as an endorsement.

1-3 General.

1-3.1 For the purposes of this standard, protective signaling systems will be classified as follows.

(a) Local Protective Signaling System.

(b) Auxiliary Protective Signaling System.

1. Local energy type
2. Parallel telephone type
3. Shunt type.

(c) Remote Station Protective Signaling System.

(d) Proprietary Protective Signaling System.

(e) Emergency Voice/Alarm Protective Signaling Systems.

1-3.2 A device or system having materials or forms different from those detailed in this standard may be examined and tested according to the intent of the standard and, if found equivalent, may be approved.

(FROM 72A 1-1.5 , 72C 1-1.2, 72D 1-1.2, 72F 1-1.2)

1-3.3 The intent and meaning of the terms used in this standard are, unless otherwise defined herein, the same as those of NFPA 70, *National Electrical Code®*.

(FROM 72A 1-1.2, 72B 1-1.2, 72F 1-2.1 MOD.)

1-4 Definitions. For the purposes of this standard, the following terms have the meanings shown below:

Alarm Signal. A signal indicating an emergency requiring immediate action, such as an alarm for fire from a manual box, a waterflow alarm, or an alarm from an automatic fire alarm system.

NOTE: For auxiliary protective signaling the "other emergency signal" is normally a signal that would require municipal fire department response when the system is connected to a municipal communication center. However, if the system is connected to some private or governmental authority, the "other emergency signal" might be other than a signal requiring response for fire extinguishment.

Alarm Verification Feature. A feature of automatic fire detection and alarm systems to reduce unwanted alarms wherein automatic smoke detectors must report alarm conditions for a minimum period of time, or confirm alarm conditions within a given time period, after being reset, to be accepted as a valid alarm initiation signal.

Alert Tone. An attention-getting signal to alert occupants to the pending transmission of a voice message.

Annunciator. A unit containing two or more indicator lamps, alpha numeric displays, or other equivalent means in which each indication identifies the circuit, condition, or location to be annunciated.

Approved. Acceptable to the "authority having jurisdiction."

NOTE: The National Fire Protection Association does not approve, inspect or certify any installations, procedures, equipment, or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

As-Built Drawings. Drawings and documents that indicate the location (and programmed address, if applicable) of all devices and appliances, the wiring sequences, wiring methods, connection of the components, and sequence of operation of the protective signaling system as installed.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, health department, building official, electrical inspector, or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the "authority having jurisdiction." In many circumstances the property owner or his designated agent assumes the role of the "authority having jurisdiction"; at government installations, the commanding officer or departmental official may be the "authority having jurisdiction."

Auxiliary Protective Signaling System. A connection to the municipal fire alarm system to transmit an alarm of fire to the public fire service communication center. Fire alarms from an auxiliary alarm system are received at the public fire service communication center on the same equipment and by the same methods as alarms transmitted from municipal fire alarm boxes located on streets.

(a) Local Energy Auxiliary Protective Signaling System. An auxiliary system that employs a locally complete arrangement of parts, initiating devices, relays, power supply, and associated components to automatically trip a municipal transmitter or master box over electric circuits that are electrically isolated from the municipal system circuits.

(b) Parallel Telephone Auxiliary Protective Signaling System. An auxiliary system connected by a municipally controlled individual circuit to the protected property, to interconnect the actuating devices and the municipal fire alarm switchboard.

(c) Shunt Auxiliary Protective Signaling System. An auxiliary system electrically connected to an integral part of the municipal alarm system extending the municipal circuit into the protected property to interconnect the actuating devices, which, when operated, open the municipal circuit shunted around the trip coil of the municipal transmitter or master box, which is thereupon energized to start transmission, without any assistance whatsoever from a local source of energy.

NOTE: The shunt system runs municipal power wires into protected premises. Thus, the municipality may lose control of its circuit. In addition, an open circuit in this shunt loop will cause an alarm condition. The use of a shunt system is a matter of individual municipal policy.

Carrier. High frequency energy that can be modulated by voice or signaling impulses.

Channel. A path for signal transmission between two or more stations or channel terminations. A channel can consist of wire, radio waves, or equivalent means of signal transmission.

Circuit Interface. A functional assembly that interfaces one or more initiating device circuits or indicating appliance circuits with a signaling line circuit in a manner that permits the central supervising station to indicate the status of each of its initiating device circuits or indicating appliance circuits.

Combination Fire Alarm and Guard's Tour Box. Manually operated box for separately transmitting a fire alarm signal and a distinctive guard partrol tour supervisory signal.

Combination System. A local protective signaling system for fire alarm, supervisory or guard's tour supervisory service whose components may be used in whole or in part in common with a nonfire signaling system, such as a paging system, a burglar alarm system, or a process monitoring supervisory system, without degradation of or hazard to the protective signaling system.

Delinquency Signal. A signal indicating the need of action in connection with the supervision of guards or system attendants.

Digital Alarm Communicator Receiver (DACR). A system component located in the remote station that will accept and display signals from DACTs sent over the public switched telephone network.

Digital Alarm Communicator System (DACS). A system in which signals are transmitted from a Digital Alarm Communicator Transmitter (DACT) located at the protected premises through the public switched telephone network to a Digital Alarm Communicator Receiver (DACR) located at the remote station.

Digital Alarm Communicator Transmitter (DACT). A system component at the protected premises to which initiating devices or groups of devices are connected. The DACT will seize the connected telephone line, dial a preselected number to connect to a DACR in the remote station, and transmit signals indicating a status change of the initiating device.

Display. The visual representation of output data other than printed copy.

Evacuation. The withdrawal of occupants from a building.

NOTE: Evacuation does not include relocation of occupants within a building.

Evacuation Signal. Distinctive signal intended to be recognized by the occupants as requiring evacuation of the building.

Fire Alarm/Evacuation Signal Tone Generator. A device that, upon command, produces a fire alarm/evacuation signal.

Fire Command Station. The principal manned or unmanned location where the status of the detection, alarm communications and control systems is displayed and from which the system(s) can be manually controlled.

Fire Warden. Building staff or tenant trained to perform assigned duties in the event of a fire emergency.

Hunt Group. A group of associated telephone lines within which an incoming call is automatically routed to an idle (not busy) telephone line for completion.

Indicating Appliance Circuit. A circuit or path directly connected to an indicating appliance(s).

Initiating Device Circuit. A circuit to which automatic or manual initiating devices are connected where the signal received does not identify the individual device operated.

Intermediate Fire Alarm or Fire Supervisory Control Unit. A control unit used to provide area fire alarm or area fire supervisory service which, when connected to the proprietary protective signaling system, with the permission of the authority having jurisdiction, becomes a part of that system.

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance withappropriate standards or performance in a specified manner.

Leg Facility. That part of a signaling line circuit connecting each protected building to the trunk facility or directly to the central supervising station.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Local Alarm System. A local system sounding an alarm as the result of the manual operation of a fire alarm box or the operation of protection equipment or systems, such as waterflowing in a sprinkler system, the discharge of carbon dioxide, the detection of smoke, or the detection of heat.

Local Supervisory System. A local system arranged to supervise the performance of guard's tours, or the operative condition of automatic sprinkler systems, or other systems for the protection of life and property against the fire hazard.

Local System. A local system is one that produces a signal at the premises protected.

Maintenance. Repair service, including periodically recurrent inspections and tests, required to keep the protective signaling system and its component parts in an operative condition at all times, together with replacement of the system or of its components when, for any reason, they become undependable or inoperative.

Master Box. A municipal fire alarm box that may also be operated by remote means.

Municipal Fire Alarm Box. A specially manufactured enclosure housing a manually operated transmitter used to send an alarm to the public fire service communication center.

Municipal Transmitter. A specially manufactured enclosure housing a transmitter that can only be tripped remotely, used to send an alarm to the public fire service communication center.

Off-Hook. To make connection with public switched telephone network in preparation to dial a telephone number.

On-Hook. To disconnect from the public switched telephone network.

Paging System. A system intended to page one or more persons such as by means of voice over loudspeaker stations located throughout the premises or by means of coded audible signals or visual signals similarly distributed, or by means of lamp annunciators located throughout the premises.

Parallel Telephone System. A telephone system in which an individual wired circuit is used for each box.

Permanent Visual Record (Recording). Immediately readable, not easily alterable print, slash, punch, etc., listing all occurrences of status change.

Private Radio Signaling. A radio system under control of the central supervising station.

Process Monitoring Alarm System (critical process). An alarm system used to supervise the functioning of a commercial process, such as manufacturing operations, heating or refrigerating systems temperature control, etc., when failure of the supervised process could result in fire or explosion endangering life or property.

Process Monitoring Supervisory System (noncritical process). A system used to supervise the normal functioning of a commercial process, where an abnormal condition does not constitute a fire or explosion emergency.

Proprietary Protective Signaling System. An installation of protective signaling systems that serves contiguous and noncontiguous properties under one ownership from a central supervising station located at the protected property, where trained, competent personnel are in constant attendance. This includes the central supervising station, power supplies, signal initiating devices, initiating device circuits, signal notification appliances, equipment for the automatic, permanent visual recording of signals, and equipment for initiating the operation of emergency building control services.

Protective Signaling Systems. Electrically operated circuits, instruments, and devices, together with the necessary electrical energy, designed to transmit alarms, supervisory, and trouble signals necessary for the protection of life and property.

Public Fire Service Communication Center. The building or portion of the building used to house the central operating part of the fire alarm system; usually the place where the necessary testing, switching, receiving, transmitting, and power supply devices are located.

Recorded Message Device. A device that reproduces stored information.

Relocation. The movement of occupants from a fire zone to a safe area within the same building.

Remote Station Protective Signaling System. An installation using a digital alarm communicator system or supervised dedicated circuits, installed in accordance with this standard, to transmit alarm, supervisory and trouble signals from one or more protected premises to a remote location at which appropriate action is taken.

Repeater Facility. Equipment needed to relay signals between the protected premises and the central supervising station.

Runner Service. A required service of a proprietary protective signaling system utilizing employees other than the required number of operators on duty at all times at the central supervising station, a runner station, or in a vehicle in constant radio contact with the central supervising station, available for prompt dispatching when necessary to the protected premises. This service does not include action pertaining to the fire protection systems other than signaling devices.

Satellite Station. A normally unattended location, remote from the central supervising station and linked by communication channel(s) to the central supervising station. Interconnection of signal receiving equipment or communication channel(s) from protected buildings with channel(s) to central supervising station is accomplished at this location.

Satellite Trunk. A circuit or path connecting a satellite to its central supervising station.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Signaling Line Circuit (Path). A circuit or path (channel or trunk and leg) over which multiple signals are transmitted and received.

Supervisory Service. The service required to monitor performance of guard's tours and the operative condition of automatic sprinkler systems and of other systems for the protection of life and property.

Supervisory Signal. A signal indicating the need of action in connection with the supervision of guard's tours, sprinkler and other extinguishing systems or equipment, or the maintenance features of other protective systems.

Supplementary. As used in this standard, supplementary refers to equipment or operation not required by this standard and designated as such by the authority having jurisdiction.

Trouble Signal. An audible signal indicating trouble, such as a circuit break or ground, occurring in the wiring associated with a protective signaling system. The audible signal may be supplemented with a visible signal that gives a continuing indication of the trouble condition after the audible trouble signal is silenced.

Trunk Facility. That part of a signaling line circuit connecting two or more leg facilities to the central supervising station or satellite station.

Wireless Initiating Devices. Any initiating device that communicates with associated control/receiving equipment by some kind of wireless transmission medium.

Zone. A defined area within the protected premises. A zone may define an area from which a signal can be received, or an area to which a signal can be sent, or an area in which a form of control can be executed.

Chapter 2 System Fundamentals at the Protected Premises

2-1 Installation Requirements.

2-1.1 Systems. All systems shall be installed in a workmanlike manner and in accordance with applicable standards and with approved specifications.

(FROM 72A 2-5.1 and 72B 2-5.1)

(FROM 72C 2-5.1 MODIFIED and 72D 2-5.1 and 72F 2-1.1 MODIFIED)

2-1.2 Equipment. All devices, combinations of devices, appliances, and equipment installed in conformity with this standard shall be listed for the protective signaling purpose for which they are used.

2-1.3 Devices and Appliances. All devices and appliances shall be located and installed so that accidental operation will not be caused by vibration or jarring.

(FROM 72A 2-5.1.1 and 72B 2-5.2 MODIFIED)

(FROM 72C 2-5.2 MODIFIED and 72D 2-5.2 and 72F 2-1.2 MODIFIED)

2-1.4* Wiring. The installation of wiring and equipment shall be in accordance with NFPA 70, Article 760, Fire Protective Signaling Systems, and Article 770, Optical Fiber Cables, *National Electrical Code*,® where applicable.

(FROM 72A 2-5.3 and 72B 2-8 MODIFIED)

(FROM 72C 2-5.4 MODIFIED and 72D 2-5.4 MODIFIED and 72F 2-2.1 MODIFIED)

2-1.5 Grounding. All systems shall test free of grounds.

Exception: Parts of circuits or equipment that are intentionally and permanently grounded to provide ground-fault detection, noise suppression, emergency ground signaling, and circuit protection grounding.

(FROM 72A 2-5.2 and 72B 2-5.3)

(FROM 72C 2-5.3 and 72D 2-5.3 and 72F 2-1.3)

2-1.6 Protection of Control Equipment. When central control equipment is located in areas that are not continuously occupied, automatic fire detection shall be provided

at each central control equipment location to provide warning of fire at these locations.

(FROM 72A 2-16 and 72F 2-4.2.5)

2-2 Documentation.

2-2.1 Approval and Acceptance. The authority having jurisdiction shall be notified prior to installation or alteration of equipment or wiring. At its request, complete information regarding the system or system alterations, including specifications, wiring diagrams, and floor plans shall be submitted for approval.

(FROM 72A 2-2.1 and 72B 2-2.1)
(FROM 72C 2-2.1 and 72D 2-2.1)

2-2.2* Certificate of Compliance. A certificate (*see Figure 2-2.2*) shall be prepared for each system. Parts 1 and 3 through 9 shall be completed after the system is installed and the installation wiring has been checked. Part 2 shall be completed after the operational acceptance tests have been completed. A preliminary copy of the certificate shall be given to the system owner and, when requested, to other authorities having jurisdiction after completion of the installation wiring tests and a final copy after completion of the operational acceptance tests.

(FROM 72A 2-2.4 and 72B 2-2.6, 72C 2-2.4 and 72D 2-2.4)

2-2.3 Every system shall include the following documentation, which shall be delivered to the owner or a representative upon final acceptance of the system.

(a)* An owner's manual or manufacturer's installation instructions covering all system equipment.

(b) As-built drawings.

2-3 Performance and Limitations.

2-3.1 Voltage, Temperature, and Humidity Variation. Equipment shall be so designed that it shall be capable of performing its intended function under the following conditions:

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

(b) At ambient temperatures of 32° ± 4°F (0° ± 2°C) and 120° ± 4°F (49° ± 2°C), for a minimum duration at each extreme of 3 hours.

(c) At a relative humidity of 85 ± 5 percent and an ambient temperature of 90° ± 4°F (32° ± 2°C), for a duration of at least 24 hours.

(FROM 72A 2-2.2.1 and 72B 2-2.4.1 MODIFIED)
(FROM 72C 2-2.2.1 MODIFIED and 72D 2-2.2.1)

2-3.2 Initiating Devices.

2-3.2.1 Signal initiating devices may be of manual or automatic type, and shall be of such design as to minimize false alarms.

(FROM 72B 2-5.21 MODIFIED)

2-3.2.2 Stations of the manually operated type shall comply with Section 3-2.

(FROM 72B 2-5.22)

2-4 Signals and Signaling Appliances.

2-4.1 Presignal Feature. Where permitted by the authority having jurisdiction, systems may have a feature where initial fire alarm signals will sound only in department offices, control rooms, fire brigade stations, or other central locations and where human action is subsequently required to activate a general alarm, or a feature where the control equipment delays general alarm by more than one minute after the start of the alarm processing. Where there is a connection to a remote location it shall activate upon initial alarm signal.

NOTE: A system provided with an alarm verification feature as permitted by 3-3.3 is not considered a presignal system since the delay in signal produced is less than 60 seconds and requires no human intervention.

(FROM 72A, 2-5.1.2)

2-4.2 Zone of Origin. Protective signaling systems shall be permitted to identify the point or zone of origin of the signal by annunciation or coded signal.

(FROM 72A 1-1.4 MODIFIED)

2-4.3* Coded Alarm Signal. A coded alarm signal shall consist of not less than three complete rounds of the number transmitted and each round shall consist of not less than three impulses.

(FROM 72A 2-5.1.4 and 3-2.2.4 MODIFIED and 72B 2-5.7 and 72A 3-2.1.4)
(FROM 72C 3-3.1.4 and 72D 4-4.2 and 72D 3-3.1.4)

2-4.4 Coded Supervisory Signal. A coded supervisory signal is permitted to consist of two rounds of the number transmitted to indicate a supervisory off-normal condition, and one round of the number transmitted to indicate the restoration of the supervisory condition to normal.

(FROM 72A 2-5.1.4 MODIFIED)

2-4.5 Combined Coded Alarm and Supervisory Signal Circuits. Where both coded sprinkler supervisory signals and fire or coded waterflow alarm signals are transmitted over the same circuit, provision shall be made either to obtain alarm signal precedence or sufficient repetition of the alarm signal shall be provided, to prevent the loss of an alarm signal.

(FROM 72A 2-9.2 and 72D 4-5.3.4)

2-4.6 Visible Zone Alarm Indication. Where required by the authority having jurisdiction, the location of an operated initiating device shall be visually indicated by building, floor, fire zone, or other approved subdivision by annunciation, printout, or other approved means. The visual indication shall not be cancelled by the operation of an audible alarm silencing switch.

(FROM 72A 2-11)

Fire Alarm System Certification and Description

	Protected Property	System Installer	System Supplier	Service Organization
Name				
Address				
Representative				
Telephone				

Location of As Built Drawings:_____

Location of Owners' Manuals:_____

Location of Test Reports:_____

1. **Certification of System Installation:** (Fill out after installation is complete and wiring checked for opens, shorts, ground faults, and improper branching, but prior to conducting operational acceptance tests.)

   This system installation was inspected by _____ on _____ and found to comply with the installation requirements of:

   _____ Chapters 6, 7, 8, 9, and 10 of NFPA 72 and NFPA 72E (Circle any that apply)

   _____ Article 760 of NFPA 70, National Electrical Code®

   _____ NFPA 72H

   _____ Manufacturer's Instructions

   _____ Other (specify)_____

   Signed _____ **Date**_____

   Organization_____

2. **Certification of System Operation:**
   All operational features and functions of this system were tested by_____ on _____ and found to be operating properly in accordance with the requirements of:

   _____ Chapters 6, 7, 8, 9, and 10 of NFPA 72 and NFPA 72E

   _____ Job Specifications

   _____ NFPA 72H

   _____ Manufacturer's Instructions

   _____ Other (specify)

   Signed _____ **Date**_____

   Organization_____

   Test Witness for the Authority Having Jurisdiction_____

Figure 2-2.2 Certificate of Compliance.

3. Type(s) of System or Service:

_____ NFPA 72, Chapter 6 — Local. If alarm is transmitted to location(s) off premise, list where received:_____

_____ NFPA 72, Chapter 7 — Auxiliary. Indicate type of connection:
Local Energy, _____ Shunt, _____ Parallel Telephone.
Location and telephone number for receipt of signals:_____

_____ NFPA 72, Chapter 8 — Remote Station.
Alarm_____
Supervisory:_____

_____ NFPA 72, Chapter 9 — Proprietary. If alarms are retransmitted to Public Fire Service Communications Center or Central Station, indicate location and telephone number of the organization receiving alarm._____
Indicate how alarm is retransmitted_____

_____ NFPA 72, Chapter 10 - Emergency Voice/Alarm Service.
Quantity of voice/alarm channels:____ Single____ Multiple (specify)_____
Quantity of speakers installed: _____ Quantity of speaker zones:_____
Quantity of telephones or telephone jacks included in system:_____

4. Alarm Initiating Devices and Circuits:
Quantity and style (See NFPA 72, Table 2-6.1) of Initiating Device Circuits connected to system:
Quantity _____ , Style _____.
Types and quantities of alarm initiating devices installed:

_____ Manual Stations:	_____ Noncoded,	_____ Coded	Quantity:_____
_____ Smoke Detectors	_____ Ion,	_____ Photo.	Quantity:_____
_____ Duct Detectors:	_____ Ion,	_____ Photo.	Quantity:_____
_____ Sprinkler Water Flow Switches			Quantity:_____
_____ Other: (List) _____			Quantity:_____

5. Alarm Indicating Appliances and Circuits:
Quantity of indicating appliance circuits connected to system:_____
Types and quantities of alarm indicating appliances installed:

_____ Bells:	Size_____	Quantity:_____
_____ Horns:		Quantity:_____
_____ Chimes:		Quantity:_____
_____ Other:	(specify)_____	Quantity:_____
_____ Visible Signals	Type:_____	Quantity:_____

Indicate whether _____ combined with audible, or _____ mounted separately.

Figure 2-2.2 Certificate of Compliance.

6. Supervisory Signal Initiating Devices and Circuits:

Quantity and Style (see NFPA 72, Table 2-6.1) of supervisory circuits:

Quantity_____

Types and quantities of supervisory signal initiating devices installed:

_____ Sprinkler Control Valve — Quantity:_____

_____ Building Temperature — Quantity:_____

_____ Site Water Temperature — Quantity:_____

_____ Site Water Supply Level — Quantity:_____

Electric Fire Pump:

_____ Fire Pump Power — Quantity:_____

_____ Fire Pump Running — Quantity:_____

_____ Fire Pump Running — Quantity:_____

Engine Driven Fire Pump:

_____ Selector in Auto. Position — Quantity:_____

_____ Engine or Control Panel Trouble — Quantity:_____

_____ Fire Pump Running — Quantity:_____

Engine Driven Generator:

_____ Selector in Auto. Position — Quantity:_____

_____ Control Panel Trouble — Quantity:_____

_____ Transfer Switch — Quantity:_____

_____ Engine Running — Quantity:_____

Other Supervisory Function (specify):_____ — Quantity:_____

_____

_____

7. Signaling Line Circuits:

Quantity and Style (See NFPA 72, Table 2-7.1) of signaling line circuits connected to system:

Quantity _____, Style(s)_____

8. System Power Supplies

a. Primary (Main): Nominal Voltage:_____, Amps_____

Overcurrent Protection: Type _____, Amps_____

Location_____

b. Secondary (Standby):

_____ Storage Battery: Amp-Hr. Rating_____

Calculated capacity to operate system, in hours: _____ 24, _____ 60

_____ Engine-driven generator dedicated to fire alarm system:

Location of fuel storage:_____

c. Emergency or Standy System used as backup to Primary Power Supply, instead of using a Secondary Power Supply:

_____ Emergency System described in NFPA 70, Article 700.

_____ Legally Required Standby System described in NFPA 70, Article 701.

_____ Optional Standby System described in NFPA 70, Article 702, which also meets the performance requirements of Article 700 or 701.

Figure 2-2.2 Certificate of Compliance.

9. System Deviations from the Referenced NFPA Standards:

_____None

_____As Follows (describe fully)_____

Figure 2-2.2 Certificate of Compliance

2-4.6.1 The primary purpose of protective signaling system annunciation is to enable responding personnel to identify quickly and accurately the location of a fire and, secondly, where required or approved by the authority having jurisdiction, to indicate the status of emergency equipment or building systems that might affect the safety of occupants in a fire situation. All required annunciation means shall be readily accessible to responding personnel and shall be located, as required by the authority having jurisdiction, to facilitate an efficient response to the fire situation.

2-4.6.2 Fire alarms, supervisory signals, and trouble signals shall be distinctively and descriptively annunciated.

2-4.6.3 Where status indicators are required to be provided for emergency equipment or building systems, they shall be arranged to reflect accurately the actual status of the associated equipment or system.

2-4.7 Trouble Signals.

2-4.7.1 General. At the central control equipment and other location(s) determined by the authority having jurisdiction, trouble shall be indicated by distinctive audible signals. These trouble signals shall be distinctive from alarm signals. If an intermittent signal is used, it shall sound at least once every 10 seconds with a minimum time duration of one-half second. An audible trouble signal may be common to several supervised circuits. The trouble signal(s) shall be located in an area where it is likely to be heard, as designated by the authority having jurisdiction.

(FROM 72A 2-7.3.1 and 72B 2-12.1 MOD.)
(FROM 72D 4-3.1 MOD.)

2-4.7.2 Silencing Switch.

2-4.7.2.1 A switch for silencing the trouble signal sounding appliance shall be permitted only if it transfers the trouble indication to a lamp or other acceptable visible indicator adjacent to the switch. The visual indication shall persist until the trouble has been corrected. The audible trouble signal shall sound if the switch is in its "silence" position and no trouble exists.

(FROM 72A 2-7.3.2 and 72B 2-12.1.1)
(FROM 72D 4-3.2)

2-4.7.2.2 Where an audible supervisory signal is used to indicate a trouble condition, as permitted in 2-4.11(b), a trouble silencing switch shall not be permitted to prevent subsequent sounding of supervisory signals.

(FROM 72A 2-7.3.2.1)

2-4.8 Audible Indicating Appliances.

2-4.8.1* Audible indicating appliances employed in fire alarm systems for alarm, supervisory, and trouble signals include electro-mechanical appliances such as bells, horns, buzzers, chimes, sirens; integral electronic tone generating appliances (tone generator, amplifier, and speaker in a common housing); and speakers energized by a remote amplifier source. The suitability of the type of appliance to be employed for a particular application and its location shall be determined by the authority having jurisdiction.

(FROM 72A 2-8.1)

2-4.8.2 Audible indicating appliances shall be listed for fire protective signaling service.

(FROM 72A 2-8.2.1)

2-4.8.3 Audible indicating appliances shall be protected against the effects of temperature, vermin, corrosion, humidity, and physical damage.

(FROM 72A 2-8.2.2)

2-4.8.4 Additional Requirements for Speakers. Speakers employed in fire alarm systems for tone signals and/or emergency voice communications shall have a frequency response and power rating suitable for the application. Speaker materials that are subject to moisture absorption shall be suitably impregnated.

(FROM 72A 2-8.3)

2-4.9* Distribution of Evacuation Signals. Fire alarm systems provided for evacuation of occupants shall have one or more audible signaling appliances approved for the purpose on each floor of the building, so located that their operation will be heard clearly regardless of the maximum noise level obtained from machinery or other equipment under normal conditions of occupancy. Each section of a floor divided by a fire wall may be considered as a separate floor for the purpose of this protection.

(FROM 72A 2-8.4)

2-4.10 Distinctive Signals. Audible indicating appliances for a fire alarm system shall produce signals that are distinctive from other similar appliances used for other purposes in the same area. The distinction among signals shall be as follows:

(a)* Fire alarm signals shall be distinctive in sound from other signals and this sound shall not be used for any other purpose.

(b)* Supervisory signals shall be distinctive in sound from other signals and this sound shall not be used for any other purpose except that it may be employed to indicate a trouble condition. Where the same sound is used for both supervisory signals and trouble signals, distinction between signals shall be by other appropriate means such as annunciation.

(c) Fire alarm, supervisory, and trouble signals shall take precedence over all other signals.

Exception: Signals from hold-up alarms or other life threatening signals shall be permitted to take precedence over supervisory and trouble signals if acceptable to the authority having jurisdiction.

NOTE: For information on distinctive signals at remote stations and proprietary central supervising stations, see Chapters 8 and 9 respectively.

(FROM 72A 2-8.5, 72C 1-5 MODIFIED)

(72D 4-4 and 4-4.1)

2-4.11 Alarm Signal Silencing. A means for silencing the alarm signal sounding appliances shall be permitted only if it is key-operated, located within a locked cabinet, or arranged to provide equivalent protection against unauthorized use. Such a means shall be permitted only if visible zone alarm indication or equivalent has been provided as specified in 2-4.6, and subsequent alarms on other initiating device circuits will cause the audible alarm signaling appliances to resound. A means that is left in the "silence" position when there is no alarm shall operate trouble signals until the means is restored to normal. Where automatic alarm silencing is permitted by the authority having jurisdiction, the alarm shall not be silenced in less than 5 minutes unless otherwise permitted by the authority having jurisdiction.

(FROM 72A 2-8.6 MODIFIED)

2-4.12 Supervisory Signal Silencing Switch. A switch for silencing the supervisory signal sounding appliance(s) shall be permitted only if it is key-operated or located within a locked cabinet. Such a switch shall be permitted only if it transfers the supervisory indication to a lamp or other visual indicator, and subsequent supervisory signals in other zones will operate the supervisory signal indicating appliance. A switch left in the "silence" position when there is no supervisory off-normal signal shall operate a visual signal silence indicator and cause the trouble signal to sound until the switch is restored to normal.

(FROM 72A 2-8.7)

2-5 Testing and Maintenance.

2-5.1* Acceptance Tests. Upon completion of an installation or alterations, satisfactory tests of the entire system shall be made in the presence of a representative of the authority having jurisdiction. All functions of the system shall be tested, including operation of the system in various alarm and trouble modes for which it is designed (e.g., open circuit, grounded circuit, power outage, etc.).

(FROM 72A 2-2.3 and 72B 2-2.5)

(FROM 72C 2-2.3 and 72D 2-2.3)

2-5.2* Periodic Tests.

2-5.2.1 All systems shall be under the supervision of qualified persons. These persons shall cause proper tests and inspections to be made at prescribed intervals. The authority having jurisdiction shall be notified of such testing.

(FROM 72A 2-3 MODIFIED and 2-4.1 MODIFIED and 72B 2-3 MODIFIED)

(FROM 72C 2-3.1 MODIFIED and 72D 2-3.1 MODIFIED and 72F 2-6.1 MODIFIED)

2-5.2.2 Complete and satisfactory tests shall be made of all devices, and test results shall be made available to the authority having jurisdiction in accordance with the following:

(a) Monthly for all automatic fire detection systems (including circuit interfaces) or other systems and devices not covered by (b), (c), or (d) below.

(b)* Every two months or more frequently, subject to the authority having jurisdiction, for all circuit interfaces and waterflow actuated devices. For sprinkler waterflow alarm tests an actual waterflow, through the use of a test connection, shall be the method employed for testing the reliability of the sprinkler alarm unit as a whole.

(c)* Semiannually for gate valve supervisory switches, manual fire alarm boxes, combination guard tour and fire alarm boxes, tank water level devices, building and tank water supervisory devices, and other sprinkler system supervisory devices.

(d) Annually for alarm indicating appliances, annunciators, control units, and emergency voice/alarm communication systems.

(e) Inspection and tests of automatic fire detection devices shall be in accordance with NFPA 72E, *Standard on Automatic Fire Detectors.*

(FROM 72A 2-4.2 MODIFIED, 72B 2-4.1 MODIFIED, 72C 2-4.3 MODIFIED, and 72D 2-4.3)

2-5.2.3 If an engine-driven generator dedicated to the protective signaling system is used as a required power source, it shall be operated weekly under load by disconnecting the normal supply to the system for a minimum of one-half hour in a continuous period.

(FROM 72A 2-4.4, 72B 2-4.2, 72C 2-4.5, and 72D 2-4.5)

2-5.3* Waterflow Devices. A flow through the alarm test bypass connection shall be used for testing the waterflow alarm of a dry-pipe, pre-action, or deluge sprinkler system. For a wet pipe sprinkler system, the test connection at the extremity of the system shall be used.

(FROM 72A 2-4.3 and 72C 2-4.4 and 72D 2-4.4)

2-5.4 Maintenance. The owner shall provide for proper maintenance of the system. A maintenance agreement with specialists acceptable to the authority having jurisdiction may be used in lieu of developing staff specialists.

(FROM 72A 2-3.1 and 72B 2-3.1)

(FROM 72C 2-3.1.1 and 72D 2-3.1.1 and 72F 2-6.1.1)

2-5.5 Alterations. The authority having jurisdiction shall be consulted on all alterations and additions to the system under its supervision.

(FROM 72A 2-3 MODIFIED TITLE and 72B 2-3 MODIFIED)

(FROM 72C 2-3.1 MODIFIED TITLE and 72D 2-3.1 MODIFIED and 72F 2-6.1 MODIFIED)

2-5.6 Restoration. All apparatus shall be restored to normal as promptly as possible after each test or alarm, and kept in normal condition for operation. This shall include rewinding, resetting, or replacement of equipment as necessary.

(FROM 72A 2-4.5 and 2-5.1.5 and 72C 2-4.6 and 72D 2-4.6 and 72F 2-5.2)

2-5.7 Records. A complete record of the tests and operations of each system shall be kept for at least 2 years. The record shall be available for examination and, where required, reported to the authority having jurisdiction.

(FROM 72A 2-3 MOD., 2-4.6 MOD., 72B 2-4.1 MOD., 72C 2-4.7 and 72D 2-4.7)

2-6 Performance of Initiating Device Circuits.

2-6.1 The purpose of Table 2-6.1 is to identify the style of initiating device circuits based on their ability to indicate alarm and trouble.

(FROM 72A 2-12.1 and 72D 3-9.1)

2-6.2* Use of Table 2-6.1 is explained in Appendix A. (*See Section 2-7*).

(FROM 72A 2-12.2 and 72D 3-9.2)

2-6.3 Numbered initiating device groups listed in Table 2-6.1, Section E, shall not be combined on the same initiating device circuit.

Exception No. 1: When implementing 3-2.4, manual means and automatic means are permitted to be combined in the same initiating device circuit.

Exception No. 2: Where only one fire alarm box is required, it is permitted to be connected to the waterflow initiating device circuit.

(FROM 72D 3-9.3)

2-6.4 The loading of initiating device circuits shall not exceed those listed in Table 2-6.1.

(FROM 72D 3-9.4)

2-7 Performance of Signaling Line Circuits.

2-7.1 The purpose of Table 2-7.1 is to identify signaling line circuits based on their ability to indicate alarm and trouble.

(FROM 72A 2-13.1 and 72D 3-10.1)

2-7.2* Use of Table 2-7.1 is explained in Appendix A. (*See Section 2-6.*)

(FROM 72D 3-10.2, 72A 2-15.2)

2-7.3 When a redundant signaling line circuit, leg facility, or trunk facility is necessary to meet the performance requirements of Table 2-7.1, the integrity of this redundant circuit shall be monitored as specified in the table.

(FROM 72D 3-10.3)

Table 2-6.1 Performance and Capacities of Initiating Device Circuits (IDC)

X = Indication at Central Supervising Station

G = Systems with ground detection shall indicate system trouble with a single ground.

* = (See Appendix A)

Style	A			B			C			D			E		
	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition
Abnormal Condition															
A. Single Open		X			X			X			X	X		X	X
B. Single Ground		X			G	X		G	X		G	X		G	X
C. Wire-to-Wire Short	X			X				X		X				X	
D. Loss of Carrier (If Used)/Channel Interface								X						X	
The following sections apply only to systems installed in accordance with Chapter 9.															
E. Maximum Quantity per Initiating Device Circuit															
1. Fire Alarm															
(a) Manual Fire Alarm Boxes		2			5			5			25			25	
(b) Water Flow Alarm Devices		1			2			2			5			5	
(c) Discharge Alarm From Other Fire Suppression Systems		1			2			2			5			5	
(d) Automatic Fire Detectors		*			*			*			*			*	
2. Fire Supervisory															
(a) Sprinkler Supervisory Devices		2			4			4			20			20	
(b) Other Fire Suppression Supervisory Devices		2			4			4			20			20	
3. Guard's Tour		1			1			1			1			1	
4. Process, Security, and Other Devices in Combination with 1, 2, and 3 Above		0			0			0			0			0	
5. Process, Security, and Other Devices Not Combined with 1, 2, and 3 Above		5			10			10			20			20	
6. Buildings		1			1			1			1			1	
7. Intermediate Fire Alarm or Fire Supervisory Control Unit		1			1			1			1			1	
F. Maximum Quantity of Initiating Device Circuits per Circuit Interface Between IDC & SLC															
1. Per Limits of E above		10			10			10			10			10	
2. With Following Limitations Fulfilled		10			20			20			50			50	
(a) One Water Flow per IDC (b) Maximum of 4 Sprinkler Supervisory Devices (c) Maximum of 5 Process, Security, and Other Devices on a Separate IDC (d) Maximum of One Intermediate Fire Alarm or Fire Supervisory Control Unit per IDC															

Table 2-7.1 Performance and Capacities of Signaling Line Circuits (SI,C)

G = Systems with ground detection shall indicate system trouble with a single ground.

M = May be capable of alarm with wire-to-wire short.

X = Indication at Central Supervising Station

Style	0.5			1			2			3			3.5			4			4.5			5			6			7		
	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition	Alarm	Trouble	Alarm Receipt Capability During Abnormal Condition
Abnormal Condition	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A. Single Open		X			X			X	X		X			X			X			X	X		X	X		X	X		X	X
B. Single Ground		X			G	X		G	X		G	X		X			G	X		X			G	X		G	X		G	X
C. Wire-to-Wire Short									M		X			X			X			X			X			X			X	X
D. Wire-to-Wire Short & Open									M		X			X			X			X			X			X			X	
E. Wire-to-Wire Short & Ground								G	M		X			X			X			X			X			X			X	
F. Open and Ground								X	X		X			X			X			X			X			X	X		X	X
G. Loss of Carrier (If Used)/Channel Interface														X			X			X			X			X			X	

The following sections apply only to systems installed in accordance with Chapter 9.

Style	0.5	1	2	3	3.5	4	4.5	5	6	7
H. Maximum Quantity per Signaling Line Circuit										
1. Initiating Devices (All Types)	250	250	250	300	300	500	500	750	1000	1000
2. Buildings	25	25	25	50	50	75	75	75	100	100
I. Maximum Quantity per Central Supervising Station (CSS)										
1. Initiating Device Circuits	500	500	500	1000	1000	1000	1000	1500	2000	2000
2. IDC's with Redundant CSS Control Equipment*	1000	1000	1000	2000	2000	2000	2000	3000	unlimited	unlimited
3. Buildings	25	25	25	25	25	50	50	75	400	400
4. Buildings with Redundant CSS Control Equipment*	25	25	25	50	50	100	100	150	unlimited	unlimited
J. Maximum Quantity Using a Satellite Station										
1. Buildings per Signaling Line Circuit	25	25	25	25	25	50	50	75	75	100
2. Buildings per Signaling Line Circuit with Redundant Signaling Line	25	25	25	25	25	100	100	150	500	500

* When the central supervising station multiplex control unit is duplicated and a switchover can be accomplished in not more than 90 seconds with no loss of signal during this period, the capacity of the system is limited.

Chapter 3 Applications of Protective Signaling Systems

3-1 Scope. This chapter describes the various types of protective signaling systems, which may include one or more of the following features:

(a) Manual fire alarm.

(b) Automatic fire alarm.

(c) Automatic detection of alarm or abnormal conditions in extinguishing systems, such as sprinkler and carbon dioxide.

(d) Guard's tour supervisory service.

(e) Automatic detection of abnormal conditions in industrial processes that could result in fire or explosion endangering life or property.

(f) Use of all or part of a system for additional purposes, such as sounding of paging signals. Such systems shall be known as COMBINATION SYSTEMS.

(FROM 72A 1-1.3, MODIFIED)

3-2 Manual Fire Alarm System.

3-2.1 Manual fire alarm boxes shall be approved for the particular application and shall be used only for fire protective signaling purposes.

Exception: Combination fire alarm and guard's tour boxes are acceptable.

(FROM 72A 3-2.2.1 MOD., 72B 3-1.1.1 MOD., 72C 3-3.1.1 AND 72D 3-3.1.1, MOD.,)

3-2.2 Each box shall be securely mounted. The bottom of the box shall be not less than 3½ ft (1.1 m) and not more than 5 ft (1.4 m) above the floor level.

(FROM 72A 3-2.2.2, 72B 3-1.1.2, 72C 3-3.1.2 AND 72D 3-3.1.2)

3-2.3 Manual fire alarm boxes shall be distributed throughout the protected area so that they are unobstructed, readily accessible, and located in the normal path of exit from the area and as follows:

(a) At least one box shall be provided on each floor of the premise.

(b) Additional boxes shall be provided so that travel distance to the nearest box will not be in excess of 200 ft (61 m) horizontal distance on the same floor.

(FROM 72A 3-2.2.3, 72B 3-1.1.3, 72C 3-3.1.3 AND 72D 3-3.1.3, ALL MODIFIED)

3-2.4 For systems employing automatic fire detectors or waterflow detection devices, a manual fire alarm box shall be provided to initiate a fire alarm signal. This box shall be located where required by the authority having jurisdiction.

(FROM 72D 3-2 MODIFIED AND 72C 3-2 MODIFIED)

3-2.5 Where signals from manual fire alarm boxes and other fire alarm initiating devices within a building are transmitted over the same signaling circuit, there shall be no interference with the fire alarm box signals when both types of signaling devices are operated at or near the same time. Provision of the shunt noninterfering method of operation is acceptable for this performance.

(FROM 72D 4-5.3.3)

3-3 Automatic Fire Detection Systems.

3-3.1 Automatic fire detectors shall be located, maintained, and tested in accordance with NFPA 72E, *Standard on Automatic Fire Detectors.*

(FROM 72A 3-4.1.1 MODIFIED TITLE, 72B 3-2.1.2, 72C 3-4.1.1 AND 72D 3-5.1.1)

3-3.2 Automatic fire detectors that have integral trouble contacts shall be wired on the initiating device circuit so that a trouble condition on one detector will not impair the alarm operation from other initiating devices.

NOTE: Though a trouble signal is required when a plug-in detector is removed from its base, it is not considered as a trouble condition on the detector and the requirement of 3-3.2 does not apply.

(FROM 72A 3-4.1.2, 72B 3-2.1.3 MOD., 72C 3-4.1.2 MOD. AND 72D 3-5.1.2 MOD.)

3-3.3 Automatic fire detection and alarm systems equipped with alarm verification features shall be permitted where approved by the authority having jurisdiction provided that a smoke detector continuously subjected to smoke concentrations above alarm threshold magnitute will activate a system alarm within one (1) minute.

Exception: Alarm operation of an alarm initiating device other than a smoke detector shall cause a system alarm signal within 15 seconds.

(FROM 72A 3-4.1.3)

3-3.4 When individual fire detectors are used to control the operation of equipment as permitted by 2-4.2, this control capability shall remain operable even if all of the initiating devices connected to the same initiating circuit are in an alarm state.

(FROM 72A 3-4.1.4)

3-3.5 Systems that require the activation of two smoke detectors to produce the alarm response shall be permitted, providing:

1. They are not prohibited by the authority having jurisdiction, and

2. there are at least two detectors in each protected space, and

3. detector spacing is no more than one-half that determined by the application of NFPA 72E, *Standard on Automatic Fire Detectors*, Chapter 4, and

4. the alarm verification feature is not used.

3-3.6 Positive Alarm Sequence. Automatic fire detection and alarm systems having positive alarm features complying with the following shall be permitted.

3-3.6.1 The signal from a detector selected for the purpose shall be acknowledged at the control unit by trained personnel within 15 seconds of annunciation in order to initiate the alarm investigation phase. If the signal is not acknowledged in 15 seconds, all normal building and remote signals shall be activated automatically.

3-3.6.2 Trained personnel shall have up to 180 seconds during the alarm investigation phase to determine the fire condition and reset the system. If the system is not reset during this investigation phase, all normal building and remote signals shall immediately be activated automatically.

3-3.6.3 If a second selected automatic fire detector is actuated during the alarm investigation phase, all normal building and remote signals shall immediately be activated automatically.

3-3.6.4 If any other initiating device is actuated, all normal building and remote signals shall immediately be activated automatically.

3-3.6.5* The system shall provide means to bypass the positive alarm sequence.

3-3.7* Where a remote alarm indicator is provided for an automatic fire detector in a concealed location, the location of the detector, and the area protected by the detector, shall be prominently indicated either at the remote alarm indicator by a permanently attached placard or by other approved means.

3-4 Sprinkler System Waterflow Alarm and Supervisory Signal System.

(FROM 72A 3-5 MOD., 72C 3-5 AND 72D 3-6, MODIFIED)

3-4.1 Waterflow Alarm Systems.

3-4.1.1 The provisions of this section apply to sprinkler system signaling attachments for indicating the flow of water in the system.

(FROM 72A 3-5.1.1, 72B 3-3.1, 72C 3-5.1, AND 72D 3-6.1, ALL MODIFIED)

3-4.1.2* Provisions shall be made to indicate the flow of water in a sprinkler system by an alarm signal within 90 seconds after flow of water equal to or greater than that from a single sprinkler of the smallest orifice size installed in the system.

Exception: Movement of water due to waste, surges, or variable pressure need not be indicated.

(FROM 72A 3-5.3.1, 72B 3-3.2, 72C 3-5.3 AND 72D 3-6.3, MODIFIED)

3-4.1.3 For systems employing waterflow detection devices, a manual fire alarm box shall be provided to initiate a fire alarm signal. This box shall be located where required by the authority having jurisdiction.

3-4.1.4 A dry-pipe or preaction sprinkler system that is supplied with water by a connection above the alarm initiating device of a wet pipe system shall be equipped with a separate waterflow initiating pressure switch or other approved means to initiate a waterflow alarm.

3-4.2 Supervisory System.

3-4.2.1 General. The provisions of this section apply to sprinkler system signaling attachments for indicating the off-normal condition of a sprinkler system component, which may adversely affect the performance of the system.

(FROM 72A 3-5.1.1 MOD., 72C 3-5.1, 72D 3-6.1, MODIFIED)

3-4.2.2 Required Conditions. Provisions shall be made for supervising the required conditions that are essential for the proper operation of sprinkler systems, unless otherwise permitted by the authority having jursidiction.

Exception: Those conditions related to water mains, tanks, cisterns, reservoirs, and other containers of water controlled by a municipality or a public utility.

(FROM 72A 3-5.4.1 MODIFIED, 72C 3-5.4.1, 72D 3-6.4.1 MODIFIED)

3-4.2.3 Signal Identification. Signals transmitted shall indicate distinctively the particular function (such as valve position, temperature, pressure, etc.) of the automatic sprinkler system that is abnormal and its restoration to a normal condition.

Exception: Where permitted by the authority having jurisdiction, a single supervisory signal is acceptable provided that the particular element of the automatic sprinkler system that is abnormal is distinctively indicated at the protected premises.

(FROM 72A 3-5.2.2 MOD., 72C 3-5.4.2 MODIFIED AND 72D 3-6.4.2 MODIFIED)

3-4.2.4 Dry-Pipe Sprinkler Systems. A dry-pipe sprinkler system equipped for waterflow alarm signal shall provide supplementary supervision of the system air pressure to avoid false signals due to neglect in maintaining air pressure.

(FROM 72A 3-5.2.1)

3-4.2.5 Control Valves. A control valve shall be supervised to obtain a distinctive signal indicating movement of the valve from its normal position. The off-normal signal shall be obtained either during the first two revolutions of a hand wheel or when the stem of the valve has moved one-fifth of the distance from its normal position.

(a) Where the initiating device of two or more valves utilizes a common circuit, an off-normal signal shall remain until all of the valves of the group are in their normal positions.

(b) An initiating device for supervising the position of a gate valve shall not interfere with the operation of the valve nor obstruct the view of its indicator nor prevent access to its stuffing box.

(c) The off-normal signal shall not be restored at any valve position except normal.

NOTE: Cancellation of the off-normal signal is acceptable as the restoration signal except where separate recording and indication of all changes of state is a specific requirement (*see Section 9-8*).

(FROM 72A 3-5.4.2, 72C 3-5.4.3, 72D 3-6.4.3 MODIFIED)

3-4.2.6 Pressure Sources. Pressure sources shall be supervised to obtain a distinctive signal indicating that the required pressure is abnormal.

(a) A pressure supervisory initiating device for a pressure tank shall detect both high and low pressure conditions. A signal shall be obtained when the pressure is increased or decreased 10 psi (69 kPa) from the required pressure value.

(b)* A pressure supervisory initiating device for a dry-pipe sprinkler system shall detect both high and low pressure conditions. A signal shall be obtained when the required pressure is increased or decreased in accordance with the requirements of the authority having jurisdiction.

(c) A steam pressure supervisory initiating device shall detect a low pressure condition. A signal shall be obtained when the normal pressure is reduced to a value that is not less than 110 percent of the minimum operating pressure of the steam operated equipment supplied.

(d) An initiating device for supervising the pressure of sources other than those specified above shall be capable of being applied and operated as required by the authority having jurisdiction.

(FROM 72A 3-5.4.3, 72C 3-5.4.4, AND 72D 3-6.4.4)

3-4.2.7 Water Level. Water storage containers shall be supervised to obtain a distinctive signal indicating that the required water level is abnormal (high or low).

(a) A pressure tank supervisory initiating device shall detect both abnormally high and low level conditions. A signal shall be obtained when the water level is lowered or raised 3 in. (76 mm) from the required level.

(b) A supervisory initiating device for other than pressure tanks shall detect a low level condition. A signal shall be obtained when the water level is lowered 12 in. (300 mm) from the required level.

(FROM 72A 3-5.4.4, 72C 3-5.4.5, AND 72D 3-6.4.5)

3-4.2.8 Water Temperature. Water storage containers shall be supervised to obtain a distinctive signal indicating that the temperature of the water has been lowered to 40°F (4°C).

(FROM 72A 3-5.4.5, 72C 3-5.4.6, AND 72D 3-6.4.6)

3-4.2.9 Fire Pumps. Fire pumps shall be supervised in accordance with the requirements of NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps*, and the authority having jurisdiction. Where both sprinkler supervisory signals and pump running signals are transmitted over the same signaling circuits, provisions shall be made to obtain pump running signal preference unless the circuit is so arranged that no signals shall be lost.

(72A 3-5.4.6, 72C 3-5.4.7, AND 72D 3-6.4.7)

3-4.3 Tampering.

3-4.3.1 Sprinkler system waterflow alarm and supervisory initiating devices and their circuits shall be so designed and installed that they cannot be readily tampered with, opened, or removed from connection to the components of the sprinkler system, without initiating a signal. This provision specifically includes junction boxes that have been installed on the outside of buildings to facilitate access to the initiating device circuit.

(FROM 72A 3-5.2.3, 72C 3-5.2 MOD, 72D 3-6.2.1 MOD)

3-4.3.2* If a valve is installed in the connection between a signal attachment and the extinguishing system to which it is attached, such a valve shall be supervised in accordance with the requirements of 3-4.2.5.

3-5 Guard's Tour Supervisory System.

3-5.1 General.

3-5.1.1 The number of guard's reporting stations, their locations, and the route to be followed by the guard for operating the stations shall be approved for the particular installation in accordance with NFPA 601, *Standard for Guard Service in Fire Loss Prevention*, and with NFPA 602, *Standard for Guard Operations in Fire Loss Prevention*.

(FROM 72A 3-3.1.1, 72D 3-4.1.1)

3-5.1.2 Connections to guard's tour supervisory signal circuit or to a combination manual fire alarm and guard tour signal circuit shall be so limited that not more than 60 scheduled signals will be transmitted in any one-hour period. Patrol scheduling shall be such as to avoid interference between guard's tour signals.

(FROM 72A 2-9.3 MODIFIED)

3-5.1.3 A permanent record indicating every time each signal-transmitting station is operated shall be made at the main control unit. When intermediate stations that do not transmit a signal are employed in conjunction with signal-transmitting stations, distinctive signals shall be transmitted at the beginning and end of each tour of a guard and a signal-transmitting station shall be provided at intervals not exceeding ten stations. Intermediate stations that do not transmit a signal shall be capable of operation only in a fixed order of succession.

(FROM 72A 3-3.1.2, 72D 3-4.1.2 MODIFIED)

3-5.2 Suppressed (Exception Reporting) Signal System.

(FROM 72A 3-3.2 MODIFIED TITLE, 72D 3-4.2 MODIFIED)

3-5.2.1 The system shall comply with the provisions of 3-5.1.1.

(FROM 72A 3-3.2.1, 72D 3-4.2.1)

3-5.2.2 The system shall transmit a "start" signal to the main control unit and shall be initiated by the guard at the start of continuous tour rounds.

(FROM 72A 3-3.2.2, 72D 3-4.2.2 MODIFIED)

3-5.2.3 The system shall automatically transmit a "delinquency" signal within 15 minutes after a predetermined time if the guard fails to actuate tour stations as scheduled.

(FROM 72A 3-3.2.3, 72D 3-4.2.3)

3-5.2.4 A "finish" signal shall be transmitted within a predetermined schedule after the guard completes the last tour of the premises.

(FROM 72A 3-3.2.4, 72D 3-4.2.4)

3-5.2.5 For periods of over 24 hours, during which tours are continuously conducted, a "start" signal shall be transmitted at least once every 24 hours.

(FROM 72A 3-3.2.5, 72D 3-4.2.5)

3-5.2.6 The "start," "delinquency," and "finish" signals shall be recorded at the main control unit.

(FROM 72A 3-3.2.6, 72D 3-4.2.6 MODIFIED)

3-5.2.7 Intermediate stations that do not transmit a signal shall be capable of operation only in a fixed order of succession.

3-6 Combination Systems.

(FROM 72A 2-10)

3-6.1* General. Fire protective signaling systems shall be permitted to share components, equipment, circuitry, and installation wiring with nonfire protective signaling systems.

(FROM 72A 2-10.1 MODIFIED TITLE)

3-6.2 Wiring Common to Both Types of System. When common wiring is employed for combination systems, the equipment for other than fire protective signaling system use shall be connected to the common wiring of the system in such a manner that short circuits or open circuits or grounds in this equipment or between this equipment and the fire protective signaling system wiring will not interfere with the supervision of the fire system or prevent alarm or supervisory signal transmissions.

(FROM 72A 2-10.2 and 72F 3-6.1 MOD.)

3-6.3 Integrity of Fire Protective Signaling System Functions. The removal, replacement, failure, or maintenance procedure on any hardware, software, or circuit not required to perform any of the fire protective signaling system functions shall not cause loss of any of these functions.

3-6.4 Use of Speakers. Speakers shall be permitted to provide the audible alarm signal for local fire alarm or sprinkler alarm systems. They shall be used for emergency voice/alarm communication systems and other emergency puposes only, unless other uses are approved by the authority having jurisdiction.

Exception: Where the fire command station is constantly attended by a trained operator, selective paging is permitted.

(FROM 72A 2-10.3 and 72F 3-6.2)

3-6.5 Operation. In combination systems, the operation shall be as follows:

(a) A fire alarm signal shall be clearly recognizable and take precedence over any other signal even when a nonfire alarm signal is initiated first.

(b) Distinctive alarm signals shall be obtained between fire alarm and other functions, such as burglar alarm.

(FROM 72A 2-10.4 and 72F 3-6.3)

3-7 Ancillary Alarm Functions.

3-7.1 Local Control Functions — General. Local control functions necessary to make the premises safer in the event of fire, or to make it possible to hear fire alarm signals, may be automatically performed. The performance of automatic control functions shall not interfere with power for lighting or for operating elevators. This does not preclude the combination of fire protective signaling services with other services requiring monitoring of operations.

(FROM 72A 2-5.1.3)

3-7.2 Extinguishing System Actuation.

3-7.2.1 The integrity of each extinguishing system actuating device and its circuit shall be monitored in accordance with 4-2.1.

3-7.2.2 In calculating the size of the secondary power supply, the total system supervisory and alarm loads shall be used.

3-7.3 Elevator Recall for Fire Fighters' Service.

3-7.3.1 System-type smoke detectors located in elevator lobbies and elevator machine rooms, which are used to initiate fire fighters' service recall, shall be connected to the building fire protective signaling system. Unless otherwise required by the authority having jurisdiction, only the elevator lobby and the elevator machine room smoke detectors shall be used to recall elevators for fire fighters' service.

(FROM 72A 2-10.5)

3-7.3.2 Each elevator lobby and elevator machine room smoke detector shall be capable of initiating elevator recall

when all other devices on the same initiating device circuit have been manually or automatically placed in the alarm condition.

(FROM 72A 2-10.5.1)

3-7.3.3 When actuated, each elevator lobby and elevator machine room smoke detector shall initiate an alarm condition on the building fire protective signaling system and shall visibly indicate, at the control panel and required remote annunciators, the alarm initiation circuit or zone from which the alarm originated.

(FROM 72A 2-10.5.2)

3-7.3.4* All elevator lobby and elevator machine room smoke detectors shall be acceptance and periodically tested in accordance with the requirements of NFPA 72E, *Automatic Fire Detectors*. See A-3-7.3.4 also.

(FROM 72A 2-10.5.3)

3-7.3.5 For each group of elevators within a building, two elevator zone circuits shall be terminated at the designated elevator controller within the group's elevator machine room(s). The operation of the elevators shall be in accordance with ANSI/ASME A17.1, *Safety Code for Elevators and Escalators*, Rules 211.3 through 211.8. The smoke detectors shall be connected to the two elevator zones as follows:

(a)* The smoke detector located in the designated elevator recall lobby shall be connected to the first elevator zone.

(b)* The smoke detectors in the remaining elevator lobbies and the elevator machine room shall be connected to the second elevator zone.

(FROM 72A 2-10.5.4)

Chapter 4 System Response to Fault Conditions

4-1 Scope. This chapter describes the monitoring integrity requirements of system installation conductors and the system functional requirements to a fault condition on these conductors.

(NEW)

4-2 Monitoring Integrity of Installation Conductors.

4-2.1 All means of interconnecting equipment, devices, and appliances shall be monitored for the integrity of the interconnecting conductors or equivalent so that the occurrence of a single open or a single ground trouble condition in the installation conductors and their restoration to normal shall be automatically transmitted to and indicated at a location acceptable to the authority having jurisdiction.

(FROM 72A 2-7.1, 2-7.1.4, , 72B 2-10.1, 2-10.2, 72C 2-7.1, 2-7.2, 72D 2-7.1, 2-7.2, 72F 2-4.1.1 ALL MODIFIED)

NOTE: The provisions of a double loop or other multiple path conductor or circuit to avoid electrical monitoring is not acceptable.

Exception No. 1: Styles of initiating device circuits, signaling line circuits, and indicating appliance circuits tabulated on Tables 2-6.1, 2-7.1, and 6-4 that do not have an "X" under "Trouble" for the abnormal condition indicated.

Exception No. 2: Shorts between conductors, except as required by Tables 2-6.1, 2-7.1, and 6-4, are not contemplated by this standard.

Exception No. 3: Interconnection to power for a trouble signal.

Exception No. 4: Interconnection to secondary (standby) power supply, provided that, when a battery is used, it is in the same enclosure as the equipment it serves or that the battery leads are installed in conduit or equivalently protected against mechanical injury.

Exception No. 5: Connections to and between supplementary system components, providing that abnormal conditions of the supplementary equipment and/or interconnecting circuits do not affect the required operation of the protective signaling system.

Exception No. 6: The neutral of a three-wire ac source.

Exception No. 7: A noninterfering shunt circuit, provided that a fault condition on the shunt circuit wiring results only in the loss of the noninterfering feature of operation.

Exception No. 8: The circuit of an alarm indicating appliance installed in the same room with the central control equipment provided that the indicating appliance circuit conductors are installed in conduit, or equivalently protected against mechanical injury.

Exception No. 9: A trouble signal circuit.

Exception No. 10: Interconnection between equipment within a common enclosure subject to the authority having jurisdiction.

NOTE: This standard does not have jurisdiction of monitoring integrity of conductors within equipment, devices, or appliances.

Exception No. 11: Interconnection between enclosures containing control equipment located within 20 ft (6 m) where the conductors are installed in conduit or equivalently protected against mechanical injury.

Exception No. 12: Conductors for ground detection, where a single ground does not prevent the required normal operation of the system.

(FROM 72A 2-7.1, 72C 2-7, 72D 2-7, 72B 2-10 ALL MODIFIED)

4-2.2 Interconnection means shall be arranged so that a single break or single ground fault will not cause an alarm signal.

(FROM 72C 2-7.1.2, 72B 2-10.3, and 72D 2-7.3, 72F 2-4.1.3)

4-2.3 An open, ground, or short circuit fault on the installation conductors of one alarm indicating circuit shall not affect the operation of any other alarm indicating circuit.

(FROM 72A 2-5.4 and 72C 2-5.5, 72F 2-2.2)

4-3 Monitoring Integrity of Installation Wiring Connections. Connections of installation wiring to alarm initiating devices and alarm indicating appliances shall be monitored for integrity.

(FROM 72A 2-7.1.1, 72B 2-10.2, 72C 2-7.2, and 72D 2-7.2, 72F 2-4.1.2)

4-4 Monitoring Integrity of Speaker Amplifier and Tone Generating Equipment. When speakers are used to produce audible fire alarm signals, the following shall apply:

(a) Failure of the audio amplifier shall result in an audible trouble signal.

(b) Failure of the tone generating equipment shall result in an audible trouble signal.

Exception: Tone generating and amplifying equipment enclosed as integral parts, and serving only a single listed loudspeaker, need not be monitored.

(FROM 72A 2-7.1.3 MODIFIED)

4-5 Monitoring Integrity of Power Supplies.

(FROM 72C 2-8, 72B 2-11, and 72D 2-8 MODIFIED)

4-5.1 All primary power supplies shall be monitored for integrity to the point of connection at the equipment.

Exception: Primary (main) power for supplementary equipment.

(FROM 72A 2-7.1.5.1 MOD, 72B 2-11.1, 72C 2-8.1, and 72D 2-8.1)

4-5.2 All primary power supplies shall be monitored for integrity to the point of connections of battery chargers.

(FROM 72A 2-7.1.5.2, 72B 2-11.1, 72C 2-8.2, and 72D 2-8.2)

Chapter 5 System Power Supplies

5-1 Scope. The provisions of this chapter apply to power sources that shall be used, subject to acceptance by the authority having jurisdiction.

(FROM 72A 2-6.1 AND 72B 2-9.1 MOD, 72F 2-3.1 MOD)

(FROM 72C 2-6.1 MOD AND 72D 2-6.1 MOD)

5-2 Code Conformance. All power supplies shall be installed in conformity with the requirements of NFPA 70, *National Electrical Code*, for such equipment, except as otherwise indicated in this section.

(FROM 72B 2-9.3.1)

5-3 Power Sources.

5-3.1 Three sources of electrical power shall be provided. These shall consist of a primary (main) supply, a secondary (standby) supply, and a trouble supply.

Exception No. 1: When the primary power is supplied by a dedicated branch circuit of an Emergency System in accordance with NFPA 70, National Electrical Code, Article 700, or a Legally Required Standby System in accordance with NFPA 70, National Electrical Code, Article 701, a secondary supply is not required.

Exception No. 2: When the primary power is supplied by a dedicated branch circuit of an Optional Standby System in accordance with NFPA 70, National Electrical Code, Article 702, which also meets the performance requirements of Article 700 or Article 701, a secondary supply is not required.

NOTE to Exception No. 1 and 2: A trouble signal is not required to indicate that the primary power is being supplied by either of the two secondary sources of power indicated above if they provide the hours of operation required by 5-3.3 and loss of primary power is otherwise indicated (e.g., by loss of building lighting).

(FROM 72A 2-6.2 MOD, 72B 2-9.3.2 MOD, 72C 2-6.2.1 MOD, 72D 2-6.2.1 MOD, 72F 2-3.2 MOD)

5-3.2 Primary Power Supply. The primary supply shall have a high degree of reliability, adequate capacity for the intended service, and shall consist of one of the following:

(a) Light and power service arranged in accordance with Section 5-4.

(b) Engine-driven generator or equivalent arranged in accordance with Section 5-5.

(FROM 72B 2-9.3.3 AND 72A 2-6.3 MOD AND 72A 2-6.3.1 MOD)

(FROM 72C 2-6.2.2 AND 72D 2-6.2.2 AND 72F 2-3.2.1 AND 2-3.3)

5-3.3 Secondary Supply Capacity and Sources. The secondary supply shall automatically supply the energy to the system within 30 seconds whenever the primary supply is incapable of providing the minimum voltage required for proper operation. The secondary (standby) power supply shall supply energy to the system in the event of total failure of the primary (main) power supply or when the primary voltage drops to a level insufficient to maintain functionality of the control equipment and system components. Under maximum normal load, the secondary supply shall have sufficient capacity to operate a local or proprietary system for 24 hours or an auxiliary or remote station system for 60 hours; and then, at the end of that period, operate all alarm indicating appliances used for evacuation or to direct aid to the location of an emergency for 5 minutes. The secondary supply shall consist of one of the following:

(a) A storage battery arranged in accordance with Section 5-5.

(b) An engine-driven generator arranged in accordance with Section 5-6 and storage batteries with 4 hours capacity arranged in accordance with Section 5-5.

(c) Multiple engine-driven generators, one of which is arranged for automatic starting, arranged in accordance with Section 5-6, capable of supplying the energy required herein, with the largest generator out of service. It shall be permitted for the second generator to be pushbutton start.

(FROM 72A 2-6.4 AND 72B 2-9.3.4)

(FROM 72C 2-6.2.3, AND 72D 2-6.2.3 MOD.)

(FROM 72F 2-3.2.2 MOD.)

NOTE: For emergency voice/alarm communications systems also see Section 10-3.5.

5-3.4 Trouble Power Supply. A separate power supply, independent of the primary supply, shall be provided for the operation of trouble signals when the primary supply fails. A primary battery (dry cell) shall not be used to power the trouble signals.

Exception: The secondary supply of 5-3.3 (a), (b), or (c) may be used for this purpose.

(FROM 72A 2-6.5 AND 72B 2-9.3.5 MOD.)

(FROM 72C 2-6.2.4 MOD., AND 72D 2-6.2.4, 72F 2-3.2.3 MOD.)

5-3.5 Power Supply for Remotely Located Control Equipment. Additional power supplies, when provided for control units, circuit interfaces, or other equipment essential to system operation, located remote from the main control unit, shall be comprised of a primary, secondary, and a trouble power supply that shall meet the same requirements as for Section 5-1 through 5-3.4.

(FROM 72A 2-6.6 MOD., AND 72B 2-9.4)

(FROM 72C 2-6.3 MOD., AND 72D 2-6.3 MOD, 72F 2-3.2.4)

(FROM 72B 2-9.8)

5-4 Light and Power Service.

5-4.1 A light and power service employed to operate the system under normal conditions shall have a high degree of reliability and capacity for the intended service. This service shall consist of one of the following:

(a) *Two-Wire Supplies:* A two-wire supply circuit may be used for either the primary operating power supply or the trouble signal power supply of the signaling system.

(b) *Three-Wire Supplies:* A three-wire ac or dc supply circuit having a continuous unfused neutral conductor, or a polyphase ac supply circuit having a continuous unfused neutral conductor where interruption of one phase does not prevent operation of the other phase, may be used with one side or phase for the primary operating power supply and the other side or phase for the trouble signal power supply of the signaling system.

(FROM 72A 2-6.7.1 MOD., AND 72B 2-9.5.1 MOD.)

(FROM 72C 2-6.4.1 MOD., AND 72D 2-6.4.1 MOD.)

5-4.2 Connections to the light and power service shall be on a dedicated branch circuit. The circuit and connections shall be mechanically protected. The circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked FIRE ALARM CIRCUIT CONTROL.

(FROM 72A 2-6.7.2 AND 72B 2-9.5.2)

(FROM 72C 2-6.4.2 AND 72D 2-6.4.2, AND 72F 2-3.3.1)

5-4.3 Circuit breakers or engine stops shall not be installed in such a manner as to cut off the power for lighting or for operating elevators.

(FROM 72B 2-5.5)

5-5 Storage Batteries.

5-5.1 Adequate facilities shall be provided to automatically maintain the battery fully charged under all conditions of normal operation. After the fully charged battery is subjected to a single discharge cycle as specified in 5-3.3, the charging current shall be such that the battery capacity after 48 hours complies with the requirements of 5-3.3. Upon attaining a fully charged condition, the trickle charge rate shall not be so excessive as to result in battery damage.

(FROM 72A 2-6.9.1 AND 72B 2-9.7.1 MOD.)

(FROM 72C 2-6.6.1 MOD., AND 72D 2-6.6.1 MOD., 72F 2-3.5)

5-5.2 Location. Storage batteries shall be so located that the signaling system equipment, including overcurrent devices, are not adversely affected by battery gases, and shall conform to the requirements of Article 480, NFPA 70, *National Electrical Code*.

(FROM 72A 2-6.9.2 MOD., AND 72B 2-9.7.2 MOD.)

(FROM 72C 2-6.6.2 MOD., AND 72D 2-6.6.2 MOD., 72F 2-3.5.1)

5-5.3 The method of charging a battery shall provide either integral meters or readily accessible terminal facilities for the connection of portable meters by which the battery voltage and charging current can be determined.

(FROM 72A 2-6.9.3 AND 72B 2-9.7.3)

(FROM 72C 2-6.6.3 AND 72D 2-6.6.3 AND 72F 2-3.5.2)

5-5.4 The battery shall be protected by overcurrent devices having a rating of not less than 150 percent and not more than 200 percent of the maximum operating load applied to the battery.

(FROM 72B 2-9.7.4)

5-6 Engine-Driven Generator.

5-6.1 An engine-driven generator shall be used only where a person specifically trained in its operation is on duty at all times.

Exception: Where acceptable to the authority having jurisdiction and where the requirements of 5-3.3(b) and (c) are met, a person specifically trained in the operation of a generator dedicated to the protective signaling system shall not be required to be on duty at all times.

(FROM 72A 2-6.8.1 MODIFIED and 72B 2-9.6.1)

(FROM 72C 2-6.5.1 and 72D 2-6.5.1, 72F 2-3.4.1)

5-6.2 The installation of such units shall conform to the provisions of NFPA 110, *Standard for Emergency and Standby Power Systems*, except as restricted by the provisions of this section.

(FROM 72A 2-3.8.2 and 72B 2-9.6.2)

(FROM 72C 2-6.5.2 and 72D 2-6.5.2)

5-6.3 Where gasoline is used as main fuel, it shall be stored in outside underground tanks whenever possible and gravity tanks shall not be used.

(FROM 72A 2-6.8.3 and 72B 2-9.6.3)

(FROM 72C 2-6.5.3 and 72D 2-6.5.3 and 72F 2-3.4.3)

5-6.4 Sufficient fuel shall be available in storage for 6 months of testing plus the capacity specified in 5-3.2.1.

Exception No. 1: If a reliable source of supply is available at any time on 2-hour notice, sufficient fuel shall be in storage for 12 hours of operation at full load.

Exception No. 2: 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-58.1-1982, Building Code Requirements for Minimum Design Loads in Buildings and Other Structures.

(FROM 72A 2-6.8.4 and 72B 2-9.6.4)

(FROM 72C 2-6.5.4 and 72D 2-6.5.4 and 72F 2-3.4.4)

5-6.5 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.

(FROM 72A 2-6.8.5 and 72B 2-9.6.5)

(FROM 72C 2-6.5.5 and 72D 2-6.5.5 and 72F 2-3.4.5)

Chapter 6 Local Protective Signaling Systems

Notice: The requirements of Chapters 1 through 5 of this standard shall apply to local protective signaling systems except where they conflict with the requirements of this chapter.

6-1 General. The requirements of this chapter apply to systems providing fire alarm or supervisory signals within the protected premises. These systems are primarily for the protection of life by indicating the necessity for evacuation of a building or fire area and, secondarily, for the protection of property.

(FROM 72A 1-1.1 MOD)

6-2 Capacity of Circuits.

6-2.1 The number of coded transmitting devices connected to any circuit shall be limited to avoid interference. The total number of coded wheels connected to a single circuit shall not exceed 256.

(FROM 72A 2-9.1.1)

6-2.2 The number of waterflow switches that may be connected to actuate a single transmitter shall not exceed five.

(FROM 72A 2-9.1.2 MOD.)

6-2.3 The number of supervisory switches that may be connected to actuate a single transmitter shall not exceed 20.

(FROM 72A 2-9.1.2 MOD.)

6-3 Trouble Signals. Trouble signals required in Section 4-2, and their restoration to normal, shall be automatically indicated at the central control equipment within 200 seconds.

(FROM 72A 2-7.1 MOD.)

6-4 Performance of Indicating Appliance Circuits. The purpose of Table 6-4 is to identify the style of indicating appliance circuits based on their ability to indicate alarm and trouble conditions during specified abnormal conditions.

(FROM 72A 2-14.1)

Table 6-4 Performance and Capabilities of Indicating Appliance Circuits (IAC)

Style	W		X		Y		Z	
G = Systems with ground detection shall indicate system trouble with a single ground. X = Indication at protected premises. Note: 1. Operates only up to location of fault.	Trouble Indication at Protected Premises	Alarm Capability During Abnormal Condition	Trouble Indication at Protected Premises	Alarm Capability During Abnormal Condition	Trouble Indication at Protected Premises	Alarm Capability During Abnormal Condition	Trouble Indication at Protected Premises	Alarm Capability During Abnormal Condition
Single Open	X	1	X	X	X	1	X	X
Single Ground	X		X		G	X	G	X
Wire to Wire Short	X		X		X		X	

(Table 2-14.1 from 72A)

6-5 Special Requirements for Low Power Wireless.

6-5.1 For wireless systems, compliance with this standard shall require the use of equipment specifically listed for the purpose.

NOTE: Applicable standards include: UL 268, *Smoke Detectors for Protective Signaling Systems*, and UL 864, *Control Units for Fire Protective Signaling Systems*.

(FROM 72A 2-2.2 MODIFIED and 72B 2-2.4 MODIFIED)

(FROM 72C 2-2.2 MODIFIED and 72D 2-2.2 MODIFIED)

6-5.2 Use of Primary Battery. A primary battery (dry cell) shall be permitted to be used as the sole power source of a low power (as defined in 47, *Code of Federal Regulations*, CFR, Part 15) wireless initiating device transmitter where all of the following conditions are met:

(a) Each transmitter shall serve only one device and shall be individually identified at the receiver/control unit.

(b) The battery shall be capable of operating the wireless initiating device transmitter for not less than one year before the battery depletion threshold is reached.

(c) A battery depletion signal shall be transmitted before the battery has been depleted to a level insufficient to support alarm transmission after seven additional days of normal operation. This signal shall be distinctive from alarm, supervisory, tamper, and trouble signals; shall visibly identify the affected initiating device transmitter; and, if silenced, shall automatically resound at least once every four hours.

(d) Catastrophic (open or short) battery failure shall cause a trouble signal identifying the affected initiating device transmitter at its receiver/control unit. If silenced, the trouble signal shall automatically resound at least once every four hours.

(e) Any mode of failure of a primary battery in an initiating device transmitter shall not affect any other initiating device transmitter.

(FROM 72A 2-6.10.1)

6-5.3 Alarm Signals.

6-5.3.1 When operated, each wireless initiating device transmitter shall automatically transmit an alarm signal.

NOTE: This requirement is not intended to preclude the inclusion of verification and local test intervals prior to alarm transmission.

(FROM 72A 2-15.1)

6-5.3.2 Each wireless initiating device in alarm shall automatically repeat alarm transmission at intervals not exceeding 60 seconds until the initiating device is returned to its normal condition.

(FROM 72A 2-15.2)

6-5.3.3 Signals indicative of alarms of fire shall have priority over all other signals.

(FROM 72A 2-15.3)

6-5.3.4 The system shall be arranged to respond with minimum delay to an alarm signal from a wireless initiating device transmitter. The maximum allowable response delay from the first alarm transmission to receipt and display by the receiver/control unit shall be 90 seconds.

(FROM 72A 2-15.4)

6-5.3.5 An alarm signal from a wireless initiating device shall latch at its receiver/control unit until manually reset and shall identify the particular wireless initiating device in alarm.

(FROM 72A 2-15.5)

6-5.4 Supervision.

6-5.4.1 The low power wireless transmitting devices shall be specifically listed as using a transmission method that is highly resistant to misinterpretation of simultaneous transmissions and to interference (e.g., impulse noise and adjacent channel interference).

NOTE: Acceptable standards for testing transmission performance are UL 985, *Household Fire Warning System Units*, Third Edition, requirements, January 3, 1986, and UL 1023, *Household Burglar-Alarm System Units*, Fourth Edition, requirements, April 7, 1986.

(FROM 72A 2-7.2.1)

6-5.4.2 The occurrence of any single fault that disables transmission between any wireless initiating device(s) and the receiver/control unit shall cause a trouble signal within 200 seconds.

Exception: Where Federal Communications Commission (FCC) regulations prevent meeting the 200-second requirement, the time period for a transmitter with only a single alarm initiating device connected may be increased to four times the minimum time interval permitted for a one second transmission up to:

(a) 4 hours maximum for a transmitter serving a single initiating device.

(b) 4 hours maximum for a repeater if disabling of the repeater or its transmission does not prevent the receipt of signals at the control unit from any initiating device transmitter.

6-5.4.3 A single fault on the signaling channel shall not cause an alarm signal.

(FROM 72A 2-7.2.3)

6-5.4.4 The normal periodic transmission from a wireless initiating device shall, by transmitting at a reduced power level or by other means, provide additional assurance of successful alarm transmission capability.

(FROM 72A 2-7.2.4)

6-5.4.5 Removal of a wireless initiating device from its installed location shall cause immediate transmission of a distinctive supervisory signal indicating its removal and individually identifying the affected device.

(FROM 72A 2-7.2.5)

6-5.4.6 Reception of any unwanted (interfering) transmission by a retransmission device (repeater), or by the main control unit, for a continuous period of 20 seconds or more, shall cause an audible and visible trouble indication at the main control unit. This indication shall identify the specific trouble condition present (interfering signal).

(FROM 72A 2-7.2.6)

Chapter 7 Auxiliary Protective Signaling Systems

Notice: The requirements of Chapters 1 through 5 of this standard shall apply to auxiliary protective signaling systems except where they conflict with the requirements of this chapter.

7-1 Application. This chapter describes the equipment and circuits for protected property that, in themselves, are insufficient for notifying the fire department in the event of fire, but that, in combination with a suitable municipal fire alarm system, are arranged to summon fire department response when operated.

(FROM 72B 1-1.1)

7-2 General.

7-2.1 An auxiliary protective signaling system provides protection to an individual occupancy or building or to a group of single occupancies and utilizes the municipal fire alarm facilities to transmit an alarm to the public fire service communication center.

(FROM 72B 1-2.1 MOD)

7-2.2 Auxiliary protective signaling systems consist of electrical circuits and associated instruments and devices having their operation under the control of the owner or others interested in the property to be protected and of the municipality to whose alarm system they are connected; they include either owned or leased systems.

(FROM 72B 1-2.4 MOD)

7-2.3 Municipal System. An auxiliary protective signaling system shall be used only in connection with a municipal fire alarm system that is suitable for the service and is well maintained. A system satisfactory to the authority having jurisdiction shall be considered as meeting this requirement.

(FROM 72B 2-2.3 MOD)

7-2.4 Permission. Permission for the connection of an auxiliary protective signaling system to a municipal fire alarm system and acceptance of the type of municipal transmitter or master box its actuating mechanism, circuits, and components connected thereto shall be obtained from the municipal authorities.

(FROM 72B 2-2.2)

7-2.5 An auxiliary protective signaling system shall be maintained and supervised by a responsible person or corporation.

(FROM 72B 1-2.3 MOD)

7-2.6 This chapter does not require the use of audible alarm signals other than those necessary to operate the auxiliary protective signaling system. If it is desired to provide fire alarm evacuation signals in the protected property, the alarms, circuits, and controls shall comply with the provisions of Chapter 6 in addition to the provisions of this chapter.

(FROM 72B 1-1.6 MODIFIED)

7-2.7 Municipal fire alarm systems are covered by NFPA 1221, *Standard for the Installation, Maintenance and Use of Public Fire Service Communication Systems.*

(FROM 72B 1-1.3)

7-3 Types of Systems. There are three types of auxiliary protective signaling systems in use, and these are described in (a), (b), and (c) below:

(a)* The local energy type [Figure A-7-3(a)(1) or (2)] is electrically isolated from the municipal alarm system and has its own power supply. The tripping of the transmitting device does not depend on the current in the municipal system. In a wired circuit, whether or not the alarm will be received by the public fire service communication center if the municipal circuit is accidently opened depends on the design of the transmitting device and the associated public fire service communication center equipment; i.e., whether or not the municipal system is designed to receive alarms through manual or automatic ground operational facilities. In a radio box type system, whether or not the alarm will be received by the public fire service communication center depends upon the proper operation of the radio transmitting and receiving equipment.

(b)* The shunt type [(Figure A-7-3(b)(1)] is electrically connected to, and is an integral part of, the municipal alarm system. A ground fault on the auxiliary circuit is a fault on the municipal circuit, and an accidental opening of the auxiliary circuit will send a needless (or false) alarm to the public fire service communication center. An open circuit in the transmitting device trip coil will not be indicated either at the protected property, or at the public fire service communication center; also, if an initiating device is operated, an alarm will not be transmitted but an open circuit indication will be given at the public fire service communication center. If a municipal circuit is open when a connected shunt type system is operated, the transmitting device will not trip until the municipal circuit returns to normal, at which time the alarm will be transmitted unless the auxiliary circuit is first returned to a normal condition.

A local system made into an auxiliary system by the addition of a relay whose coil is energized by a local power supply and whose normally closed contacts trip a shunt type master box shall not be permitted [Figure A-7-3(b)(2)].

(c)* A parallel telephone type system [Figure A-7-3(c)] is a system in which alarms are transmitted over a circuit directly connected to the annunciating switchboard at the public fire service communication center and terminated at the protected property by an end-of-line device.

Such auxiliary systems are for connection to municipal fire alarm systems of the type in which each municipal alarm box annunciates at the public fire service communication center switchboard by individual circuit.

(FROM 72B 1-1.4)

NOTE: The essential difference between the local energy or parallel telephone types and the shunt type system is that accidental opening of the alarm initiating circuits will cause an alarm on the shunt type system only. Also, a ground on the alarm initiating circuit of either the shunt type or parallel telephone type systems extends into the municipal box wired circuit or switchboard, to which they are respectively connected, thereby grounding these circuits. If other grounds are present on the same wired circuit or at the switchboard, alarm signal transmission could be impaired or a false alarm could result.

(FROM 72B 1-1.5)

7-4 Installation and Design.

(FROM 72B 2-5)

7-4.1 Application of System Types.

7-4.1.1 A shunt-type system shall be permitted to be used only for waterflow and/or manual fire alarm service.

(FROM 72B 2-5.10 and 72B 2-5.2.1 Exc)

7-4.1.2 Only local energy and parallel telephone type systems shall be permitted to be used for automatic fire alarm signals.

(FROM 72B 3-2.1.1 MODIFIED)

7-4.2 Location of Transmitting Devices.

7-4.2.1 Auxiliary systems shall be so arranged that one municipal transmitter or master box does not serve more than 100,000 ft^2 (9290 m^2) total fire area.

(FROM 72B 2-5.11)

7-4.2.2 A separate municipal transmitter or master box shall be provided for each building or, where permitted by the authority having jurisdiction, for each group of buildings of single ownership or occupancy.

(FROM 72B 2-5.14)

7-4.2.3 The same fire alarm box may be used as a municipal street box and as a transmitting device for an auxiliary system where permitted by the authority having jurisdiction and the municipal authorities, provided that the box is located at the outside of the entrance to the protected property.

NOTE: The fire department may require the box to be equipped with a signal light to differentiate between automatic and manual operation, unless local outside alarms at the protected property would serve the same purpose.

(FROM 72B 2-5.17)

7-4.2.4 The transmitting device shall be located as required by municipal authority and the authority having jurisdiction.

(FROM 72B 2-5.20)

7-4.3 Multiple Transmitting Devices. Where more than three municipal transmitters or master boxes serve one property, each group of such devices shall be on separate municipal circuits where available.

(FROM 72B 2-5.12 MOD)

7-4.4 Manual Initiation. For systems employing automatic fire detectors or waterflow alarm detection devices, a means shall be provided to manually initiate a fire alarm signal. The location shall be as required by the authority having jurisdiction.

Exception: If the master box is located in the normal path of exit from the area, it may be accepted as complying with the foregoing.

(FROM 72B 2-5.13 MOD)

7-4.5 A visual indicator at or near the transmitting device or other location acceptable to the fire department, shall be provided to show the location, by building and floor, of the operation of all alarm signal initiating devices.

Exception: The provisions of this section may be modified by the authority having jurisdiction, where the size or other special conditions are such that these indications are not deemed essential.

(FROM 72B 2-5.18)

7-4.6 Public fire service alarms from an auxiliary system shall be received at the public fire service communcation center on the same equipment and by the same alerting methods as alarms transmitted from municipal fire alarm boxes located on street.

(FROM 72B 1-2.2 MOD)

7-4.7 The system shall be so designed and arranged that a single fault on the auxiliary system shall not jeopardize operation of the municipal system and shall not, in case of a single fault on either the auxiliary or municipal systems, transmit a false alarm on either system.

Exception: See Section 7-3 for shunt systems.

(FROM 72B 2-5.9 MOD)

7-4.8 Delayed Alarms. Transmission of alarms to the public fire service communication center shall not be delayed in cases where provision has been made for delaying evacuation alarm signals.

(FROM 72B 2-5.4 MOD)

7-4.9 Trouble Signals. For systems having manual operation only, the trouble signal may be at the protected building; for systems having automatic or manual and automatic operation, the trouble signal shall be where there is someone on duty at all times with facilities for immediately notifying the repair person, or as specified by the authority having jurisdiction.

(FROM 72B 2-12.1.2 MOD)

7-4.10 Rewinding and Resetting.

7-4.10.1 All apparatus shall be restored to normal as promptly as possible after each test or alarm and kept in normal condition for operation. This shall include rewinding, resetting, or replacement, as necessary. The decision as to who will rewind and reset the municipal transmitter or master box after either test or alarm shall be incorporated into the maintenance agreement. All other apparatus in the system requiring rewinding or resetting to maintain normal operation shall be restored to normal by the owner or an authorized representative as promptly as possible after each test or alarm.

(FROM 72B 2-7.1)

7-4.10.2 A transmitting device that requires manual resetting after operation shall provide an audible and visible indication when it requires resetting. This indication shall be located within the protected property and may be combined with the system trouble signal devices (*see 2-4.8*).

(FROM 72B 2-5.19)

7-5 Notification of Trouble Conditions.

7-5.1 The municipality shall notify the owner or occupant of trouble on the municipal circuits that puts the auxiliary system out of service.

(FROM 72B 2-6.1 MOD)

7-5.2 When auxiliary alarm systems are not functioning because of trouble on either the auxiliary system or the municipal system, the owner or occupant shall notify the authority having jurisdiction.

(FROM 72B 2-6.2)

7-5.3 In case of trouble on a system, the owner or occupant shall notify the maintenance contractor and the fire department that the system is out of service.

(FROM 72B 2-6.3)

7-5.4 The owner or occupant of a building equipped with a shunt or parallel telephone system shall receive notification by municipal officials when ground faults in the municipal box circuit are traced to wiring in the auxiliary circuit or to wires inside the premises. The owner or occupant shall immediately notify the maintenance contractor.

(FROM 72B 2-6.4 MOD)

7-6 System Requirements.

7-6.1 Shunt-Type Systems.

7-6.1.1 Shunt systems shall be noncoded with respect to any remote electrical tripping or activating devices.

(FROM 72B 2-5.6 MOD)

7-6.1.2 All conductors of the shunt circuit shall be installed in accordance with Article 346, for rigid conduit, or Article 348, for electrical metallic tubing, of NFPA 70, *National Electrical Code*.

(FROM 72B 2-8.1 MOD)

7-6.1.3 Both sides of the shunt circuit shall be in the same conduit.

(FROM 72B 2-8.1 MOD)

7-6.1.4 Where a municipal transmitter or master box is located within a private premise, it shall be installed in accordance with NFPA 1221, *Standard for the Installation, Maintenance and Use of Public Fire Service Communication Systems*.

(FROM 72B 2-8.1 MOD)

7-6.1.5 Where a shunt loop is used, it shall not exceed a length of 750 ft (230 m) and shall be in conduit.

(FROM 72B 2-8.1 MOD)

7-6.1.6 Conductors of the shunt circuits shall not be smaller than No. 14 AWG and shall be insulated as prescribed in Article 310, of NFPA 70, *National Electrical Code*.

(FROM 72B 2-8.1 MOD)

7-6.1.7 Power Sources. The power for shunt-type systems shall be provided by the municipal fire alarm system.

(FROM 72B 2-9.2 MOD)

7-6.1.8 Additional design restrictions for shunt systems may be found in municipal laws or ordinances.

(FROM 72B 2-5.8 MOD)

7-6.2 Local Energy Type Systems.

7-6.2.1 Local energy systems may be of coded or noncoded type.

(FROM 72B 2-5.6 MOD)

7-6.2.2 Power Sources. Power supply sources for local energy systems shall conform to Chapter 5.

(FROM 72B 2-9.3)

7-6.3 Parallel Telephone-Type Systems.

7-6.3.1 Parallel telephone systems shall be noncoded with respect to any remote electrical tripping or activating devices.

(FROM 72B 2-5.6 MOD)

7-6.3.2 Two methods of parallel telephone systems are permitted to be used:

(a) The circuits are extended beyond the entrance termination point to actuating devices with the supervisory device beyond the last actuating device in the circuit; or

(b) The supervisory device for the circuit is located at the entrance termination point. The tripping relay shall be located immediately adjacent to the supervisory device and shall be connected thereto with conductors not smaller than No. 14 AWG in conduit.

(FROM 72B 2-5.15 MOD)

7-6.3.3 Nonvoice circuits connected to a parallel telephone system shall be indicated with distinctive and different color from voice circuits and be grouped in a reserved separate section of the municipal receiving equipment with adequate written warning that no voice is to be expected on these alarms and that the fire department must be dispatched on alarm light indication.

(FROM 72B 2-5.16 MOD)

Chapter 8 Remote Station Protective Signaling Systems

NOTICE: The requirements of Chapters 1 through 5 of this standard shall apply to remote station protective signaling systems except where they conflict with the requirements of this chapter.

8-1 Application.

8-1.1 This chapter describes the installation, maintenance, testing, and use of a remote station signaling system that serves properties under various ownership from a remote station where trained, competent personnel are in constant attendance. It covers the minimum requirements for operating personnel, the remote station, power supplies, signal initiation, and signal notification and recording of signals.

(FROM 72C 1-1.1)

8-1.2 This chapter recognizes the interconnection of other systems to make the premises safer in the event of fire or other emergencies indicative of hazards to life or property.

(FROM 72C 1-1.3)

8-2 General.

8-2.1 This section applies to general requirements for remote station protective signaling systems. These systems provide an automatic visual and audible indication of alarm, supervisory, or trouble conditions and a manual or automatic permanent record of these conditions.

(FROM 72C 2-1)

8-2.2 Where a remote station connection is used to transmit an alarm signal, the signal shall be received at the public fire service communications center, at a fire station, or at the similar governmental agency that has a public responsibility for taking prescribed action to assure response upon receipt of a fire alarm signal.

Exception: Where such an agency is unwilling to receive alarm signals, the authority having jurisdiction shall be permitted to accept another location with personnel on duty at all times trained to receive the alarm signal and immediately retransmit it to the fire department.

(FROM 72C 1-3.1)

8-2.3 Supervisory and trouble signals shall be handled at a constantly attended location having personnel on duty trained to recognize the type of signal received and to take the proper action.

(FROM 72C 1-3.2)

8-2.4 Where a location other than the public fire service communication center is used for the remote station, access to alarm receiving equipment shall be restricted in accordance with requirements of the authority having jurisdiction.

(FROM 72C 1-3.3)

8-2.5 Sufficient personnel shall be available at all times to receive alarm signals at the remote station and to take appropriate action promptly. Duties other than operation of the remote station receiving equipment shall be permitted, subject to the approval of the authority having jurisdiction.

(FROM 72C 1-3.4)

8-2.6 This chapter does not require the use of audible alarm signals other than those necessary to operate the remote station system. If it is desired to provide fire alarm evacuation signals in the protected property, the alarms, circuits, and controls shall comply with the provisions of Chapter 6, Local Protective Signaling Systems, in addition to the provision of this chapter.

(FROM 72C 3-8.1)

8-3 System Operation.

8-3.1 Where the remote station is at a location other than the public fire service communication center, alarm signals shall be immediately retransmitted to the public fire service communication center. Where the public fire service communication center is the remote station, there is no need for retransmission and alarm signals shall be treated in the same manner as alarm signals received by other means.

(72C 1-4.1)

8-3.2 When it is necessary to retransmit alarm signals from the remote station to the fire department, they shall be transmitted by one of the following methods, listed in descending order of preference:

37(a) A dedicated circuit that is independent of any switching network. This circuit may be used for voice communication or for transmission of coded signals.

(b) A one-way (outgoing only) telephone at the remote station that utilizes the commercial dial network. This telephone shall be used primarily for voice transmission of alarms to a telephone at the public fire service communication center that cannot be used for outgoing calls.

(c) A private radio system using the fire department frequency, where permitted by the fire department.

(d) Other methods acceptable to the authority having jurisdiction.

(FROM 72C 1-4.2)

8-3.3 Upon receipt of a trouble or supervisory signal, it shall be the responsibility of the operator on duty to initiate action immediately to notify the owner or a designated representative.

(FROM 72C 1-4.3)

8-3.4 An audible trouble signal appliance at a remote station may be common to several signaling line circuits. The act of silencing this appliance upon receipt of a trouble signal from one circuit shall not prevent it from operating immediately upon the receipt of a trouble signal from another circuit.

(FROM 72C 1-4.4 MOD)

8-3.5 Signal Silencing. Means for silencing audible alarm, supervisory, and trouble signals shall be provided and shall be so arranged that subsequent signals will resound the audible signal.

(FROM 72C 1-4.5)

8-3.6 Where suitable visual means is provided in the remote station to readily identify the type of signal received, a common audible signal may be used for alarms, supervisory, and trouble signals.

(FROM 72C EXCEPTION TO 1-5)

8-4 Drills and Periodic Tests. All operator controls at the remote station designated by the authority having jurisdiction shall be tested at each change of shift.

(FROM 72C 2-4.1)

8-5 Signal Capacity of Circuits.

8-5.1 The number of signal transmitting devices connected to any signaling circuit and the number of plants that may be served by a single circuit shall be determined by the authority having jurisdiction and shall not exceed the limitations specified in Section 8-5.

NOTE: A plant may consist of one or more buildings under the same ownership.

(FROM 72C 3-7.1)

8-5.2 The number of waterflow switches or alarm initiating circuits that may be connected to actuate a single transmitter or to a noncoded circuit of a control panel shall not exceed five.

(FROM 72C 3-7.2 MODIFIED)

8-5.3 The number of supervisory switches that may be connected to actuate a single transmitter or to a noncoded circuit of a control panel shall not exceed 20.

(FROM 72C 3-7.2 MODIFIED and 72C 3-7.10 MODIFIED)

8-5.4 In noncoded operations, a single circuit shall not serve more than one plant.

(FROM 72C 3-7.3)

8-5.5 In coded operations, a single alarm circuit may serve up to five plants where specifically permitted by the authority having jurisdiction.

NOTE: In evaluating the capacity permitted on a single circuit, consideration shall be given to the length and reliability of the circuit, the hazards to which the circuit is exposed, the value and arrangement of the properties protected, anticipated signal traffic, and availability of repairs.

(FROM 72C 3-7.4)

8-5.6 A coded supervisory circuit shall not serve more than ten plants.

(FROM 72C 3-7.5 MOD)

8-5.7 The circuit arrangement shall be such that an alarm signal will not be received from more than one transmitting device in a plant at a time. The shunt noninterference principle is acceptable as a means of accomplishing the foregoing.

(FROM 72C 3-7.6)

8-5.8 The total number of code wheels connected to a single coded system circuit shall not exceed 100.

(FROM 72C 3-7.7)

8-5.9 The total number of waterflow alarm devices, detection circuits, manual fire alarm stations, or any combination of the three, connected to a single noncoded system circuit shall not exceed five, unless approved visual indications are provided at the protected plant to designate the source of the alarm.

NOTE: Where a single plant has more than one gate entrance or has multiple buildings, separate circuits may be required so that the alarm to the remote station will indicate the area to which the fire apparatus should be dispatched.

(FROM 72C 3-7.8 MODIFIED)

8-5.10 The total number of automatic fire detection devices connected to a single detection circuit shall not exceed 100.

(FROM 72C 3-7.9 MOD)

8-6 Operations Under Fault Conditions.

8-6.1 Alarm circuits between the fire alarm control unit or the transmitter in the protected premises and the remote station shall be arranged so as to comply with the provisions of subdivision (a) for coded systems and either subdivision (a) or (b) for noncoded systems.

(a) Circuits shall be arranged so that the occurrence of a single break or single ground fault will not prevent the transmission of an alarm signal. Circuits complying with this subsection shall be automatically self-adjusting in the event of either a single break or a single ground fault, and shall be automatically self-restoring in the event that the break or fault is corrected.

(b) Circuits shall be arranged so as to be normally isolated from ground (except for reference ground detection) and so that a single ground fault will not prevent the transmission of an alarm signal. Circuits complying with this subitem shall be provided with a ground reference circuit so as to detect and indicate automatically the existence of a single ground fault, unless a multiple ground fault condition that would prevent alarm operation will be indicated by an alarm or by a trouble signal.

(FROM 72C 3-6.1 MODIFIED)

8-6.2 Supervisory circuits shall be separate from alarm circuits. Supervisory circuits within the protected premises and between the protected premises and the remote station, except as hereinafter excluded, shall be arranged as described in 8-6.1(a) or 8-6.1(b).

Exception: A single circuit between the protected premises and a remote station may be used for both alarm and supervisory signals, where the reception of these signals at the same remote station is permitted by the authority having jurisdiction. In addition the supervisory signals shall not interfere with the alarm signals, and alarm signals have priority.

(FROM 72C 3-6.2 MODIFIED)

8-6.3 The requirements of 8-6.1 and 8-6.2 do not apply to the following circuits.

(a) Circuits wholly within the remote station,

(b) Circuits wholly within the protected premises extending from one or more automatic fire detectors or other non-coded initiating devices other than waterflow devices to a transmitter or control unit, or

(c) Power supply leads wholly within the building or buildings protected.

(FROM 72C 3-6.4)

8-7 Digital Alarm Communicator Systems.

8-7.1 General.

8-7.1.1 Applicable Requirements. All provisions of this chapter shall apply to digital alarm communicator system except where they conflict with the requirements of this section.

8-7.1.2 Where acceptable to the authority having jurisdiction, digital alarm communicator systems may be used for fire alarm, supervisory, and trouble signaling over the public switched telephone network.

8-7.1.3 The digital alarm communicator system equipment and installations shall comply with Part 68 of the Federal Communications Commission's Rules and Regulations concerning connection of telephone equipment, systems, and protective apparatus to the public switched telephone network.

8-7.2 Digital Alarm Communicator Transmitter (DACT).

8-7.2.1 A DACT shall be connected to the public switched telephone network upstream of any private telephone system at the protected premises. In addition, special attention is required to ensure that this connection is made only to a "loop start" telephone circuit and not to a "ground start" telephone circuit.

8-7.2.2 All information exchanged between the DACT (protected premises) and the DACR (remote station) shall be by digital code or equivalent. Signal repetition, digital parity check, or some equivalent means of signal verification shall be used.

8-7.2.3* DACT shall be capable of seizing the telephone line (going off-hook) at the protected premises, disconnecting an outgoing or incoming telephone call, and preventing its use for outgoing telephone calls until signal transmissions has been completed. A DACT shall not be connected to a party line telephone facility.

8-7.2.4 A DACT shall have the means to satisfactorily obtain an available dial tone, dial the number(s) of the DACR, obtain verification that the DACR is ready to receive signals, transmit the signal, and receive acknowledgment that the DACR has accepted that signal. In no event shall the time from going off-hook to on-hook exceed 90 seconds per attempt.

8-7.2.5* A DACT shall have suitable means to reset and retry if the first attempt to complete a signal transmission sequence is unsuccessful. A failure to complete connection shall not prevent subsequent attempts to transmit an alarm if such alarm is generated from any other initiating device circuit. Additional attempts shall be made until the signal transmission sequence has been completed to a minimum of five and a maximum of ten attempts.

If the maximum number of attempts to complete the sequence is reached, an indication of the failure shall be made at the premises.

8-7.2.6 A DACT shall be connected to two separate lines (numbers) at the protected premises. The DACT shall be capable of selecting the operable line (number) in the event of failure of either line (number).

8-7.2.7* Failure of either of the telephone lines (numbers) at the protected premises shall be annunciated at the protected premises and a trouble signal shall be transmitted to the remote station over the other line (number). Transmission shall be initiated within 4 minutes of detection of the fault.

8-7.2.8 Each DACT shall be programmed to call a second DACR line (number) should the signal transmission sequence to the first called line (number) be unsuccessful.

8-7.2.9 Each DACT shall automatically initiate and complete a test signal transmission sequence to its associated DACR at least once every 24 hours. A successful signal transmission sequence of any other type within the same 24-hour period shall be considered sufficient to fulfill the requirement to test the integrity of the reporting system, if signal processing is automated so that 24-hour delinquencies must be individually acknowledged by remote station personnel.

8-7.3 Digital Alarm Communicator Receiver (DACR).

8-7.3.1 Equipment.

8-7.3.1.1 Spare DACRs shall be provided in the remote station and shall be able to be switched in place of a failed unit within 30 seconds after detection of failure.

NOTE: One spare DACR may serve as backup for up to five DACRs in use.

8-7.3.1.2 The number of incoming lines to a DACR shall be limited to 8.

Exception: Where the signal receiving, processing, display, and recording equipment at the remote station is duplicate and a switch-over can be accomplished in less than 30 seconds with no loss of signal during this period, the number of incoming lines to the unit is unlimited.

8-7.3.2 Operations.

8-7.3.2.1* Required Signal Information. Any status change signal initiated by the DACT shall be presented in a form to expedite prompt operator interpretation. Status change signals shall provide the following information.

(a) *Type of signal.* Identification of the type of signal to show whether it is an alarm, supervisory, delinquency, or trouble signal.

(b) *Condition.* Identification of the signal to differentiate between the initiation of an alarm, supervisory, delinquency, or trouble signal, and a restoration to normal from any of these conditions.

(c) *Location.* Identification of the premises from which the DACT is reporting.

8-7.3.2.2 Display and Recording. Any method of recording and display or indication of change of status shall be permitted, providing all of the following conditions are met:

(a) Each change of status signal requiring action to be taken by the operator shall result in an audible signal and not less than two independent methods of identifying the type, condition, and location of the status change.

(b) Each change of status signal shall be automatically recorded. The record shall provide the type of signal, condition, and location as required by 8-7.3.2.1 in addition to the time and date the signal was received.

(c) Failure of an operator to acknowledge or act upon a change of status signal shall not prevent subsequent alarm signals from being received, indicated or displayed, and recorded. Each incoming signal to the DACR shall initiate an audible signal that persists until manually acknowledged.

Exception: Test signal (see 8-7.2.9) received at the DACR may be excepted from this requirement.

8-7.3.3 Communication Channel.

8-7.3.3.1* The DACR equipment at the remote station shall be connected to a minimum of two separate incoming telephone lines (numbers). If the lines (numbers) are in a single hunt group, they must be individually accessible; otherwise, separate hunt groups are required. These lines (numbers) are to be used for no other purpose than receiving signals from DACTS. These lines (numbers) shall be unlisted.

8-7.3.3.2 Failure of any telephone line (number) connected to a DACR due to loss of line voltage shall be annunciated visually and audibly in the remote station.

8-7.3.3.3* The loading capacity for a hunt group shall be in accordance with Table 8-7.3.3.3, or be capable of demonstrating a 90 percent probability of immediately answering the incoming call.

Table 8-7.3.3.3 is based on an average distribution of calls and an average connected time of 30 seconds for a message. The loading figures in the table above presume that the lines are in a hunting group (i.e., DACT can access any available line). Note that a single-line DACR is NOT ACCEPTABLE for any of the listed configurations. This table also presumes there is no signaling traffic other than that associated with fire protective signaling.

8-7.3.3.4* A signal shall be received on each individual DACR line at least once every 24 hours.

8-7.3.3.5 The failure to receive a test signal from the protected premises shall be treated as a trouble signal. (*See 8-3.3.*)

8-7.4 Power Supply Sources and Monitoring Integrity.

8-7.4.1 Power supply sources and monitoring integrity for digital alarm communications systems shall be in accordance with Sections 4-5 and 5-3.

NOTE: Since digital alarm communicator systems establish communication channels between the protected premises and the remote station via the public switched telephone network, the requirement to monitor the circuits between the protected premises and the remote station (see Section 4-2) is considered met when the communication channel is periodically tested in accordance with 8-7.2.9.

8-7.4.2* The primary power failure trouble signal for the DACT shall not be transmitted until the actual battery capacity is depleted at least 25 percent, but not more than 50 percent.

Table 8-7.3.3.3

		1 line Hunt Group	2 line Hung Group	3 line Hung Group	4 line Hunt Group	5 through 8 line Hunt Group
A. Protected Premises Equipment with Initiating Device Circuits.	N					
Maximum number of waterflow devices per initiating device circuits.	O	5	5	5	5	
Maximum number of sprinkler supervisory devices per initiating device circuit.	T	20	20	20	20	
Maximum number of all types of initiating device circuits per DACT.	A C	10	10	10	10	
When the following limitations are met:						
1. A maximum of one waterflow switch per initiating device circuit.	C					
2. A maximum of four sprinkler supervisory switches per initiating device circuit.	E					
Then the maximum number of initiating device circuits per DACT is	P T	50	50	50	50	
B. System Loading at the Remote Station with DACR Lines Processed in Parallel	A					
-Number of initiating circuits		5000	10000	20000	20000	
-Number of DACTS with DACR lines processed serially (put on hold, then answered one at a time)	B L	500	1500	3000	3000	
-Number of initiating circuits		3000	5000	6000	6000	
-Number of DACTS	E	300	800	1000	1000	

Chapter 9 Proprietary Protective Signaling Systems

NOTICE: The requirements of Chapter 1 through 5 of this standard shall apply to proprietary protective signaling systems except where they conflict with the requirements of this chapter.

9-1* Application. This chapter describes the general requirements for proprietary protective signaling systems. These systems provide an automatic, permanent visual record by date and time of alarm and abnormal conditions, except as specifically exempted in Section 4-2, Monitoring Integrity of Installation Conductors, and recognize the interconnection of other systems to make the premises safer in the event of fire or other emergencies indicative of hazards to life or property.

(FROM 72D 2-1)

9-2 General.

9-2.1 The central supervising station shall be located in a fire-resistive, detached building or in a suitable cut-off room and, in any event, shall not be near or exposed to the hazardous parts of the premises protected.

(FROM 72D 1-3.1)

9-2.2 The central supervising station shall be restricted to those persons directly concerned with the implementation and direction of emergency action initiation and procedure.

(FROM 72D 1-3.2)

9-2.3 A sufficient number of reserve operators shall be kept in training so that one competent operator is constantly on duty. When the means for transmitting alarms to the fire department is not automatic, at least two operators, one of whom may be a runner, shall be on duty at all times. When the runner is not in attendance at the central supervising station, the runner shall establish two-way communications with the station at intervals not exceeding 15 minutes.

(FROM 72D 1-3.3)

9-2.4 The primary duties of the operator(s) shall be to monitor signals, operate the system, and take such action as shall be required by the authority having jurisdiction. The operator(s) shall not be assigned any additional duties that would take precedence over the primary duties.

(FROM 72D 1-3.4)

9-3 Retransmission.

9-3.1 Indication of a fire shall be promptly retransmitted to the public fire service communication center or other locations acceptable to the authority having jurisdiction, indicating the building or group of buildings from which the alarm has been received.

(FROM 72D 1-4.1)

9-3.2* The means of retransmission shall be acceptable to the authority having jurisdiction and shall be in accordance with Chapter 7, Auxiliary Protective Signaling Systems; Chapter 8, Remote Station Protective Signaling Systems; or NFPA 1221, *Standard for the Installation, Maintenance and Use of Public Fire Service Communication Systems.*

Exception: Secondary power supply capacity shall be as required in 5-3.3.

(FROM 72D 1-4.2)

9-3.3* Retransmission by coded signals shall be confirmed by two-way voice communication indicating the nature of the alarm. (See 9-2.1).

(FROM 72D 1-4.3)

9-3.4 When trouble conditions exist, it shall be the duty of the operator(s) to initiate action immediately to notify the personnel responsible for servicing the system, the owner of the system or designated representative, and the authority having jurisdiction.

(FROM 72D 1-4.4)

9-4 Drills and Periodic Tests. All operator controls at the central supervising stations(s) designated by the authority having jurisdiction shall be tested at each change of shift.

(FROM 72D 2-4.1)

9-5 Private Radio Signaling.

9-5.1 Where a private radio is used as the signaling channel, appropriate supervised transmitting and receiving equipment shall be provided at central supervising, satellite, and repeater stations.

9-5.2 Where more than five protected buildings or premises or 50 initiating devices or initiating device circuits are being serviced by a private radio carrier, the central supervising, satellite, and repeater station radio facilities shall meet all of the following:

(a) Dual supervised transmitters, arranged for automatic switching from one to the other in case of trouble, shall be installed. Where the transmitters are located where someone is always on duty, switchboard facilities may be manually operated if the switching can be carried out within 30 seconds. Where the transmitters are located where no one is normally on duty, the circuit extending between the central supervising station and the transmitters shall be a supervised circuit.

(b)* Transmitters shall be operated on a two-to-one time ratio basis within each 24 hours.

(c) Dual receivers shall be installed with a means for selecting a usable output from one of the two receivers. The failure of one shall in no way interfere with the operation of the other. Failure of either receiver shall be annunciated.

9-5.3 Means shall be provided at the central supervising station for the supervision and control of central, satellite, and repeater station radio transmitting and receiving equipment. This shall be accomplished via a supervised circuit where the radio equipment is remote from the central supervising station.

(a) The following conditions shall be supervised at the central supervising station:

1. Transmitter in use (radiating).
2. Failure of ac power supplying the radio equipment.
3. Receiver malfunction.
4. Indication of automatic switchover.

(b) It shall be possible to independently deactivate either transmitter from the central supervising station.

(FROM 72D 3-7, 3-7.1, 3-7.1.1 MODIFIED)

9-6 Satellite Station Facilities. Where 25 or more protected buildings or premises are connected to a satellite station, both of the following shall be provided at the satellite station:

(a) Automatic means for receiving and recording signals under emergency-manned conditions.

(b) A telephone.

(FROM 72D 3-8, 3-8.1)

9-7 Signal Notification.

9-7.1 This section applies to signal notification requirements in a central supervising station and, if provided, signal notification for evacuation of occupants or signals directing aid to the location of an emergency.

(FROM 72D 4-1)

9-7.2 The suitability and location of indicating appliances for alarm, supervisory, and trouble signals shall be determined by the authority having jurisdiction.

(FROM 72D 4-2.1)

9-7.3 Provision shall be made to designate the building in which a signal originates. The floor, section, or other subdivision of the building shall be designated at the central supervising station or at the building protected, except that the authority having jurisdiction may waive this detailed designation where the area, height, or special conditions of occupancy make it unessential. This detailed designation shall utilize indicating appliances acceptable to the authority having jurisdiction.

(FROM 72D 4-2.2 MODIFIED)

9-7.4 This section does not require the use of audible alarm signals other than one at the central supervising station. If it is desired to operate audible alarm-indicating

appliances for the purpose of evacuation or directing aid to the location of an emergency, the alarm-indicating circuits and their controls shall comply with the applicable provisions of Chapter 6, Local Protective Signaling Systems, in addition to the provisions of this chapter.

(FROM 72D 4-2.3)

9-8 System Operation.

9-8.1 Signal Redundancy.

9-8.1.1 The central supervising station shall have, in addition to a recording device, two different means for alerting the operator when each signal is received indicating a change of state of any connected initiating device circuit. One of these shall be an audible signal and shall persist until manually acknowledged. This shall include the receipt of alarm signals, supervisory signals, and trouble signals including signals indicating restoration to normal.

(FROM 72D 4-5.1 MODIFIED)

9-8.1.2 Where suitable means is provided in the central supervising station to readily identify the type of signal received, a common audible indicating appliance may be used for alarm, supervisory, and trouble indication.

(FROM 72D 4-4.1 Exception)

9-8.1.3 At a central supervising station an audible trouble signal shall be permitted to be silenced provided the act of silencing it shall not prevent it from operating immediately upon receipt of a subsequent trouble signal.

(FROM 72D 4-3.3 MODIFIED)

9-8.2 Signal Recording. All signals received by the central supervising station that show a change in status shall be automatically and permanently recorded, including time and date of occurrence. This record shall be in a form that will expedite operator interpretation in accordance with any one of the following:

(a) In the event that a visual display is used that automatically provides change of status information for each individual signal, including type and location of occurrence, any form of automatic permanent visual record is acceptable. The recorded information shall include the content described above. The visual display shall show status information content at all times and shall be distinctly different after the operator has manually acknowledged each signal. Acknowledgment shall cause information to be recorded indicating time and date of acknowledgment.

(b) In the event that a visual display is not provided, signal content information shall be automatically recorded on duplicate permanent visual recording instruments.

One recording instrument shall be used for recording all incoming signals, while the other shall be used for fire, supervisory, and trouble signals only. Failure to acknowledge a signal shall not prevent subsequent signals from recording. Restoration of the signaling device to its prior or normal condition shall be recorded.

(c) In the event that a system combines the use of a sequential visual display and recorded permanent visual presentation, the signal content information shall be displayed and recorded. The visual information component shall be either retained on the display until manual acknowledgment, or periodically repeated at intervals not greater than five seconds, for durations of two seconds each, until manually acknowledged. Each new displayed status change shall be accompanied by an audible indication which shall persist until manual acknowledgment of the signal is performed.

There shall be means provided for the operator to redisplay status of initiating device circuits that have been acknowledged but not yet restored to a normal condition. If the system retains the signal on the visual display until manually acknowledged, subsequent recorded presentations shall not be inhibited upon failure to acknowledge. Fire alarm signals shall be segregated on a separate visual display in this configuration unless given priority status on the common visual display.

(FROM 72D 4-5.2 MODIFIED)

9-8.3 System Response Time.

9-8.3.1 The maximum elapsed time, from sensing a fire alarm at an initiating device or initiating device circuit until it is recorded or displayed at the central supervising station, shall not exceed 90 seconds.

(FROM 72D 4-5.3.1)

9-8.3.2 To facilitate the prompt receipt of fire alarm signals, from systems handling other types of signals that may produce multiple simultaneous status changes, the requirements of either of the following shall be met:

(a) In addition to the maximum processing time for a single alarm, the system shall record simultaneous status changes at a rate not slower than either a quantity of 50, or 10 percent of the total number of initiating device circuits connected, within 90 seconds, whichever number is smaller, without loss of any signal.

(b) In addition to the maximum processing time, the system shall display or record fire alarm signals at a rate not slower than one every 10 seconds, regardless of the rate or number of status changes occurring, without loss of any signals.

Exception: Where fire alarm, waterflow alarm, sprinkler supervisory signals, and their associated trouble signals are the only signals processed by the system, the rate of recording shall not be slower than one round of code every 30 seconds.

(FROM 72D 4-5.3.2 MODIFIED)

9-8.3.3 Trouble Signals. Trouble signals required in Section 4-2, and their restoration to normal, shall be automatically indicated and recorded at the central supervising station within 200 seconds.

(FROM 72D 2-7.1 MODIFIED)

9-9 Transmission Fault. The recorded information for the occurrence of any trouble condition of the signaling line circuit, leg facility, or trunk facility that prevents receipt of alarm signals at the central supervising station shall be such that the central supervising station operator

is able to determine the presence of the trouble condition. Trouble conditions in a leg facility shall not affect or delay receipt of signals to the central supervising station from other leg facilities on the same trunk facility.

(FROM 72D 4-6 MODIFIED)

9-10 Signal Reports and Disposition.

9-10.1 Arrangements shall be made to furnish such reports of signals that may be received and in such form as may be required by the authority having jurisdiction. These reports shall be available for examination for at least one year.

(FROM 72D 4-7.1)

9-10.2 Alarms. Upon receipt of a fire alarm signal, the central supervising station operator shall initiate action to:

(a) Immediately notify the fire department, the plant fire brigade, and such other parties as the authority having jurisdiction may require.

(b) Promptly dispatch a runner to the alarm location. (Travel time shall not exceed one hour.)

(c) Restore the system to its normal operating condition as soon as possible after disposition of the cause of the alarm signal.

(FROM 72D 4-7.2)

9-10.3 Guard's Tour Delinquency. If a regular signal is not received from a guard within a 15-minute maximum grace period, or if a guard fails to follow a prescribed route in transmitting his signals (if a prescribed route has been established), it shall be treated as a delinquency signal. When a guard's tour delinquency occurs, the central supervising station operator shall initiate action to:

(a) Communicate at once with the protected areas or premises by telephone, radio, calling back over the system circuit, or other means acceptable to the authority having jurisdiction.

(b) Dispatch a runner to investigate the delinquency, if communications with the guard cannot be promptly established. (Travel time shall not exceed one-half hour.)

(FROM 72D 4-7.3)

9-10.4 Supervisory Signals. Upon receipt of sprinkler system and other supervisory signals, the central supervising station operator shall initiate action to:

(a) Where required, communicate immediately with the designated person(s) to ascertain the reason for the signal.

(b) Where required, dispatch a runner or maintenance person (travel time not to exceed one hour) to investigate, unless supervisory conditions are promptly restored to normal.

(c) Where required, notify the fire department.

(d) Where required, notify the authority having jurisdiction when sprinkler systems are wholly or partially out of service for more that eight hours.

(e) Where required, provide written notice to the authority having jurisdiction as to the nature of the signal, time of occurrence, and restoration of service, when equipment has been out of service for eight hours or more.

(FROM 72D 4-7.4)

9-10.5 Trouble Signals. Upon receipt of trouble signals or other signals pertaining solely to matters of equipment maintenance of the signaling system, the central supervising station operator shall initiate action to:

(a) Where required, communicate immediately with the designated person(s) to ascertain reason for signal.

(b) Where required, dispatch a runner or maintenance person (travel time not to exceed one hour) to investigate.

(c) Where required, notify the fire department.

(d) Where required, notify the authority having jurisdiction when interruption of normal service will exist for more than four hours.

(e) Where required, provide written notice to the authority having jurisdiction as to the nature of the signal, time of occurrence, and restoration of service, when equipment has been out of service for eight hours or more.

(FROM 72D 4-7.5)

Chapter 10 Emergency Voice/Alarm Communication Systems

NOTICE: The requirements of Chapters 1 through 5 of this standard shall apply to emergency voice/alarm communciation systems except where they conflict with the requirements of this chapter.

10-1 Application. This chapter describes the requirements for emergency voice/alarm communication systems. The primary purpose is to provide dedicated manual and automatic facilities for the origination, control, and transmission of information and instructions pertaining to a fire alarm emergency to the occupants (including fire department personnel) of the building. It is the intent of this standard to establish the minimum requirements for emergency voice/alarm communication systems.

(FROM 72F 1-1.1 MOD.)

10-2 General.

10-2.1 Occurrence of a short or open in loudspeaker installation wiring shall result in an audible trouble signal.

(FROM 72F 2-4.1.4)

10-2.2 When a two-way telephone communication circuit is provided, its installation wires shall be monitored for a short circuit fault that would make the telephone communication circuit inoperative.

(FROM 72F 2-4.1.5)

10-2.3 The trouble signal required by Section 4-2 shall be automatically signaled to and received by the building fire command station within 200 seconds.

(FROM 72F 2-4.1.1)

10-2.4 Records. After successful completion of acceptance tests satisfactory to the authority having jurisdiction, a set of reproducible "as-built" installation drawings, operation and

maintenance manuals, and test and maintenance schedules and records shall be provided for the owner or a designated representative. It shall be the responsibility of the owner to maintain these records and to keep them current.

(FROM 72F 2-5.1)

10-2.5* Functional and operational testing of the voice/alarm signaling service shall be conducted at least quarterly. Testing shall include the use of a representative number of reporting devices, i.e., two-way telephones for the fire service, the fire warden, or general public emergency use and the automatic and manual voice paging systems in each zone. The testing procedure shall be such that all elements of the system are tested at least annually.

(FROM 72F 2-6.2)

10-3 Survivability.

10-3.1 The system shall be so designed and installed that attack by fire in a paging zone causing loss of communication to this paging zone shall not result in loss of communication to any other paging zone. The system shall be so designed and installed that attack by fire causing failure of equipment or a fault on one or more installation wiring conductors of one communication path shall not result in total loss of communication to any paging zone.

Exception No. 1: The fire command station and the central control equipment.

Exception No. 2: Where there is a separate means acceptable to the authority having jurisdiction for voice communication to each floor or paging zone.

Exception No. 3: Where the installation wiring is enclosed in a 2-hr fire-rated enclosure, other than a stairwell.

Exception No. 4: Where the installation wiring is enclosed within a 2-hr fire-rated stairwell that is fully sprinklered in accordance with NFPA 13, Installation of Sprinkler Systems.

Exception No. 5: When a paging zone is directly attacked by fire within the zone.

(FROM 72F 2-4.2.1 MOD)

10-3.2 The fire command station and the central control equipment shall be located in fire-resistive areas and shall have a minimum 3-ft (1-m) clearance about the face of the fire command station.

Exception: When approved by the authority having jurisdiction, the fire command station may be located in a lobby or other approved space.

(FROM 72F 2-4.2.2)

10-3.3 When the fire command station is remote from the central control equipment, the wiring between the two shall be installed in conduit or other metal raceway which is routed through areas whose characteristics are at least equal to the limited combustible characteristics as defined in NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*. The maximum run of conduit or raceway shall not exceed 100 feet (30 m), or must be enclosed in a 2-hr fire-rated enclosure.

(FROM 72F 2-4.2.3)

10-3.4 The primary power supply installation wiring between the central control equipment and the main service entrance shall also be routed through areas whose characteristics are at least equal to the limited combustible characteristics as defined in NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*.

(FROM 72F 2-4.2.4)

10-3.5 The secondary (standby) power supply shall be provided capable of operating the system under maximum normal load for 24 hours and then capable of operating the system during a fire or other emergency condition for a period of 2 hours. Fifteen minutes of evacuation alarm operation at maximum connected load shall be considered the equivalent of 2 hours of emergency operation.

10-4 Voice/Alarm Signaling Service.

10-4.1* General. The purpose of the voice/alarm signaling service is to provide an automatic response to the receipt of a signal indicative of a fire emergency. Subsequent manual control capability of the transmission and audible reproduction of evacuation tone signals, preannounce alert tone signals, and voice directions on a selective and all-call basis, as determined by the authority having jurisdiction, is also required from the fire command station.

Exception: Where the fire command station or a remote monitoring location is constantly attended by trained operators, and operator acknowledgement of receipt of a fire alarm signal is received within 30 seconds, automatic response is not required.

(FROM 72F 3-1)

10-4.2 Multichannel Capability. Where required by the authority having jurisdiction, the system shall allow the application of an evacuation signal to one or more zones and at the same time shall permit voice paging to the other zones selectively or in any combination.

(FROM 72F 3-1.1)

10-4.3 Functional Sequence.

10-4.3.1 In response to an initiating signal indicative of a fire emergency, the system shall automatically transmit, either immediately or after a delay acceptable to the authority having jurisdiction:

(a) An alert tone of 3-to-10 seconds duration followed by a message, or messages where multichannel capability is provided, to direct the occupants of the fire initiation zone and other zones in accordance with the building's fire evacuation plan, or

(b) An evacuation signal to the fire initiation zone and other zones in accordance with the building's fire evacuation plan is permitted.

(FROM 72F 3-2)

10-4.3.2 Failure of the message described by 10-4.3.1(a), where used, shall sound the evacuation signal automatically. Instructions shall be given at least three times. Provisions for manual initiation of voice instructions or evacuation signal generation shall be provided. Different functional sequences shall be permitted where approved by the authority having jurisdiction.

(FROM 72F 3-2.1)

10-4.3.3 Live voice instructions shall override all previously initiated signals on that channel.

(FROM 72F 3-2.2)

10-4.4 Voice and Tone Devices.

10-4.4.1 The alert tone preceding any message may be part of the voice message, or may be transmitted automatically from a separate tone generator.

(FROM 72F 3-3.1)

10-4.4.2* The output of audio amplifiers and signal generators, when provided, shall be continuously monitored so that an audible trouble signal will result on failure.

Exception: Tone generating and amplifying equipment, enclosed as internal parts, and serving only a single listed loudspeaker need not be monitored.

(FROM 72F 3-3.2)

10-4.5 Fire Command Station.

10-4.5.1 A fire command station shall be provided near a building entrance or other location approved by the authority having jurisdiction. The fire command station shall provide a communications center for the arriving fire department and shall provide for control and display of the status of detection, alarm, and communication systems. The fire command station may be physically combined with other building operations and security centers as permitted by the authority having jurisdiction. Operating controls for use by the fire department shall be clearly marked.

(FROM 72F 3-4.1)

10-4.5.2 The fire command station shall control the emergency voice/alarm communication signaling service and, where provided, the two-way telephone communication
service.

(FROM 72F 3-4.2)

10-4.6 Loudspeakers.

10-4.6.1* Loudspeakers and their enclosures used in emergency voice/alarm communication signaling service shall be listed for this service.

(FROM 72F 3-5.1)

10-4.6.2* There shall be one or more loudspeakers on each floor of the building, so located that they can be clearly heard regardless of the maximum noise level produced by machinery or other equipment under normal conditions of occupancy.

(FROM 72F 3-5.2 MOD.)

10-4.6.3 Each elevator car shall be equipped with a loudspeaker connected to a separate paging zone for each elevator group. Each enclosed stairway shall be equipped with loudspeakers connected to a separate paging zone.

(FROM 72F 3-5.3)

10-5 Two-Way Telephone Communication Service.

10-5.1* Purpose. The provisions of this chapter describe the performance of required two-way telephone communication service when provided in a building for use during fire and other emergencies.

(FROM 72F 4-1)

10-5.2 General. Two-way telephone communication service, where provided, shall be available for use by the fire service. Additional uses where specifically permitted by the authority having jurisdiction may include signaling and communication for a building fire warden organization, signaling and communication for reporting a fire and other emergencies, i.e., voice call box service, signaling and communication for guard service, and other uses. Variation of equipment and systems operation provided to facilitate additional use of the two-way telephone communication service shall not adversely affect the performance when used by the fire service.

(FROM 72F 4-2)

10-5.3 Two-way telephone communication service shall be capable of permitting the simultaneous operation of any five telephone stations in a common talk mode.

(FROM 72F 4-2.1)

10-5.4 Momentary contact push to talk switches shall be provided on the handsets.

10-5.5 Off-Hook Indicator. A notification signal, at the fire command station, distinctive from any other alarm or trouble signal, shall indicate the off-hook condition of a calling telephone circuit. Where a selective talk telephone system is supplied, a distinct visible indicator shall be furnished for each selectable circuit so that all circuits with telephones "off-hook" are continuously and visibly indicated.

(FROM 72F 4-3 MOD)

10-5.6 Call-In Signal Silencing. A switch for silencing the audible call-in signal-sounding appliance shall be permitted only if it is key-operated, in a locked cabinet, or given equivalent protection from use by unauthorized persons. Such a switch shall be permitted only if it operates a visible indicator and sounds a trouble signal whenever the switch is in the "silence" position when there are no telephone circuits in an "off-hook" condition. When a selective talk telephone system is used, such a switch shall be permitted only if subsequent telephone circuits going "off-hook" will operate the audible signal sounding appliance.

(FROM 72F 4-4)

10-5.7 Fire Service or Fire Warden Use. The minimum requirement for fire service use shall be a common talk, i.e., a conference or party line circuit. The minimum requirement for fire warden use, where provided, shall be a selective talking system controlled at the fire command station. Either system shall be capable of operation with

five telephone stations connected together. There shall be at least one fire service telephone station or jack per floor and at least one per exit stairway. Where provided, there shall be at least one fire warden station or jack to serve each fire paging zone.

(FROM 72F 4-5)

Chapter 11 Referenced Publications

11-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

11-1.1 NFPA Publications. National Fire Protection Assocation, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 13-1989, *Standard for the Installation of Sprinkler Systems*

NFPA 20-1990, *Standard for the Installation of Centrifugal Fire Pumps*

NFPA 70-1990, *National Electrical Code*

NFPA 72E-1990, *Standard on Automatic Fire Detectors*

NFPA 90A-1989, *Standard for the Installation of Air Conditioning and Ventilating Systems*

NFPA 110-1988, *Standard for Emergency and Standby Power Systems*

NFPA 601-1986, *Standard for Guard Service in Fire Loss Prevention*

NFPA 602-1986, *Standard for Guard Operations in Fire Loss Prevention*

NFPA 1221-1988, *Standard for the Installation, Maintenance and Use of Public Fire Service Communication Systems.*

11-1.2 Other Publications.

11-1.2.1 ANSI Publications. American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.

ANSI A17.1-1984, *Safety Code for Elevators, Dumb Waiters, Escalators, and Moving Walks.*

ANSI 58.1-1982, *Building Code Requirements for Minimum Design Loads in Buildings and Other Structures.*

Appendix A

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

A-1.2.1 In determining the performance criteria for initiating device, signaling line (multiplex), and indicating appliance circuits, consult the performance and capacity tables in Chapters 2 and 6. On modifying an existing system, the system should be tested to determine the style of each circuit for the proper description and understanding of the system.

A-2-1.4 Wiring and Equipment. The installation of all protective signaling system wiring should take into account the protective signaling system manufacturer's published installation instructions and the limitations of the applicable product listings or approvals.

A-2-2.2 NFPA 72H, *Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems*, should be used as a guide for performing the installation wiring and operational acceptance tests required when completing the certificate of compliance.

A-2-2.3(a) The owner's manual or manufacturer's installation instructions should include:

(a) A detailed narrative description of the system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations.

(b) Operator instructions for basic system operations including alarm acknowledgment, system reset, interpreting system output (LED's, CRT display, and printout), operation of manual evacuation signaling and ancillary function controls, changing printer paper, etc.

(c) A detailed description of routine maintenance and testing as required and recommended and as would be provided under a maintenance contract, including a testing and maintenance instructions for each type of device installed. This information should include:

1. A listing of the individual system components that require periodic testing and maintenance.

2. Step-by-step instructions detailing the requisite testing and maintenance procedures and the intervals at which those procedures should be performed, for each type of device installed.

3. A schedule that correlates the testing and maintenance procedures required by paragraph (2) above with the listing required by paragraph (1) above.

(d) Detailed troubleshooting instructions for each specific type of trouble condition recognized by the system, including opens, grounds, parity errors, "loop failures," etc. These instructions should include a list of all trouble signals annunciated by the system, a description of the condition(s) that will cause those trouble signals, and step-by-step instructions describing how to isolate those problems and correct them (or call for service, as appropriate).

(e) A service directory, including a list of names and telephone numbers for those who should be called to obtain service on the system.

A-2-3.1(a) This requirement does not preclude transfer to secondary supply at less than 85 percent of nominal primary voltage as long as the requirements of 5-3.3 are met.

A-2-4.3 Coded Signal Designations. The following suggested coded signal assignment for buildings having four floors and multiple basements is provided as a guide:

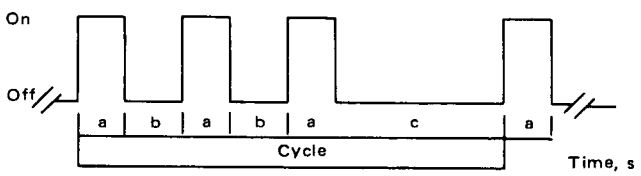
LOCATION	CODED SIGNAL
Fourth Floor	2-4
Third Floor	2-3
Second Floor	2-2
First Floor	2-1
Basement	3-1
Sub-Basement	3-2

A-2-4.8.1 It is recommended that at least one audible fire alarm signal be located outside the building to alert persons in the vicinity who in turn could summon fire fighting assistance.

A-2-4.9 To ensure that audible evacuation signals are clearly heard, it is recommended that their sound level be at least 15 dBA above the equivalent sound level or 5 dBA above the maximum sound level having a duration of at least 60 seconds (whichever is greater) measured 5 ft (1.5 m) above the floor in the occupiable area. The equivalent sound level is the mean square, A-weighted sound pressure measured over a 24-hour period. Refer to NFPA 72G, *Guide for the Installation, Maintenance, and Use of Notification Appliances for Protective Signaling Systems.*

Where the system alarm signals are not intended to notify all occupants of the protected premises in the event of fire in any zone, the system should include automatic transmissions of alarms to summon the fire department.

A-2-4.10(a) When a distinctive fire alarm signal is to be used to notify the building occupants of the need to evacuate (leave the building), the use of a national standard fire alarm evacuation signal is recommended to facilitate quick and positive recognition of the signal.



Key:
Phase a signal is "on" for 0.5 s = 10%
Phase b signal is "off" for 0.5 s = 10%
Phase c signal is "off" for 1.5 s = 10% (c = a + 2b)
Total cycle lasts for 4 s = 10%

Figure A-2-4.10(a)(1) Temporal pattern parameters.

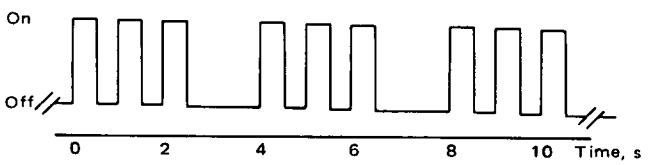


Figure A-2-4.10(a)(2) Temporal pattern imposed on signaling appliances that emit a continuous signal while energized.

The recommended fire alarm evacuation signal is a "Three-Pulse" temporal pattern using any appropriate sound. The pattern consists of an "on" phase (a) lasting 0.5 second ± 10 percent followed by an "off" phase (b)

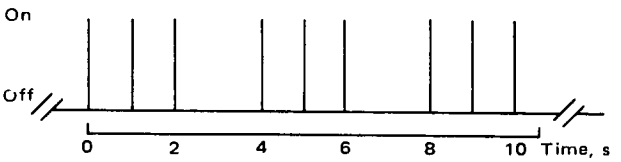


Figure A-2-4.10(a)(3) Temporal pattern imposed on a single stroke bell or chime.

lasting 0.5 second ± 10 percent for three successive "on" periods, then followed by an "off" phase (c) lasting 1.5 seconds ± 10 percent [see Figure A-2-4.10(a)(1)]. The signal should be repeated for a period appropriate for the purposes of evacuation of the building but for not less than 180 seconds. A single-stroke bell or chime sounded at "on" intervals lasting 1 second ± 10 percent with a 2 second ± 10 percent "off" interval after each third "on" stroke is acceptable [see Figure A-2-4.10(a)(3)].

Exception: The minimum repetition time may be manually interrupted.

The recommended standard fire alarm evacuation signal is intended for use only as an evacuation signal. Its use should be restricted to situations where it is desired to have all occupants hearing the signal evacuate the building immediately. It should not be used where, with the approval of the authority having jurisdiction, the planned action during a fire emergency is not evacuation, but relocation of the occupants from the affected area to a safe area within the building, or their protection in place (e.g., high rise buildings, health care facilities, penal institutions. etc.).

A-2-4.10(b) A tamper switch, low pressure switch, or other device intended to cause a supervisory signal when actuated should not be connected in series with the end-of-line supervisory device of initiating device circuits unless a distinctive signal different from a trouble signal is indicated.

A-2-5.1 Recommended procedures and test methods for acceptance testing can be found in NFPA 72H, *Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems.*

A-2-5.2 Recommended procedures and test methods for periodic testing can be found in NFPA 72H, *Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems.*

A-2-5.2.2(b) After any vertically mounted sprinkler system control valve has been operated, the owner or occupant should be encouraged to perform a drain test to ensure that the valve has been fully reopened.

A-2-5.2.2(c) If possible, one of the supervisory switches tested at each inspection should be the most electrically remote device on the circuit being tested.

A-2-5.3 The testing of the waterflow alarm device for a dry-pipe, deluge, or pre-action system, using the by-pass test valve, does not require tripping of the dry-pipe, deluge, or pre-action valve where all related equipment is maintained in proper operating condition. Trip tests of dry-pipe, deluge, or pre-action valves are considered a responsibility of the property owner or leasee.

The test point for a wet sprinkler system should have an orifice sized for the smallest sprinkler head in the system and be located in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

A-2-6.2 and A-2-7.2 Using Tables 2-6.1 and 2-7.1.

(a) Determine whether the initiating devices are:

1. Directly connected to the initiating device circuit.

2. Directly connected to an initiating device circuit which in turn is connected to a circuit interface on the signaling line circuit.

(b) Determine the style of signaling performance required. The rows marked A through E in Table 2-6.1 and 0.5 through 7 in Table 2-7.1 are arranged in ascending order of performance and capacities.

(c) Upon determining the style of the system, the charts singularly or together will specify the maximum number of devices, equipment, premises, and buildings allowed to be incorporated into an actual installation for a proprietary protective signaling system.

(d) In contrast, where the number of devices, equipment, premises, and buildings in addition to signaling ability in an installation is known, a system style can be determined.

(e) The prime purpose of the tables is to enable identification of minimum performance for styles of initiating device circuits and signaling line circuits. It is not the intention that the styles be construed as "grades." That is, a Style 3 system is not better than a Style 2, or vice versa. In fact, a particular style may better provide adequate and reliable signaling for an installation than a more complex style number. The quantities tabulated under each style do, unfortunately, tend to imply that one style is better than the one to its left. The increased quantities for the higher style numbers are based on the ability to signal an alarm during an abnormal condition in addition to signaling the same abnormal condition.

(f) The tables allow users, designers, manufacturers, and the authority having jurisdiction to identify minimum performance of present and future systems by determining the trouble and alarm signals received at the central supervising station for the specified abnormal conditions.

(g) The overall system reliability is considered to be equal from style to style when the capacities are at the maximum allowed.

(h) Upon determining the style of the system, the tables indicate the maximum number of devices, equipment, protected buildings, etc., allowed to be incorporated into an actual installation for a proprietary protective signaling system.

(i) The number of automatic fire detectors connected to an initiating device circuit is limited by good engineering practice. If a large number of detectors are connected to one initiating device circuit covering a widespread area, pinpointing the source of alarm becomes difficult and time consuming.

On certain types of detectors, a trouble signal results from faults in the detector. When this occurs with a large number of detectors on an initiating device circuit, locating the faulty detector also becomes difficult and time consuming.

A-3-3.6.5 The bypass means is intended to enable automatic or manual day/night/weekend operation.

A-3-3.7 Embossed plastic tape, pencil, ink, crayon, etc. should not be considered a permanently attached placard.

A-3-4.1.2 Care should be taken, when designating waterflow alarm systems for sprinklers utilizing on-off heads, to ensure that an alarm will be received in the event of a waterflow condition. On-off sprinklers open at a predetermined temperature and close when the temperature reaches a predetermined lower temperature. With certain types of fires, waterflow may occur in a series of short bursts of 10 to 30 seconds duration each. A waterflow detection device with retard may not detect waterflow under these conditions. It is recommended that an excess pressure system or one that operates on pressure drop be considered to facilitate waterflow detection on sprinkler systems utilizing on-off sprinklers.

Excess pressure systems may be used without or with alarm valves. The following is a description of one type of excess pressure system with an alarm valve.

An excess pressure system with an alarm valve consists of an excess pressure pump with pressure switches to control the operation of the pump. The inlet of the pump is connected to the supply side of the alarm valve and the outlet is connected to the sprinkler system. The pump control pressure switch is of the differential type, maintaining the sprinkler system pressure above the main pressure by a constant amount. Another switch monitors low sprinkler system pressure to initiate a trouble signal in the event of a failure of the pump or other malfunction. An additional pressure switch may be used to stop pump operation in the event of a deficiency in water supply.

Another pressure switch is connected to the alarm outlet of the alarm check valve to initiate a waterflow alarm signal when waterflow exists. This type of system also inherently prevents false alarms due to water surges. The sprinkler alarm retard chamber should be eliminated to enhance the detection capability of the system for short duration flows.

A-3-4.2.6(b) A dry-pipe sprinkler system equipped for waterflow alarm signals should provide supplementary supervision of the system air pressure to avoid false alarm signals due to neglect in maintaining air pressure.

A-3-4.3.2 Sealing or locking such a valve in the open position, or removing the handle from the valve, does not meet the intent of this requirement.

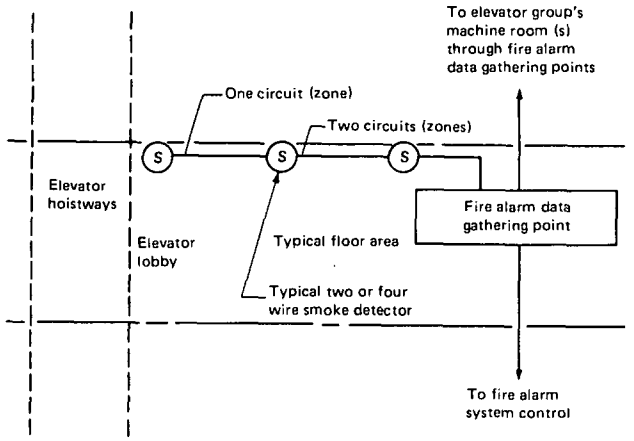


Figure A-3-7.3.5(a) Elevator zone — Elevator and signaling system installed same time.

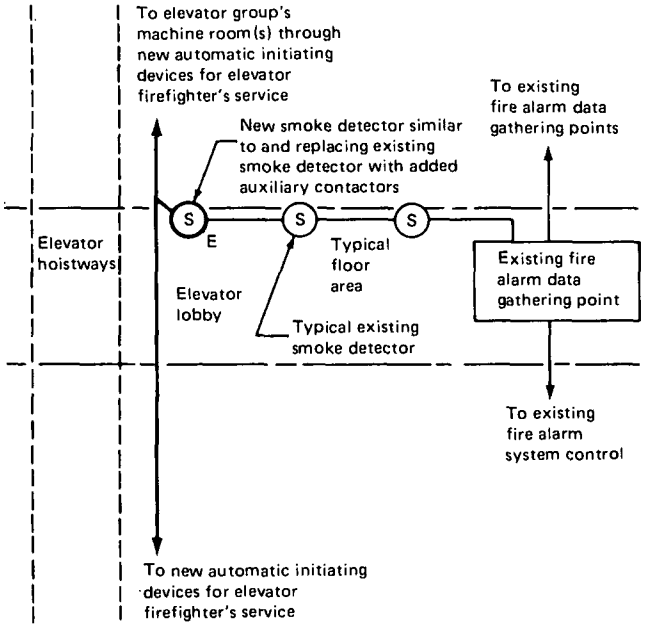


Figure A-3-7.3.5(b) Elevator zone — Elevator installed after signaling system.

A-3-6.1 The provisions of this section apply to the types of equipment used in common for fire protective signaling systems, such as fire alarm, sprinkler supervisory or guard's tour service, and for other signaling systems such as burglar alarm, or coded paging systems; and to methods of circuit wiring common to both types of system.

A-3-7.3.4 NFPA 72H, *Guide for Testing Procedures for Protective Signaling Systems.*

A-3-7.3.5 (a) and (b) It is recommended that the installations be in accordance with the following figures: Use Figure A-3-7.3.5(a) when the elevator is installed at the same time as the building fire protective signaling system. Use Figure A-3-7.3.5(b) when the elevator is installed after the building fire protective signaling system.

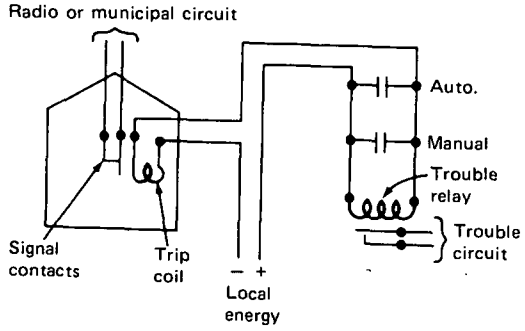


Figure A-7-3(a)1 Local energy-type alarm system.

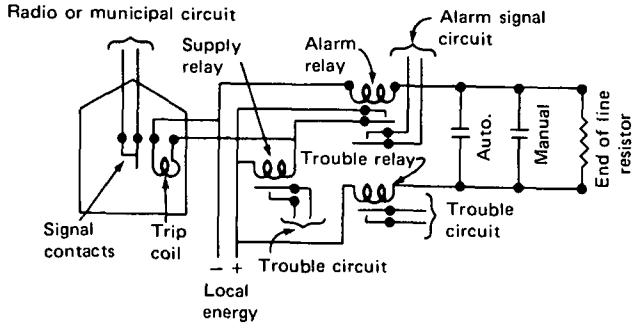


Figure A-7-3(a)2 Alarm systems with local alarm.

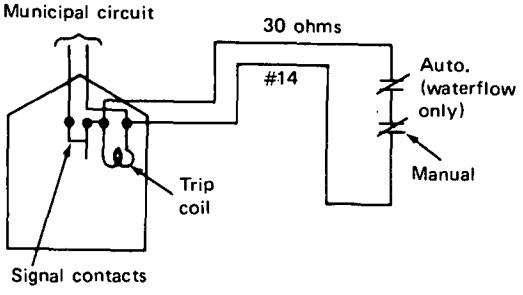


Figure A-7-3(b)1 Shunt-type alarm system.

A-8-7.2.3 In order to give the DACT the ability to disconnect an incoming call to the protected premises, telephone service must be of the type that provides for timed-release disconnect. In some telephone systems (step by step offices) timed-release disconnect may not be provided.

A-8-7.2.5 A DACT may be programmed to originate calls to the DACR telephone lines (numbers) in any alternating sequence. The sequence can consist of single or multiple calls to one DACR telephone line (number) followed by single or multiple calls to a second DACR telephone line (number) or any combination thereof that is consistent with the minimum/maximum attempt requirements in 8-7.2.5.

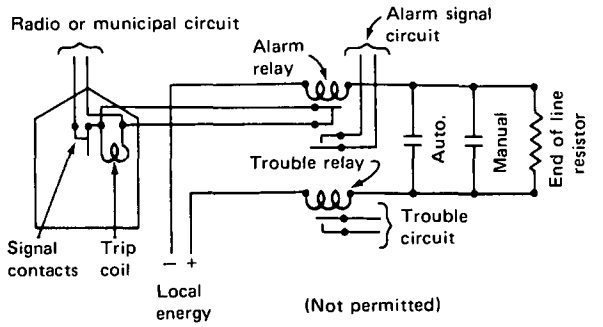


Figure A-7-3(b)2 Shunt-type master box and local energy-type alarm systems.

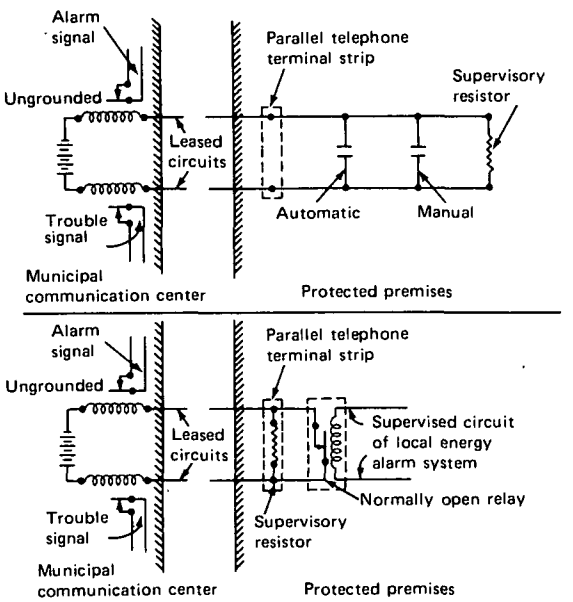


Figure A-7-3(c) Parallel telephone alarm system.

A-8-7.2.7 Most failures of a telephone line may be detected by supervising the presence of the telephone line voltage. A loss of voltage indicates failure. Where the telephone line is also used for telephone communication the voltage will drop when the telephone is in use. The presence of current will also indicate a normal line condition during this period.

A-8-7.3.2.1 The signal information may be provided in coded form. Records may be used to interpret these codes.

A-8-7.3.3.1 The time-release disconnect considerations as outlined in A-8-7.2.3 apply to the telephone lines (numbers) connected to a DACR at the remote station.

It may be necessary to consult with appropriate telephone service personnel to assure that numbers assigned to the DACR can be individually accessed even though they may be connected in rotary (a hunt group).

A-8-7.3.3.3 In determining system loading, Table 8-7.3.3.3 may be used or, as an alternate, it may be demonstrated that there is a 90 percent probability of incoming line availability. Table 8-7.3.3.3 is based on an average distribution of calls and an average connected time of 30 seconds for a message. Therefore, when it is proposed to use Table 8-7.3.3.3 to determine system loading, if any factors are disclosed that will extend DACR connect time so as to increase the average connect time, this will dictate that the alternate method of determining system loading be used. Higher (or possibly lower) loadings may be appropriate in some applications. Some factors that may increase (or reduce) the capacity of a hunt group are listed below.

a. Shorter (or longer) average message transmission time.

b. The use of audio monitors (listen-in), slow scan video, or other similar equipment may significantly increase the connected time for a signal and reduce effective hunt group capacity.

c. The clustering of active burglar alarm signals may generate high peak loads at certain hours.

d. Inappropriate scheduling of 24-hour test signals may generate excessive peak loads.

Demonstration of a 90 percent probability of incoming line availability can be accomplished by in-service monitoring of line activity:

a. Incoming lines are assigned to telephone hunt groups. When a DACT calls the main number of a hunt group it can connect to any currently available line in that hunt group.

b. The receiver continuously monitors the "available" status of each line. A line is available if it is waiting for an incoming call. A line is unavailable for any of the following reasons:

(1) Currently processing a call.

(2) Line in trouble.

(3) Audio monitoring (listen-in) in progress.

(4) Any other condition that makes the line input unable to accept calls.

c. The receiver monitors the "available" status of the hunt group. A hunt group is available if any line in it is available.

d. A message is emitted by the receiver if a hunt group is unavailable for more than 1 minute in 10. This message references the hunt group and the degree of overload.

A-8-7.3.3.4 The verification of the 24-hour DACR line test should be done early enough in the day to allow repairs to be made by the telephone company.

A-8-7.4.2 Recommended techniques for determining battery capacity are precision voltage measurements under normal discharge or voltage measurements under high load pulse discharge.

A-9-1 Scope. The following paragraphs are in the appendix to provide guidelines for utilizing building systems and equipment in addition to proprietary protective signaling equipment to provide life safety and property protection.

Building functions that may be initiated or controlled during a fire alarm condition include but are not limited to the following:

(a) Elevator operation consistent with ANSI A17.1, *Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks.*

(b) Unlocking stairwell and exit doors. Refer to NFPA 80, *Standard for Fire Doors and Windows*, and NFPA 101, *Life Safety Code.*®

(c) Release of fire and smoke dampers. Refer to NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*, and NFPA 90B, *Standard for the Installation of Warm Air Heating and Air Conditioning.*

(d) Monitoring and initiating of self-contained automatic fire extinguishing systems and equipment. Refer to NFPA 11, *Standard for Low Expansion Foam and Combined Agent Systems*; NFPA 11A, *Standard for Medium- and High-Expansion Foam Systems*; NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*; NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*; NFPA 12B, *Standard on Halon 1211 Fire Extinguishing Systems*; NFPA 13, *Standard for the Installation of Sprinkler Systems*; NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*; NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*; and NFPA 17, *Standard for Dry Chemical Extinguishing Systems.*

(e) Lighting control necessary to provide essential illumination during fire alarm conditions. Refer to NFPA 70, *National Electrical Code*, and NFPA 101, *Life Safety Code.*

(f) Emergency shutoff of hazardous gas.

(g) Control of building environmental heating, ventilating, and air conditioning equipment to provide smoke control. Refer to NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems.*

(h) Control of process, data processing, and similar equipment as necessary during fire alarm conditions.

A-9-3.2 It is the intent of this standard that the operator within the central supervising station should have a secure means of immediately retransmitting any signal indicative of a fire to the public fire department communication center. Automatic retransmission using an approved method installed in accordance with Chapter 7, Auxiliary Protective Signaling Systems, or Chapter 8, Remote Station Protective Signaling Systems, is no doubt the best method for proper retransmission. However, a manual means may be used, consisting of either a manual connection following the requirements of two chapters listed above, or in the form of a municipal fire alarm box installed within 50 ft (15 m) of the central supervising station in accordance with NFPA 1221, *Standard for the Installation, Maintenance and Use of Public Fire Service Communication Systems.*

A-9-3.3 No matter what type of retransmission facility is used, telephone communication between the central supervising station and the fire department should be available at all times and should not depend on a switchboard operator.

A-9-5.2(b) Transmitters should be operated alternately, sixteen hours on sixteen hours off.

A-10-2.5 NFPA 72H, *Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems*, is recommended for testing procedures.

A-10-4.1 It is not the intention that emergency voice/alarm communication systems be limited to English-speaking populations. Emergency messages should be provided in the language of the predominant building population. Where there is a probability of isolated groups that do not speak the predominant language, multilingual messages should be provided. It is expected that small groups of transients unfamiliar with the predominant language will be picked up in the traffic flow in time of emergency, and are not likely to be in an isolated situation.

A-10-4.4.2 Backup amplifying and evacuation signal generating equipment is recommended with automatic transfer upon primary equipment failure to assure prompt restoration of service in the event of equipment failure.

A-10-4.6.1 Loudspeakers should be in accordance with NFPA 72G, *Guide for the Installation, Maintenance, and Use of Notification Appliances for Protective Signaling Systems.*

A-10-4.6.2 To ensure that audible evacuation signals are clearly heard, it is recommended that their sound level be at least 15 dBA above the equivalent sound level or 5 dBA above the maximum sound level having a duration of at least 60 seconds (whichever is greater) measured 5 ft (1.5 m) above the floor in the occupied area. Temporary sound sources not normally found in the occupied area continuously need not be considered in measuring maximum sound level. The equivalent sound level is the mean square, A-weighted sound pressure measured over a 24-hour period. Each section of a floor divided by a required 2-hour rated fire wall may be considered as a separate zone for the purpose of this protection.

A-10-5.1 The telephone appliances should be in accordance with NFPA 72G, *Guide for the Installation, Maintenance, and Use of Notification Appliances for Protective Signaling Systems.*

Appendix B Referenced Publications

B-1 The following documents or portions thereof are referenced within this standard for informational purposes only and thus should not be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

B-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 11-1988, *Standard for Low Expansion Foam and Combined Agent Systems*

NFPA 11A-1988, *Standard for Medium- and High-Expansion Foam Systems*

NFPA 12-1989, *Standard on Carbon Dioxide Extinguishing Systems*

NFPA 12A-1989, *Standard on Halon 1301 Fire Extinguishing Systems*

NFPA 12B-1990, *Standard on Halon 1211 Fire Extinguishing Systems*

NFPA 13-1989, *Standard for the Installation of Sprinkler Systems*

NFPA 14-1990, *Standard for the Installation of Standpipe and Hose Systems*

NFPA 15-1990, *Standard for Water Spray Fixed Systems for Fire Protection*

NFPA 17-1990, *Standard for Dry Chemical Extinguishing Systems*

NFPA 37-1990, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*

NFPA 70-1990, *National Electrical Code*

NFPA 72E-1990, *Standard on Automatic Fire Detectors*

NFPA 72G-1989, *Guide for the Installation, Maintenance, and Use of Notification Appliances for Protective Signaling Systems*

NFPA 72H-1988, *Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems*

NFPA 80-1990, *Standard for Fire Doors and Windows*

NFPA 90A-1989, *Standard for the Installation of Air Conditioning and Ventilating Systems*

NFPA 90B-1989, *Standard for the Installation of Warm Air Heating and Air Conditioning Systems*

NFPA 101-1988, *Life Safety Code*

NFPA 110-1988, *Standard for Emergency and Standby Power Systems*

NFPA 600-1986, *Recommendations for Organization, Training and Equipment of Private Fire Brigades*

NFPA 1221-1988, *Standard for the Installation, Maintenance and Use of Public Fire Service Communication Systems*

B-1.2 UL Publications. Underwriters Laboratories Inc., 333 Pfingston Rd., Northbrook, IL 60062.

UL 268, *Standard for Smoke Detectors for Fire Protective Signaling Systems*, third edition.

UL 864, *Standard for Control Units for Fire Protective Signaling Systems*, sixth edition.

UL 985, *Standard for Household Fire Warning System Units*, third edition.

UL 1023, *Standard for Household Burglar-Alarm System Units*, third edition.

B-1.3 Other Publications.

ANSI A17.1-1984, *Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks*; American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

Code of Federal Regulations, Title 47, October 1, 1973, U.S. Government Printing Office, Washington, D.C.

Appendix C

Paragraph Previously Published in NFPA Having the following Number:	Can be Found in the Recombination Document Having Paragraph Number:
72A	1990 Recombination
1-1	1-1
1-1.1	6-1
1-1.2	1-3.3
1-1.3	3-1
1-1.4	2-4.3
1-1.5	1-3.2
1-2	1-4
2-1	Not Necessary
2-2	2-2
2-2.1	2-2.1
2-2.2	2-1.2
2-2.2.1	2-3.1
2-2.3	2-5.1
2-2.4	2-2.2
2-3	2-5.5, 2-5.2, 2-5.7
2-3.1	2-5.4
2-4	2-5.2
2-4.1	2-5.2.1
2-4.2	2-5.2.2
2-4.3	2-5.3
2-4.4	2-5.2.2
2-4.5	2-5.6
2-4.6	2-5.7
2-5	2-1
2-5.1	2-1.1
2-5.1.1	2-1.3
2-5.1.2	2-4.1
2-5.1.3	2-4.2
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2-5.2	2-1.5
2-5.3	2-1.4
2-5.4	4-4.1
2-6	Chapter 5
2-6.1	5-1
2-6.2	5-3.1
2-6.3	5-3.2
2-6.3.1	5-3.2
2-6.4	5-3.3
2-6.5	5-3.4
2-6.6	5-3.5
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2-6.7.2	5-4.2
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2-6.8.1	5-6.1
2-6.8.2	5-6.2
2-6.8.3	5-6.3
2-6.8.4	5-6.4
2-6.8.5	5-6.5
2-6.9	5-5
2-6.9.1	5-5.1
2-6.9.2	5-5.2
2-6.9.3	5-5.3
2-6.10	6-5.1
2-6.10.1	6-5.1
2-7	4-2
2-7.1	4-2.1, 6-3
2-7.1.1	4-3
2-7.1.2	4-2.2
2-7.1.3	4-5
2-7.1.4	4-2.1, Exc. 5
2-7.1.5	4-6
2-7.1.5.1	4-6.1

2-7.1.5.2	4-6.2
2-7.2	
2-7.2.1	6-5.3.1
2-7.2.2	6-5.3.2
2-7.2.3	6-5.3.3
2-7.2.4	6-5.3.4
2-7.2.5	6-5.3.5
2-7.2.6	6-5.3.6
2-7.3	2-4.8
2-7.3.1	2-4.8.1
2-7.3.2	2-4.8.2.1
2-7.3.2.1	2-4.8.2.2
2-8	2-4.9
2-8.1*	2-4.9.1
2-8.2	Not Needed
2-8.2.1	2-4.9.2
2-8.2.2	2-4.9.3
2-8.3	2-4.9.4
2-8.4*	2-4.10
2-8.5	2-4.11
2-8.6	2-4.12
2-8.7	2-4.13
2-9	6-2
2-9.1	Deleted
2-9.1.1	6-2.1
2-9.1.2	6-2.2, 6-2.3
2-9.2	2-4.5
2-9.3	3-5.1.2
2-10	3-6
2-10.1	3-6.1
2-10.2	3-6.2
2-10.3	3-6.3
2-10.4	3-6.4
2-10.5	3-6.5 title 3-6.5.1 text
2-10.5.1	3-6.5.2
2-10.5.2	3-6.5.3
2-10.5.3	3-6.5.4
2-10.5.4	3-6.5.5
2-11	2-4.7
2-12	2-6
2-12.1	2-6.1
2-12.2*	2-6.2
2-13	2-7
2-13.1	2-7.1
2-13.2*	2-7.2
2-14	6-4
2-14.1	6-4
2-15	6-5.2
2-15.1	6-5.2.1
2-15.2	6-5.2.2
2-15.3	6-5.2.3
2-15.4	6-5.2.4
2-15.5	6-5.2.5
2-16	2-1.6
3-1	3-1
3-2	3-2
3-2.1	3-2.4
3-2.2	Not Needed
3-2.2.1	3-2.1
3-2.2.2	3-2.2
3-2.2.3	3-2.3
3-2.2.4*	2-4.4
3-3	3-5
3-3.1	3-5.1
3-3.1.1	3-5.1.1
3-3.1.2	3-5.1.3
3-3.2	3-5.2
3-3.2.1	3-5.2.1
3-3.2.2	3-5.2.2
3-3.2.3	3-5.2.3
3-3.2.4	3-5.2.4
3-3.2.5	3-5.2.5
3-3.2.6	3-5.2.6
3-4	3-3
3-4.1	Not Needed
3-4.1.1	3-3.1
3-4.1.2	3-3.2
3-4.1.3	3-3.3
3-4.1.4	3-3.4
3-5	3-4
3-5.1	Not Needed
3-5.1.1*	3-4.1.1 & 3-4.2.1
3-5.2	Not Needed
3-5.2.1	3-4.2.4
3-5.2.2	3-4.2.3
3-5.2.3	3-4.3
3-5.2.4	6-2.2 & 6-2.3
3-5.3	3-4.1
3-5.3.1*	3-4.1.2
3-5.4	3-4.2
3-5.4.1	3-4.2.2
3-5.4.2	3-4.2.5
3-5.4.3	3-4.2.6
3-5.4.4	3-4.2.7
3-5.4.5	3-4.2.8
3-5.4.6	3-4.2.9
4-1	11-1
4-1.1	11-1.1
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A-2-8.4	A-2-4.10
A-2-8.5(a)	A-2-4.11(a)
A-2-10.5.4 (a) and (b)	A-3-6.5.5(a) & (b)
A-2-12.2 and A-2-13.2 Using Tables	A-2-6.2
2-12.1 and 2-13-1	A-2-7.2
A-3-2.2.4	A-2-4.4
A-3-5.1.1	A-3-4.1.1
A-3-5.3.1	A-3-4.1.2
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B-1.1	B-1.1
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2-5.2	2-1.3
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