Fire Alarm Systems

CHAPTER 2

The information contained in this chapter is intended to assist the registered design professional (RDP), commissioning agent, authority having jurisdiction (AHJ), and the installing contractor in the proper commissioning of a fire alarm system. Included here are preliminary design requirements in the basis of a design document, information on the submission of plans and calculations during the permitting process, and a description of the inspections and tests required to verify system performance. Information related to the needed documentation required for operation and maintenance manuals is also included. This information will assist the RDP, commissioning agent, and/or the AHJ in developing the system-specific commissioning requirements, methods, and procedures for a project specification.

APPROVAL AND ACCEPTANCE

In most jurisdictions a building permit is required. In addition, a permit to install may be required for building systems, including fire alarm systems. Separate submittals should be made to the appropriate code official, RDP, and insurance company for approval. These submittals and approvals should be obtained prior to the installation of any system or component. The requirements of *NFPA 72®*, *National Fire Alarm and Signaling Code*, include provisions on the qualifications of persons designing, installing, and testing fire alarm systems.

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> Fire alarm system and emergency communications system plans and specifications shall be developed in accordance with this Code by persons who are experienced in the proper design, application, installation, and testing of the systems. [NFPA 72-10:10.4.1.1]
>
> Evidence of qualifications shall be provided to the authority having jurisdiction upon request. [NFPA 72-10:10.4.3.2]
>
> The authority having jurisdiction shall be notified prior to installation or alteration of equipment or wiring. [NFPA 72-10:10.18.1.1]
>
> At the authority having jurisdiction's request, complete information regarding the system or system alterations, including specifications, type of system or service, shop drawings, input/output matrix, battery calculations, and notification appliance circuit voltage drop calculations, shall be submitted for approval. [NFPA 72-10:10.18.1.2]

Shop Drawings

Ordinarily, prior to obtaining a permit to install, shop drawings are submitted to the AHJ for review and approval. Shop drawings may contain more detailed information than the preliminary concept drawings submitted by the RDP for the building permit.

Such approval is not intended to relieve the contractor or the RDP of the responsibility for compliance with codes, standards, and specifications. This review and permit application should be completed prior to installation.

Note that the standard scale for architectural drawings is ⅛ in. = 1 ft and should be indicated in the title block of the drawing. In some cases, ¼ in. = 1 ft is used for smaller buildings, with larger scales such as ⅜ in. = 1 ft or ½ in. = 1 ft for elevation views or enlarged plan details.

Shop drawings provide the details of the system and its installation and form the basis of the record drawings that are needed to document the system design, installation, operation, and maintenance. The term "record drawings" is defined in the *Fire Alarm and Signaling Code* as drawings that document the location of all devices, appliances, wiring sequences, wiring methods, and connections of the components of the fire alarm system as installed.

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A Shop drawings for fire alarm systems should provide basic information and should provide the basis for the record drawings required elsewhere in this Code.

Shop drawings should include, to an extent commensurate with the extent of the work being performed, floor plan drawings, riser diagrams, control panel wiring diagrams, point-to-point wiring diagrams, conduit, conductor routing, typical wiring diagrams, and other information as described herein.

All shop drawings should be drawn on sheets of uniform size and should include the following information:

(1) Name of protected premises, owner, and occupant (where applicable)
(2) Name of installer or contractor
(3) Location of protected premises
(4) Device legend in accordance with NFPA® 170, *Standard for Fire Safety and Emergency Symbols*
(5) Date of issue and any revisions

Floor plan drawings should be drawn to an indicated scale and should include the following information:

(1) Floor identification
(2) Point of compass (indication of north)
(3) Graphic scale
(4) All walls and doors
(5) All partitions extending to within 10 percent of the ceiling height (where applicable)
(6) Room descriptions
(7) Fire alarm device/component locations
(8) Locations of fire alarm primary power connection(s)
(9) Locations of monitor/control interfaces to other systems
(10) Riser locations
(11) Type and number of fire alarm system components/devices on each circuit, on each floor or level
(12) Type and quantity of conductors and conduit (if used) used for each circuit
(13) Location of all supply and return air diffusers (where automatic detection is used)

Fire alarm system riser diagrams should include the following information:

(1) General arrangement of the system in building cross-section
(2) Number of risers
(3) Type and number of circuits in each riser

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(4) Type and number of fire alarm system components/devices on each circuit, on each floor or level
(5) Type and quantity of conductors and conduit (if used) for each circuit

Control unit wiring diagrams should be provided for all control equipment (i.e., equipment listed as either a control unit or control unit accessory), power supplies, battery chargers, and annunciators and should include the following information:

(1) Identification of the control equipment depicted
(2) Location(s)
(3) All field wiring terminals and terminal identifications
(4) All circuits connected to field wiring terminals and circuit identifications
(5) All indicators and manual controls, including the full text of all labels
(6) All field connections to supervising station signaling equipment, releasing equipment, and fire safety control interfaces

Typical wiring diagrams should be provided for all initiating devices, notification appliances, remote indicators, annunciators, remote test stations, and end-of-line and power supervisory devices. [NFPA 72-10: A.10.18.1.2]

Final Approval

The fire alarm system record of completion can be used for documenting the final approval.

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Before requesting final approval of the installation and if required by the authority having jurisdiction, the installing contractor shall furnish a written statement stating that the system has been installed in accordance with approved plans and tested in accordance with the manufacturer's published instructions and the appropriate NFPA requirements. [NFPA 72-10:10.18.1.3]

Regarding installation and testing prior to the final approval, it should be noted that the requirements of the *National Fire Alarm and Signaling Code* include provisions on the qualifications and experience of those supervising installation personnel.

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State or local licensure regulations shall be followed to determine qualified personnel. Depending on state or local licensure regulations, qualified personnel shall include, but not be limited to, one or more of the following:

(1) Personnel who are registered, licensed, or certified by a state or local authority
(2) Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction
(3) Personnel who are factory trained and certified for fire alarm system design and emergency communications system design of the specific type and brand of system and who are acceptable to the authority having jurisdiction [NFPA 72-10: 10.4.1.2]

Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of systems addressed within the scope of this Code. Qualified personnel shall include, but not be limited to, one or more of the following:

(1) Personnel who are factory trained and certified for the specific type and brand of system being serviced
(2) Personnel who are certified by a nationally recognized certification organization acceptable to the authority having jurisdiction
(3) Personnel who are factory trained and certified for fire alarm system design and emergency communications system design of the specific type and brand of sys-

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tem and who are acceptable to the authority having jurisdiction [NFPA 72-10: 10.4.3.1]

COMPLETION DOCUMENTS

Record of Completion

Record of Completion Defined

The record of completion is an essential part of fire alarm system documentation. Among other things, it documents the type of system, the names of the installers, and the locations of record drawings, owners' manuals, and test reports. It also provides a confirming record of the acceptance tests and gives details of the components and wiring of the system. It is required for all fire alarm systems. The system installer is responsible for its completion.

Part 1 and Part 2 of the record of completion should verify the system description and installation requirements as detailed in the basis of design. Part 10 is verification by more than one party of tests and deviations from the initial design.

The record of completion should be included with other project closeout documentation, such as as-built drawings and operation and maintenance manuals (see Exhibit 2.1).

EXHIBIT 2.1 Checklist for Required System Testing Documentation

Documentation Checklist:

- ❑ Fire Alarm System Record of Completion
- ❑ Point-to-Point Wiring Diagrams
- ❑ Individual Device Interconnection Drawings
- ❑ As-Built (Record) Drawings
- ❑ Copy of Original Equipment Submittals
- ❑ Operational Manuals
- ❑ Manufacturer's Proper Testing and Maintenance Requirements
- ❑ Device Address List/Conventional Device Location List

Source: National Fire Alarm Code® Handbook, *NFPA, 2010, Exhibit 10.2*

Preparation of a Record of Completion

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The preparation of a record of completion, Figure 10.18.2.1.1, shall be the responsibility of the qualified and experienced person described in 10.4.2. [NFPA 72-10: 10.18.2.1.1]

(A) Parts 1, 2, and 4 through 10 shall be completed after the system is installed and the installation wiring has been checked. Part 3 shall be completed after the operational acceptance tests have been completed.

(B) A preliminary copy of the record of completion shall be given to the system owner and, if requested, to other authorities having jurisdiction after completion of the installation wiring tests. . [NFPA 72-10: 10.18.2.1.2.2]

A final copy shall be provided after completion of the operational acceptance tests. [NFPA 72-10: 10.18.2.1.2.3]

Part 3 of the record of completion includes a provision for the attachment of the inspection, testing, and maintenance formto document the completion of the inspection and testing required by Chapter 10 of the *National Fire Alarm and Signaling Code*.

EXHIBIT 2.2 Example of Filled-Out Record of Completion *Source:* National Fire Alarm Code® Handbook, *NFPA, 2010, Exhibit S6.1.*

FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM RECORD OF COMPLETION

To be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

1. PROPERTY INFORMATION

Name of property: Main Street Towers

Address: 12345 Main Street, Pleasantville, NY 01111

Description of property: 40-story high-rise building with an adjacent 1-story parking structure

Occupancy type: B

Name of property representative: Mary Morris, Property Manager, Mary's Management Company

Address: 12345 Main Street, Pleasantville, NY 01111

Phone: 222/222-2222 Fax: 333/333-3333 E-mail: mm@mmc.com

Authority having jurisdiction over this property: Inspector Jack Jones, Pleasantville Fire Department

Phone: 444/444-4444 Fax: 555/555-5555 E-mail: jackjones@pfd.org

2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION

Installation contractor for this equipment: Fred's Fine Fire Alarm Systems

Address: 789 Broad Street, Pleasantville, NY 01113

License or certification number: NY–1634

Phone: 888/888-8888 Fax: 999/999-9999 E-mail: fredfriendly@fffas.com

Service organization for this equipment: Fred's Fine Fire Alarm Systems

Address: Same

License or certification number:

Phone: Fax: E-mail:

A contract for test and inspection in accordance with NFPA standards is in effect as of: June 11, 2010

Contracted testing company: Fred's Fine Fire Alarm Systems

Address: Same

Phone: Fax: E-mail:

Contract expires: June 11, 2011 Contract number: 45678 Frequency of routine inspections: Quarterly

3. DESCRIPTION OF SYSTEM OR SERVICE

❑ Fire alarm system (nonvoice)

❑ Fire alarm with in-building fire emergency voice alarm communication system (EVACS)

❑ Mass notification system (MNS)

☑ Combination system, with the following components:

☑ Fire alarm ☑ EVACS ☑ MNS ☑ Two-way, in-building, emergency communication system

❑ Other (specify): N/A

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EXHIBIT 2.2 Continued

3. DESCRIPTION OF SYSTEM OR SERVICE *(continued)*

NFPA 72 edition: 2010 Additional description of system(s): N/A

3.1 Control Unit

Manufacturer: Megasystems Model number: AZ–1230

3.2 Mass Notification System

❑ This system does not incorporate an MNS.

3.2.1 System Type:

☑ In-building MNS — combination

❑ In-building MNS — stand-alone ❑ Wide-area MNS ❑ Distributed recipient MNS

❑ Other (specify): N/A

3.2.2 System Features:

☑ Combination fire alarm/MNS ❑ MNS autonomous control unit ❑ Wide-area MNS to regional national alerting interface

❑ Local operating console (LOC) ❑ Distributed recipient MNS (DRMNS) ❑ Wide-area MNS to DRMNS interface

❑ Wide-area MNS to high-power speaker array (HPSA) interface ❑ In-building MNS to wide-area MNS interface

❑ Other (specify): N/A

3.3 System Documentation

☑ An owner's manual, a copy of the manufacturer's instructions, a written sequence of operation, and a copy of the numbered record drawings are stored on site. Location: Building management office, Suite 2222

3.4 System Software

❑ This system does not have alterable site-specific software.

Operating system (executive) software revision level: 4.567

Site-specific software revision date: June 26, 2010 Revision completed by: Fred Friendly

☑ A copy of the site-specific software is stored on site. Location: Building management office, Suite 2222

3.5 Off-Premises Signal Transmission

❑ This system does not have off-premises transmission.

Name of organization receiving alarm signals with phone numbers:

Alarm: Manny's Monitoring Phone: 777/777-7777

Supervisory: Manny's Monitoring Phone: 777/777-7777

Trouble: Manny's Monitoring Phone: 777/777-7777

Entity to which alarms are retransmitted: Pleasantville Fire Department Phone: 444/444-4444

Method of retransmission: Central station operator calls 444/444-4444 after receiving a signal

If Chapter 26, specify the means of transmission from the protected premises to the supervising station:

DACT

If Chapter 27, specify the type of auxiliary alarm system: ❑ Local energy ❑ Shunt ❑ Wired ❑ Wireless

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EXHIBIT 2.2 Continued

4. CIRCUITS AND PATHWAYS

4.1 Signaling Line Pathways

4.1.1 Pathways Class Designations and Survivability

Pathways class: A Survivability level: 2 Quantity: 12

(See NFPA 72, Sections 12.3 and 12.4)

4.1.2 Pathways Utilizing Two or More Media

Quantity: 0 Description: N/A

4.1.3 Device Power Pathways

☑ No separate power pathways from the signaling line pathway

❑ Power pathways are separate but of the same pathway classification as the signaling line pathway

❑ Power pathways are separate and different classification from the signaling line pathway

4.1.4 Isolation Modules

Quantity: 4

4.2 Alarm Initiating Device Pathways

4.2.1 Pathways Class Designations and Survivability

Pathways class: N/A Survivability level: N/A Quantity: 0

(See NFPA 72, Sections 12.3 and 12.4)

4.2.2 Pathways Utilizing Two or More Media

Quantity: 0 Description: N/A

4.2.3 Device Power Pathways

❑ No separate power pathways from the initiating device pathway

❑ Power pathways are separate but of the same pathway classification as the initiating device pathway

❑ Power pathways are separate and different classification from the initiating device pathway

4.3 Non-Voice Audible System Pathways

4.3.1 Pathways Class Designations and Survivability

Pathways class: B Survivability level: N/A Quantity: 24

(See NFPA 72, Sections 12.3 and 12.4)

4.3.2 Pathways Utilizing Two or More Media

Quantity: 0 Description: N/A

4.3.3 Appliance Power Pathways

☑ No separate power pathways from the notification appliance pathway

❑ Power pathways are separate but of the same pathway classification as the notification appliance pathway

❑ Power pathways are separate and different classification from the notification appliance pathway

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EXHIBIT 2.2 Continued

5. ALARM INITIATING DEVICES

5.1 Manual Initiating Devices

5.1.1 Manual Fire Alarm Boxes ❑ This system does not have manual fire alarm boxes.

Type and number of devices: Addressable: 74 Conventional: 0 Coded: 0 Transmitter: 0

Other (specify): N/A

5.1.2 Other Alarm Boxes ❑ This system does not have other alarm boxes.

Description: _____

Type and number of devices: Addressable: 10 Conventional: 0 Coded: 0 Transmitter: 0

Other (specify): N/A

5.2 Automatic Initiating Devices

5.2.1 Smoke Detectors ❑ This system does not have smoke detectors.

Type and number of devices: Addressable: 96 Conventional: 0

Other (specify): N/A

Type of coverage: ❑ Complete area ☑ Partial area ❑ Nonrequired partial area

Other (specify): Located in all electrical and equipment rooms, in elevator lobbies, and at fire doors

Type of smoke detector sensing technology: ❑ Ionization ☑ Photoelectric ❑ Multicriteria ❑ Aspirating ❑ Beam

Other (specify): N/A

5.2.2 Duct Smoke Detectors ❑ This system does not have alarm-causing duct smoke detectors.

Type and number of devices: Addressable: 33 Conventional: 0

Other (specify): N/A

Type of coverage: Located at the supply and return of all air handling units

Type of smoke detector sensing technology: ❑ Ionization ☑ Photoelectric ❑ Aspirating ❑ Beam

5.2.3 Radiant Energy (Flame) Detectors ☑ This system does not have radiant energy detectors.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): N/A

Type of coverage: N/A

5.2.4 Gas Detectors ☑ This system does not have gas detectors.

Type of detector(s): N/A

Number of devices: Addressable: _____ Conventional: _____

Type of coverage: N/A

5.2.5 Heat Detectors ❑ This system does not have heat detectors.

Type and number of devices: Addressable: 12 Conventional: 0

Type of coverage: ❑ Complete area ☑ Partial area ❑ Nonrequired partial area ❑ Linear ☑ Spot

Type of heat detector sensing technology: ☑ Fixed temperature ☑ Rate-of-rise ❑ Rate compensated

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EXHIBIT 2.2 Continued

5. ALARM INITIATING DEVICES *(continued)*

5.2.6 Addressable Monitoring Modules ❑ This system does not have monitoring modules.

Number of devices: 67

5.2.7 Waterflow Alarm Devices ☑ This system does not have waterflow alarm devices.

Type and number of devices: Addressable: 42 Conventional: 0 Coded: 0 Transmitter: 0

5.2.8 Alarm Verification ☑ This system does not incorporate alarm verification.

Number of devices subject to alarm verification: _____ Alarm verification set for _____ seconds

5.2.9 Presignal ❑ This system does not incorporate pre-signal.

Number of devices subject to presignal: N/A

Describe presignal functions: N/A

5.2.10 Positive Alarm Sequence (PAS) ☑ This system does not incorporate PAS.

Describe PAS: N/A

5.2.11 Other Initiating Devices ☑ This system does have other initiating devices.

Describe: N/A

6. SUPERVISORY SIGNAL–INITIATING DEVICES

6.1 Sprinkler System Supervisory Devices ❑ This system does not have sprinkler supervisory devices.

Type and number of devices: Addressable: 49 Conventional: 0 Coded: 0 Transmitter: 0

Other (specify): N/A

6.2 Fire Pump Description and Supervisory Devices ❑ This system does not have a fire pump.

Type fire pump: ☑ Electric ❑ Engine

Type and number of devices: Addressable: 3 Conventional: 0 Coded: 0 Transmitter: 0

Other (specify): N/A

6.2.1 Fire Pump Functions Supervised

☑ Power ☑ Running ☑ Phase reversal ❑ Selector switch not in auto ❑ Engine or control panel trouble ❑ Low fuel

Other (specify): N/A

6.3 Duct Smoke Detectors (DSDs) ☑ This system does not have DSDs causing supervisory signals.

Type and number of devices: Addressable: _____ Conventional: _____

Other (specify): N/A

Type of coverage: N/A

Type of smoke detector sensing technology: ❑ Ionization ❑ Photoelectric ❑ Aspirating ❑ Beam

6.4 Other Supervisory Devices ☑ This system does not have other supervisory devices.

Describe: _____

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EXHIBIT 2.2 Continued

7. MONITORED SYSTEMS

7.1 Engine-Driven Generator

❑ This system does not have a generator.

7.1.1 Generator Functions Supervised

☑ Engine or control panel trouble ☑ Generator running ☑ Selector switch not in auto ☑ Low fuel

❑ Other (specify): N/A

7.2 Special Hazard Suppression Systems

❑ This system does not monitor special hazard systems.

Description of special hazard system(s): Sprinkler preaction system in 24th floor computer room

7.3 Other Monitoring Systems

☑ This system does not monitor other systems.

Description of other system(s):

8. ANNUNCIATORS

❑ This system does not have annunciators.

8.1 Location and Description of Annunciators

Location 1: Fire command center

Location 2: Front lobby at east entrance doors

Location 3: Engineering office on P1 level

9. ALARM NOTIFICATION APPLIANCES

9.1 In-Building Fire Emergency Voice Alarm Communication System

❑ This system does not have an EVACS.

Number of single voice alarm channels: 58 Number of multiple voice alarm channels: 0

Number of speakers: 490 Number of speaker circuits: 58

Location of amplification and sound-processing equipment: Fire command center

Location of paging microphone stations:

Location 1: Fire command center

Location 2: N/A

Location 3: N/A

9.2 Nonvoice Notification Appliances

❑ This system does not have nonvoice notification appliances.

Horns: 0 With visible: 0 Bells: 0 With visible: 0

Chimes: 0 With visible: 0

Visible only: 566 Other (describe): 0

9.3 Notification Appliance Power Extender Panels

❑ This system does not have power extender panels.

Quantity: 42

Locations: 2 in the fire command center and 1 in the electrical equipment room on each floor

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EXHIBIT 2.2 Continued

10. MASS NOTIFICATION CONTROLS, APPLIANCES, AND CIRCUITS

❑ This system does not have an MNS.

10.1 MNS Local Operating Consoles

Location 1: Fire command center

Location 2: N/A

Location 3: N/A

10.2 High-Power Speaker Arrays

Number of HPSA speaker initiation zones: None

Location 1: _____

Location 2: _____

Location 3: _____

10.3 Mass Notification Devices

Combination fire alarm/MNS visible appliances: 0 MNS-only visible appliances: 216

Textual signs: 0 Other (describe): N/A

Supervision class: B

10.3.1 Special Hazard Notification

☑ This system does not have special suppression predischarge notification.

❑ MNS systems DO NOT override notification appliances required to provide special suppression predischarge notification.

11. TWO-WAY EMERGENCY COMMUNICATION SYSTEMS

11.1 Telephone System

❑ This system does not have a two-way telephone system.

Number of telephone jacks installed: 138 Number of warden stations installed: 0

Number of telephone handsets stored on site: 8

Type of telephone system installed: ☑ Electrically powered ❑ Sound powered

11.2 Two-Way Radio Communications Enhancement System

☑ This system does not have a two-way radio communications enhancement system.

Percentage of area covered by two-way radio service: Critical areas: _____ % General building areas: _____ %

Amplification component locations: N/A

Inbound signal strength: _____ dBm Outbound signal strength: _____ dBm

Donor antenna isolation is _____ dB above the signal booster gain

Radio frequencies covered: _____

Radio system monitor panel location: _____

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EXHIBIT 2.2 Continued

11. TWO-WAY EMERGENCY COMMUNICATION SYSTEMS *(continued)*

11.3 Area of Refuge (Area of Rescue Assistance) Emergency Communications Systems

❑ This system does not have an area of refuge (area of rescue assistance) emergency communications system.

Number of stations: 43 Location of central control point: Fire command center

Days and hours when central control point is attended: During incident

Location of alternate control point: Building management office

Days and hours when alternate control point is attended: 8 to 5 on weekdays

11.4 Elevator Emergency Communications Systems

❑ This system does not have an elevator emergency communications system.

Number of elevators with stations: 12 Location of central control point: Fire command center

Days and hours when central control point is attended: During incident

Location of alternate control point: Building management office

Days and hours when alternate control point is attended: 8 to 5 on weekdays

11.5 Other Two-Way Communication Systems

Describe: N/A

12. CONTROL FUNCTIONS

This system activates the following control functions:

☑ Hold-open door releasing devices ☑ Smoke management ❑ HVAC shutdown ☑ F/S dampers

☑ Door unlocking ☑ Elevator recall ☑ Fuel source shutdown ❑ Extinguishing agent release

☑ Elevator shunt trip ☑ Mass notification system override of fire alarm notification appliances

Other (specify): N/A

12.1 Addressable Control Modules

❑ This system does not have control modules.

Number of devices: 122

Other (specify): N/A

13. SYSTEM POWER

13.1 Control Unit

13.1.1 Primary Power

Input voltage of control panel: 120 VAC Control panel amps: 6.2

Overcurrent protection: Type: Circuit breaker Amps: 15

Location (of primary supply panel board): First floor electrical room

Disconnecting means location: First floor electrical room

13.1.2 Engine-Driven Generator

❑ This system does not have a generator.

Location of generator: Lower level generator room

Location of fuel storage: Sub basement fuel storage room Type of fuel: Diesel

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EXHIBIT 2.2 Continued

13. SYSTEM POWER *(continued)*

13.1.3 Uninterruptible Power System ☑ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.1.4 Batteries

Location: Fire command center Type: Gel cell Nominal voltage: 24 VDC Amp/hour rating: 30

Calculated capacity of batteries to drive the system:

In standby mode (hours): 38 In alarm mode (minutes): 11

☑ Batteries are marked with date of manufacture ☑ Battery calculations are attached

13.2 In-Building Fire Emergency Voice Alarm Communication System or Mass Notification System

❑ This system does not have an EVACS or MNS system.

13.2.1 Primary Power

Input voltage of EVACS or MNS panel: 120 VAC EVACS or MNS panel amps: 11.9

Overcurrent protection: Type: Circuit breaker Amps: 15

Location (of primary supply panel board): First floor electrical room

Disconnecting means location: First floor electrical room

13.2.2 Engine-Driven Generator ❑ This system does not have a generator.

Location of generator: Lower level generator room

Location of fuel storage: Sub basement fuel storage room Type of fuel: Diesel

13.2.3 Uninterruptible Power System ☑ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.2.4 Batteries

Location: Fire command center Type: Gel cell Nominal voltage: 24 VDC Amp/hour rating: 120

Calculated capacity of batteries to drive the system:

In standby mode (hours): 30 In alarm mode (minutes): 8

☑ Batteries are marked with date of manufacture ☑ Battery calculations are attached

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EXHIBIT 2.2 Continued

13. SYSTEM POWER *(continued)*

13.3 Notification Appliance Power Extender Panels

❑ This system does not have power extender panels.

13.3.1 Primary Power

Input voltage of power extender panel(s): 120 VAC Power extender panel amps: 2

Overcurrent protection: Type: Circuit breaker Amps: 15

Location (of primary supply panel board): E Power panels located every three floors in the electrical rooms

Disconnecting means location: E Power panels

13.3.2 Engine-Driven Generator

❑ This system does not have a generator.

Location of generator: Lower level generator room

Location of fuel storage: Sub basement fuel storage room Type of fuel: Diesel

13.3.3 Uninterruptible Power System

☑ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

13.3.4 Batteries

Location: Inside each panel Type: Gel cell Nominal voltage: 24 VDC Amp/hour rating: 14

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): See attached calculations

☑ Batteries are marked with date of manufacture ☑ Battery calculations are attached

14. RECORD OF SYSTEM INSTALLATION

Fill out after all installation is complete and wiring has been checked for opens, shorts, ground faults, and improper branching, but before conducting operational acceptance tests.

This is a: ☑ New system ❑ Modification to an existing system Permit number: 4567

The system has been installed in accordance with the following requirements: (Note any or all that apply.)

☑ *NFPA 72,* Edition: 2010

☑ *NFPA 70, National Electrical Code,* Article 760, Edition: 2008

☑ Manufacturer's published instructions

Other (specify): Pleasantville local codes, revised 2008

System deviations from referenced NFPA standards: None known

Signed: Fred Friendly Printed name: Fred Friendly Date: 8/21/2010

Organization: Fred's Fine Fire Alarm Syst. Title: President Phone: 444/444-4444

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EXHIBIT 2.2 Continued

15. RECORD OF SYSTEM OPERATONAL ACCEPTANCE TEST

☑ New system

All operational features and functions of this system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements for the following:

❑ Modifications to an existing system

All newly modified operational features and functions of the system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements of the following:

☑ *NFPA 72,* Edition: 2010

☑ *NFPA 70, National Electrical Code,* Article 760, Edition: 2008

☑ Manufacturer's published instructions

Other (specify): Pleasantville local codes, revised 2008

☑ Individual device testing documentation [Inspection and Testing Form (Figure 14.6.2.4) is attached]

Signed: Fred Friendly Printed name: Fred Friendly Date: 8/21/2010

Organization: Fred's Fine Fire Alarm Syst. Title: President Phone: 444/444-4444

16. CERTIFICATIONS AND APPROVALS

16.1 System Installation Contractor:

This system, as specified herein, has been installed and tested according to all NFPA standards cited herein.

Signed: Fred Friendly Printed name: Fred Friendly Date: 8/21/2010

Organization: Fred's Fine Fire Alarm Syst. Title: President Phone: 888/888-8888

16.2 System Service Contractor:

The undersigned has a service contract for this system in effect as of the date shown below.

Signed: Fred Friendly Printed name: Fred Friendly Date: 8/21/2010

Organization: Fred's Fine Fire Alarm Syst. Title: President Phone: 888/888-8888

16.3 Supervising Station:

This system, as specified herein, will be monitored according to all NFPA standards cited herein.

Signed: Manny Monitor Printed name: Manny Monitor Date: 8/30/2010

Organization: Manny's Monitoring Title: President Phone: 777/777-7777

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EXHIBIT 2.2 Continued

16. CERTIFICATIONS AND APPROVALS *(continued)*

16.4 Property or Owner Representative:

I accept this system as having been installed and tested to its specifications and all NFPA standards cited herein.

Signed: Mary Morris Printed name: Mary Morris Date: 8/30/2010

Organization: Mary's Management Title: Property Manager Phone: 222/222-2222

16.5 Authority Having Jurisdiction:

I have witnessed a satisfactory acceptance test of this system and find it to be installed and operating properly in accordance with its approved plans and specifications, with its approved sequence of operations, and with all NFPA standards cited herein.

Signed: Jack Jones Printed name: Jack Jones Date: 9/10/2010

Organization: Pleasantville Fire Dept. Title: Inspector Phone: 444/444-4444

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The preparation of a record of completion, Figure 10.18.2.1.1 shall be in accordance with 10.18.2.1.2.1 through 10.18.2.1.2.8. [NFPA 72-10: 10.18.2.1.2]

Parts 1 through 14 of the record of completion shall be completed after the system is installed and the installation wiring has been checked. [NFPA 72-10: 10.18.2.1.2.1]

Parts 15 and 16 of the record of completion shall be completed after the operational acceptance tests have been completed. [NFPA 72-10: 10.18.2.1.2.2]

A preliminary copy of the record of completion shall be given to the system owner and, if requested, to other authorities having jurisdiction after completion of the installation wiring tests. [NFPA 72-10: 10.18.2.1.2.3]

A final copy of the record of completion shall be provided after completion of the operational acceptance tests. [NFPA 72-10: 10.18.2.1.2.4]

One copy of the record of completion shall be stored at the fire alarm control unit or other approved location. [NFPA 72-10: 10.18.2.1.2.5]

This copy shall be updated to reflect all system additions or modifications and maintained in a current condition at all times. [NFPA 72-10: 10.18.2.1.2.6]

System Documentation

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Every system shall include the following documentation, which shall be delivered to the owner or the owner's representative upon final acceptance of the system:

(1) An owner's manual and manufacturer's published instructions covering all system equipment
(2) Record drawings
(3) For software-based systems, record copy of the site-specific software
(4) A written sequence of operation [NFPA 72-10: 10.18.2.3]

Compliance Verification

Where compliance verification is required, it should be completed by an independent third party. The inspections, tests, and documentation required by *NFPA 72®, the National Fire Alarm Signaling Code,* form the documentation package that supports compliance verification.

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Where required, compliance of the completed installation with the requirements of this Code, as implemented via the referring code(s), specifications, and/or other criteria applicable to the specific installation, shall be certified by a qualified and impartial third-party organization acceptable to the authority having jurisdiction. [NFPA 72-10: 18.2.4]

A This section is intended to provide a basis for the authority having jurisdiction to require third-party verification and certification that the authority having jurisdiction and the system owner can rely on to reasonably assure that the fire alarm system installation complies with the applicable requirements. [NFPA 72-10: A.10.18.2.4]

Verification shall ensure that the installed system includes all components and functions, that those components and functions are installed and operate as required, that the system has been 100 percent acceptance tested in accordance with Chapter 14, and that all required documentation has been provided to the system owner. [NFPA 72-10: 10.18.2.4.1]

Exception: Where the installation is an extension, modification, or reconfiguration of an existing system, the verification shall be required for the new work only, and reacceptance testing in accordance with Chapter 14 shall be acceptable. . [NFPA 72-10:10.18.2.4.1]

SYSTEM TESTING

Initial Acceptance Testing

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All new systems shall be inspected and tested in accordance with the requirements of Chapter 14 [of NFPA 72]. [NFPA 72-10: 14.4.1.1.1.1]

A visual inspection should always be conducted prior to any testing, including initial and reacceptance testing. Exhibit 2.3 identifies various fire alarm system components and subsystems and also provides the frequency required for periodic inspections. Visual inspections confirm that equipment is located and installed as intended by the system design and as documented on the record drawings and system documentation.

EXHIBIT 2.3 Visual Inspection Frequencies *Source:* NFPA 72®, *2010, Table 10.3.1.*

	Component	Initial/ Reacceptance	Monthly	Quarterly	Semiannually	Annually
1.	Control Equipment: Fire Alarm Systems Monitored for Alarm, Supervisory, and Trouble Signals					
	(a) Fuses	X	—	—	—	X
	(b) Interfaced equipment	X	—	—	—	X
	(c) Lamps and LEDs	X	—	—	—	X
	(d) Primary (main) power supply	X	—	—	—	X
2.	Control Equipment: Fire Alarm Systems Unmonitored for Alarm, Supervisory, and Trouble Signals					
	(a) Fuses	X (weekly)	—	—	—	—
	(b) Interfaced equipment	X (weekly)	—	—	—	—
	(c) Lamps and LEDs	X (weekly)	—	—	—	—
	(d) Primary (main) power supply	X (weekly)	—	—	—	—
3.	Batteries					
	(a) Lead-acid	X	X	—	—	—
	(b) Nickel-cadmium	X	—	—	X	—
	(c) Primary (dry cell)	X	X	—	—	—
	(d) Sealed lead-acid	X	—	—	X	—
4.	Transient Suppressors	X	—	—	X	—
5.	Control Unit Trouble Signals	X (weekly)	—	—	X	—
6.	Fiber-Optic Cable Connections	X	—	—	—	X
7.	Emergency Voice/Alarm Communications Equipment	X	—	—	X	—
8.	Remote Annunciators	X	—	—	X	—
9.	Initiating Devices					
	(a) Air sampling	X	—	—	X	—
	(b) Duct detectors	X	—	—	X	—
	(c) Electromechanical releasing devices	X	—	—	X	—
	(d) Fire extinguishing system(s) or suppression system(s) switches	X	—	—	X	—

EXHIBIT 2.3 Continued

	Component	Initial/ Reacceptance	Monthly	Quarterly	Semiannually	Annually
	(e) Fire alarm boxes	X	—	—	X	—
	(f) Heat detectors	X	—	—	X	—
	(g) Radiant energy fire detectors	X	—	X	—	—
	(h) Smoke detectors	X	—	—	X	—
	(i) Supervisory signal devices	X	—	X	—	—
	(j) Waterflow devices	X	—	X	—	—
10.	Guard's Tour Equipment	X	—	—	X	—
11.	Interface Equipment	X	—	—	X	—
12.	Alarm Notification Appliances — Supervised	X	—	—	X	—
13.	Supervising Station Fire Alarm Systems — Transmitters					
	(a) DACT	X	—	—	X	—
	(b) DART	X	—	—	X	—
	(c) McCulloh	X	—	—	X	—
	(d) RAT	X	—	—	X	—
14.	Special Procedures	X	—	—	X	—
15.	Supervising Station Fire Alarm Systems — Receivers					
	(a) DACR*	X	X	—	—	—
	(b) DARR*	X	—	—	X	—
	(c) McCulloh systems*	X	—	—	X	—
	(d) Two-way RF multiplex*	X	—	—	X	—
	(e) RASSR*	X	—	—	X	—
	(f) RARS*	X	—	—	X	—
	(g) Private microwave*	X	—	—	X	—

*Reports of automatic signal receipt shall be verified daily.

Chapter 14 of the *National Fire Alarm and Signaling Code* includes requirements for testing of all fire alarm system components and subsystems. Initial acceptance testing of the entire system in accordance with the test methods prescribed in Chapter 14 is required before the system can be approved and put into service.

Reacceptance Testing

Whenever a fire alarm system is modified or parts are replaced for maintenance, reacceptance testing is required. Reacceptance testing of specific components or subsystems must also be in accordance with the test methods prescribed in Chapter 14 before the equipment and system can be approved and put back into service.

Initiating Device, Notification Appliance, Control Relay Changes

Initiating devices and notification appliances are defined as follows:

> *Initiating Device:* A system component that originates transmission of a change-of-state condition, such as in a smoke detector, manual fire alarm box, or supervisory switch. [NFPA 72-10: 3.3.122]

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Notification Appliance. A fire alarm system component such as a bell, horn, speaker, light, or text display that provides audible, tactile, or visible outputs, or any combination thereof. [NFPA 72-10: 3.3.160]

When an initiating device, notification appliance, or control relay is added, it shall be functionally tested. [NFPA 72-10: 14.4.1.2.1.1]

When an initiating device, notification appliance, or control relay is deleted, another device, appliance, or control relay on the circuit shall be operated. [NFPA 72-10: 14.4.1.2.1.2]

Control Equipment Hardware Changes

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When modifications or repairs to control equipment hardware are made, the control equipment shall be tested in accordance with Table 14.4.2.2 , items 1(a) and 1(d). [NFPA 72-10: 14.4.1.2.1.3]

Signaling 104

Site-Specific Software Changes

Site-specific software defines the specific operation and configuration of a particular system, including the type and quantity of hardware modules, customized labels, and the system's specific operating features.

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Programs, instruments, procedures, data, and the like that are executed by a central processing unit of a product and that influence the functional performance of that product. For the purpose of software is one of two types: executive software and site-specific software. (SIG-TMS) . [NFPA 72-10: 3.3.255]

Executive Software. Control and supervisory execution of all other programs and directly or indirectly causes the required functions of the product to be performed. Executive software is sometimes referred to as firmware, BIOS, or executive program. (SIG-TMS) [NFPA 72-10: 3.3.255.1]

Site-Specific Software. Program that is separate from, but controlled by, the executive software which allows inputs, outputs, and system configuration to be selectively defined to meet the needs of a specific installation. Typically it defines the type and quantity of hardware, customized labels, and the specific operating features of a system. (SIG-TMS) [NFPA 72-10:3.3.255.2]

When changes are made to site-specific software, the following shall apply:

(1) All functions known to be affected by the change, or identified by a means that indicates changes, shall be 100 percent tested.
(2) In addition, 10 percent of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, also shall be tested and correct system operation shall be verified.
(3) A revised record of completion in accordance with 10.18.2.1 shall be prepared to reflect these changes. [NFPA 72-10: 14.4.1.2.1.4]

Control Units Changes

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Changes to all control units connected or controlled by the system's executive software shall require a 10 percent functional test of the system, including a test of at least one device on each input and output circuit to verify critical system functions such as notification appliances, control functions, and off-premises reporting. [NFPA 72-10:114.4.1.2.2]

Operating System Software Changes

The system's executive software is the operating system software that is fundamental to the system's operation and can only be altered by the equipment manufacturer or its authorized representative.

TEST METHODS

Specific test methods for each fire alarm system component and subsystem apply to initial acceptance testing, reacceptance testing, and to periodic testing. Testing completed in accordance with these methods assures that the system will perform as intended by the system design and as documented on the record drawings and system documentation. A record of all system inspection and testing is required. The inspection and testing form (Exhibit 2.4) contains additional information that must be provided; the form can be used to facilitate documentation of the system inspection and testing.

Fire alarm systems and other systems and equipment that are associated with fire alarm systems and accessory equipment shall be tested according to Table 14.4.2.2. [NFPA 72-10: 14.4.2.2]

RECORDS

Permanent Records

A permanent record is defined as one that has been determined by the AHJ to have sufficient value to warrant its permanent preservation and protection. In commissioning fire alarm systems, the permanent records should include, as a minimum, the as-built drawings, operation and maintenance manuals (O&M), inspection and test reports, and the basis of design document. These records can be maintained in paper or electronic format and should be stored appropriately as required by NFPA 232, *Standard for the Protection of Records.*

Permanent records are intended to be maintained on file for the life of the system. The information contained therein is critical to provide the system owner, the AHJ, and maintenance personnel with a complete understanding of the system operation and function of system components throughout the operational life of the system.

> After successful completion of acceptance tests approved by the authority having jurisdiction, the requirements in 14.6.1.1 through 14.6.1.3 shall apply. [NFPA 72-10: 14.6.1]
>
> A set of reproducible as-built installation drawings, operation and maintenance manuals, and a written sequence of operation shall be provided to the building owner or the owner's designated representative. [NFPA 72-10: 14.6.1.1]
>
> The system owner shall be responsible for maintaining these records for the life of the system for examination by any authority having jurisdiction. Paper or electronic media shall be permitted. [NFPA 72-10: 14.6.3]

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SUMMARY

The commissioning of a fire alarm system involves the following process:

- Development of the system design and installation documents
- Submittal and approval of the system design and installation documents

EXHIBIT 2.4 Sample Inspection and Testing Form *Source: Adapted from* NFPA 72®, *2010, Figure 10.6.2.3.*

FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM INSPECTION AND TESTING FORM

To be completed by the system inspector or tester at the time of the inspection or test.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

Date of this inspection or test: _____ Time of inspection or test: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

Description of property: _____

Occupancy type: _____

Name of property representative: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Authority having jurisdiction over this property: _____

Phone: _____ Fax: _____ E-mail: _____

2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION

Service and/or testing organization for this equipment: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Service technician or tester: _____

Qualifications of technician or tester: _____

A contract for test and inspection in accordance with NFPA standards is in effect as of: _____

The contract expires: _____ Contract number: _____ Frequency of tests and inspections: _____

Monitoring organization for this equipment: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Entity to which alarms are retransmitted: _____ Phone: _____

3. TYPE OF SYSTEM OR SERVICE

❑ Fire alarm system (nonvoice)

❑ Fire alarm with in-building fire emergency voice alarm communication system (EVACS)

❑ Mass notification system (MNS)

❑ Combination system, with the following components:

❑ Fire alarm ❑ EVACS ❑ MNS ❑ Two-way, in-building, emergency communication system

❑ Other (specify): _____

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EXHIBIT 2.4 Continued

3. TYPE OF SYSTEM OR SERVICE *(continued)*

NFPA 72 edition: _____ Additional description of system(s): _____

_____

3.1 Control Unit

Manufacturer: _____ Model number: _____

3.2 Mass Notification System

❑ This system does not incorporate an MNS.

3.2.1 System Type:

❑ In-building MNS — combination

❑ In-building MNS — stand-alone ❑ Wide-area MNS ❑ Distributed recipient MNS

❑ Other (specify): _____

3.2.2 System Features:

❑ Combination fire alarm/MNS ❑ MNS ACU only ❑ Wide-area MNS to regional national alerting interface

❑ Local operating console (LOC) ❑ Direct recipient MNS (DRMNS) ❑ Wide-area MNS to DRMNS interface

❑ Wide-area MNS to high-power speaker array (HPSA) interface ❑ In-building MNS to wide-area MNS interface

❑ Other (specify): _____

3.3 System Documentation

❑ An owner's manual, a copy of the manufacturer's instructions, a written sequence of operation, and a copy of the record drawings are stored on site. Location: _____

3.4 System Software

❑ This system does not have alterable site-specific software.

Software revision number: _____ Software last updated on: _____

❑ A copy of the site-specific software is stored on site. Location: _____

4. SYSTEM POWER

4.1 Control Unit

4.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____

4.1.2 Engine-Driven Generator

❑ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

4.1.3 Uninterruptible Power System

❑ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

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EXHIBIT 2.4 Continued

4. SYSTEM POWER *(continued)*

4.1.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

❑ Batteries are marked with date of manufacture.

4.2 In-Building Fire Emergency Voice Alarm Communication System or Mass Notification System

❑ This system does not have an EVACS or MNS.

4.2.1 Primary Power

Input voltage of EVACS or MNS panel: _____ EVACS or MNS panel amps: _____

4.2.2 Engine-Driven Generator

❑ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

4.2.3 Uninterruptible Power System

❑ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

4.2.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

❑ Batteries are marked with date of manufacture.

4.3 Notification Appliance Power Extender Panels

❑ This system does not have power extender panels.

4.3.1 Primary Power

Input voltage of power extender panel(s): _____ Power extender panel amps: _____

4.3.2 Engine-Driven Generator

❑ This system does not have a generator.

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

4.3.3 Uninterruptible Power System

❑ This system does not have a UPS.

Equipment powered by a UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

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EXHIBIT 2.4 Continued

4. SYSTEM POWER *(continued)*

4.3.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

❑ Batteries are marked with date of manufacture.

5. ANNUNCIATORS

❑ This system does not have annunciators.

5.1 Location and Description of Annunciators

Annunciator 1: _____

Annunciator 2: _____

Annunciator 3: _____

6. NOTIFICATIONS MADE PRIOR TO TESTING

Monitoring organization	Contact: _____	Time: _____
Building management	Contact: _____	Time: _____
Building occupants	Contact: _____	Time: _____
Authority having jurisdiction	Contact: _____	Time: _____
Other, if required	Contact: _____	Time: _____

7. TESTING RESULTS

7.1 Control Unit and Related Equipment

Description	Visual Inspection	Functional Test	Comments
Control unit	❑	❑	
Lamps/LEDs/LCDs	❑	❑	
Fuses	❑	❑	
Trouble signals	❑	❑	
Disconnect switches	❑	❑	
Ground-fault monitoring	❑	❑	
Supervision	❑	❑	
Local annunciator	❑	❑	
Remote annunciators	❑	❑	
Power extender panels	❑	❑	
Isolation modules	❑	❑	
Other (specify)	❑	❑	

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EXHIBIT 2.4 Continued

7. TESTING RESULTS *(continued)*

7.2 Control Unit Power Supplies

Description	Visual Inspection	Functional Test	Comments
120-volt power	❑	❑	
Generator or UPS	❑	❑	
Battery condition	❑	❑	
Load voltage	❑	❑	
Discharge test	❑	❑	
Charger test	❑	❑	
Other (specify)	❑	❑	

7.3 In-Building Fire Emergency Voice Alarm Communications Equipment

Description	Visual Inspection	Functional Test	Comments
Control unit	❑	❑	
Lamps/LEDs/LCDs	❑	❑	
Fuses	❑	❑	
Primary power supply	❑	❑	
Secondary power supply	❑	❑	
Trouble signals	❑	❑	
Disconnect switches	❑	❑	
Ground-fault monitoring	❑	❑	
Panel supervision	❑	❑	
System performance	❑	❑	
Sound pressure levels Occupied ❑ Yes ❑ No Ambient _____ dBA Alarm _____ dBA (attach report with locations, values, and weather conditions)	❑	❑	
System intelligibility ❑ CSI ❑ STI (attach report with locations, values, and weather conditions)	❑	❑	
Other (specify)	❑	❑	

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EXHIBIT 2.4 Continued

7. TESTING RESULTS *(continued)*

7.4 Notification Appliance Power Extender Panels

Description	Visual Inspection	Functional Test	Comments
Lamps/LEDs/LCDs	❑	❑	
Fuses	❑	❑	
Primary power supply	❑	❑	
Secondary power supply	❑	❑	
Trouble signals	❑	❑	
Ground-fault monitoring	❑	❑	
Panel supervision	❑	❑	
Other (specify)	❑	❑	

7.5 Mass Notification Equipment

Description	Visual Inspection	Functional Test	Comments
Functional test	❑	❑	
Reset/power down test	❑	❑	
Fuses	❑	❑	
Primary power supply	❑	❑	
UPS power test	❑	❑	
Trouble signals	❑	❑	
Disconnect switches	❑	❑	
Ground-fault monitoring	❑	❑	
CCU security mechanism	❑	❑	
Prerecorded message content	❑	❑	
Prerecorded message activation	❑	❑	
Software backup performed	❑	❑	
Test backup software	❑	❑	
Fire alarm to MNS interface	❑	❑	
MNS to fire alarm interface	❑	❑	
In-building MNS to wide-area MNS	❑	❑	

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EXHIBIT 2.4 Continued

7. TESTING RESULTS *(continued)*

7.5 Mass Notification Equipment *(continued)*

Description	Visual Inspection	Functional Test	Comments
MNS to direct recipient MNS	❑	❑	
Sound pressure levels Occupied ❑ Yes ❑ No Ambient _____ dBA Alarm _____ dBA (attach report with locations, values, and weather conditions)	❑	❑	
System intelligibility ❑ CSI ❑ STI (attach report with locations, values, and weather conditions)	❑	❑	
Other (specify)	❑	❑	

7.6 Two-Way Communications Equipment

Description	Visual Inspection	Functional Test	Comments
Phone handsets	❑	❑	
Phone jacks	❑	❑	
Off-hook indicator	❑	❑	
Call-in signal	❑	❑	
System performance	❑	❑	
System audibility	❑	❑	
System intelligibility	❑	❑	
Radio communications enhancement system	❑	❑	
Area of refuge communication system	❑	❑	
Elevator emergency communications system	❑	❑	
Other (specify)	❑	❑	

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EXHIBIT 2.4 Continued

7. TESTING RESULTS *(continued)*

7.7 Combination Systems

Description	Visual Inspection	Functional Test	Comments
Fire extinguishing monitoring devices/system	❑	❑	
Carbon monoxide detector/system	❑	❑	
Combination fire/ security system	❑	❑	
Other (specify)	❑	❑	

7.8 Special Hazard Systems

Description (specify)	Visual Inspection	Functional Test	Comments
	❑	❑	
	❑	❑	
	❑	❑	

7.9 Emergency Communications System

❑ Visual

❑ Functional

❑ Simulated operation

❑ Ensure predischarge notification appliances of special hazard systems are not overridden by the MNS. See *NFPA 72,* 24.4.1.7.1.

7.10 Monitored Systems

Description (specify)	Visual Inspection	Functional Test	Comments
Engine-driven generator	❑	❑	
Fire pump	❑	❑	
Special suppression systems	❑	❑	
Other (specify)	❑	❑	

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EXHIBIT 2.4 Continued

7. TESTING RESULTS *(continued)*

7.11 Auxiliary Functions

Description	Visual Inspection	Functional Test	Comments
Door-releasing devices	❑	❑	
Fan shutdown	❑	❑	
Smoke management/ Smoke control	❑	❑	
Smoke damper operation	❑	❑	
Smoke shutter release	❑	❑	
Door unlocking	❑	❑	
Elevator recall	❑	❑	
Elevator shunt trip	❑	❑	
MNS override of FA signals	❑	❑	
Other (specify)	❑	❑	

7.12 Alarm Initiating Device

❑ Device test results sheet attached listing all devices tested and the results of the testing

7.13 Supervisory Alarm Initiating Device

❑ Device test results sheet attached listing all devices tested and the results of the testing

7.14 Alarm Notification Appliances

❑ Appliance test results sheet attached listing all appliances tested and the results of the testing

7.15 Supervisory Station Monitoring

Description	Yes	No	Time	Comments
Alarm signal	❑	❑		
Alarm restoration	❑	❑		
Trouble signal	❑	❑		
Trouble restoration	❑	❑		
Supervisory signal	❑	❑		
Supervisory restoration	❑	❑		

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EXHIBIT 2.4 Continued

8. NOTIFICATIONS THAT TESTING IS COMPLETE

Monitoring organization	Contact: _____	Time: _____
Building management	Contact: _____	Time: _____
Building occupants	Contact: _____	Time: _____
Authority having jurisdiction	Contact: _____	Time: _____
Other, if required	Contact: _____	Time: _____

9. SYSTEM RESTORED TO NORMAL OPERATION

Date: _____ Time: _____

10. CERTIFICATION

10.1 Inspector Certification:

This system, as specified herein, has been inspected and tested according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

10.2 Acceptance by Owner or Owner's Representative:

The undersigned has a service contract for this system in effect as of the date shown below.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

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EXHIBIT 2.4 Continued

DEVICE TEST RESULTS

(Attach additional sheets if required)

Device Type	Address	Location	Test Results

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- Installation, inspection, and testing of the system in accordance with the system design and installation documents
- Documentation of the as-built installation as well as the inspection and testing
- Final approval of the system installation and testing

The fire alarm system record of completion is the focal point for the documentation of the system design, installation, testing, and approval. This document requires verification and documentation of items such as the types of system or service, record of system installation and operation, and information on signaling line circuits, alarm-initiating and supervisory devices and circuits, alarm notification appliances and circuits, and system power supplies. The record of completion also requires documentation of the inspection and testing of the fire alarm system through the attachment of the completed inspection and testing form.

In addition, the project specification may require other components to be installed, such as sleeving and packing of wall or floor penetrations, signage, and so on. Verification of the installation can be made and adequacy of these components or other equipment and components can be verified by an installation report or a supplement to the fire alarm system record of completion. The training and documentation recommendations in Part One of NFPA 3, Chapter 1 should be followed for proper documentation of the commissioning activities for the system.