



## First Revision No. 5111-NFPA 72-2022 [ Global Input ]

[Revise 3.3.24]

### **3.3.24 Authorized Personnel.**

~~The property owner, or designated representative appointed or selected by the property owner, who performs certain duties. (SIG-FUN)See 3.3.211, Personnel.~~

[Revise 3.3.103]

### **3.3.103 Emergency Personnel.**

~~Person(s) who have been trained in emergency response. (SIG-FUN)See 3.3.211, Personnel.~~

[relocate definitions to 3.3.211.1 and 3.3.211.2]

### **3.3.211 Personnel.**

#### **3.3.211.1 Authorized Personnel.**

The property owner, or designated representative appointed or selected by the property owner, who performs certain duties. (SIG-FUN)

#### **3.3.211.2 Emergency Personnel.**

Person(s) who have been trained in emergency response. (SIG-FUN)

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 09:02:25 EDT 2022

## Committee Statement

**Committee Statement:** The definitions are moved under the heading for Personnel for consistency.

**Response Message:** FR-5111-NFPA 72-2022



## First Revision No. 5363-NFPA 72-2022 [ Detail ]

Insert a new definition for 'Cybersecurity-related Only Software' in 3.3.291 Software, as follows:

### **3.3.291.4 Cybersecurity-Related Only Software.**

Software that is included in a system element that is arranged such that its inclusion or exclusion in no way affects the executive or site-specific software execution and whose purpose is to reduce the vulnerability of the system to cybersecurity attacks. (SIG-FUN)

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Fri Jul 22 12:04:37 EDT 2022

## Committee Statement

**Committee Statement:** The new term is defined to recognize types of software that are used only for cybersecurity protection.

**Response Message:** FR-5363-NFPA 72-2022

[Public Input No. 337-NFPA 72-2022 \[New Section after 3.3.288.2\]](#)



## First Revision No. 5002-NFPA 72-2022 [ Section No. 1.4.1 ]

### 1.4.1

~~Unless otherwise noted, it is not intended that the~~ The provisions of this document shall not be required to be applied to facilities, equipment, structures, or installations that were existing or approved for construction or installation prior to the effective date of the document.

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 08:41:13 EDT 2022

### Committee Statement

**Committee Statement:** Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 2.3.1.1 requires chapter 1 to be written in mandatory language.

**Response:** FR-5002-NFPA 72-2022

**Message:**

Public Input No. 69-NFPA 72-2022 [Section No. 1.4.1]



## First Revision No. 5003-NFPA 72-2022 [ Section No. 1.6 ]

### 1.6 Units and Formulas.

#### 1.6.1

The units of measure in this Code ~~are~~ shall be presented in U.S. Customary Units (inch-pound units).

#### 1.6.2

Where presented, the International System (~~SI~~) of Units (SI) shall follow the inch-pound units in parentheses.

#### 1.6.3

Where both systems of units are presented, either system shall be acceptable for satisfying the requirements in this Code.

#### 1.6.4

Where both systems of units are presented, users of this Code shall ~~apply one set of units consistently and shall not alternate between units.~~ comply with both of the following:

- (1) Shall utilize only one set of units consistently.
- (2) Shall not alternate between units

#### 1.6.5\*

The values presented for measurements in this Code ~~are~~ shall be expressed with a degree of precision appropriate for practical application and enforcement. ~~It is not intended that the application or enforcement of these values be more precise than the precision expressed.~~

#### A.1.6.5

Where dimensions are expressed in inches, it is intended that the precision of the measurement be 1 in., thus plus or minus  $\frac{1}{2}$  in. The conversion and presentation of dimensions in millimeters would then have a precision of 25 mm, thus plus or minus 13 mm. It is not intended that the application or enforcement of these values be more precise than the precision expressed.

#### 1.6.6

Where extracted text contains values expressed in only one system of units, the values in the extracted text ~~have been~~ shall be retained without conversion to preserve the values established by the responsible technical committee in the source document.

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 08:46:00 EDT 2022

## Committee Statement

**Committee Statement:** Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 2.3.1.1 requires chapter 1 to be written in mandatory language.

**Response:** FR-5003-NFPA 72-2022

**Message:**

[Public Input No. 73-NFPA 72-2022 \[Section No. 1.6.5\]](#)

[Public Input No. 71-NFPA 72-2022 \[Section No. 1.6.2\]](#)

[Public Input No. 70-NFPA 72-2022 \[Section No. 1.6.1\]](#)

[Public Input No. 72-NFPA 72-2022 \[Section No. 1.6.4\]](#)

[Public Input No. 75-NFPA 72-2022 \[Section No. 1.6.6\]](#)

[Public Input No. 74-NFPA 72-2022 \[Section No. A.1.6.5\]](#)



## First Revision No. 5205-NFPA 72-2022 [ Chapter 2 ]

### Chapter 2 Referenced Publications

#### 2.1 General.

The documents or portions thereof listed in this chapter are referenced within this Code and shall be considered part of the requirements of this document.

#### 2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2022 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, ~~2022~~ 2025 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, ~~2020~~ 2023 edition.

NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*, ~~2021~~ 2024 edition.

NFPA 70<sup>®</sup>, *National Electrical Code*<sup>®</sup>, ~~2020~~ 2023 edition.

NFPA 75, *Standard for the Fire Protection of Information Technology Equipment*, ~~2020~~ 2024 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, ~~2021~~ 2024 edition.

NFPA 101<sup>®</sup>, *Life Safety Code*<sup>®</sup>, ~~2021~~ 2024 edition.

NFPA 110, *Standard for Emergency and Standby Power Systems*, ~~2022~~ 2025 edition.

NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*, ~~2022~~ 2025 edition.

NFPA 170, *Standard for Fire Safety and Emergency Symbols*, ~~2021~~ 2024 edition.

NFPA 601, *Standard for Security Services in Fire Loss Prevention*, 2020 edition.

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, ~~2020~~ 2023 edition.

NFPA 1031, *Standard for Professional Qualifications for Fire Inspector and Plan Examiner*, 2014 edition.

~~NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2019 edition.~~

NFPA 1225, *Standard for Emergency Services Communications*, 2022 edition.

NFPA 1600<sup>®</sup>, *Standard on Continuity, Emergency, and Crisis Management*, 2019 edition.

NFPA 1620, *Standard for Pre-Incident Planning*, 2020 edition.

#### 2.3 Other Publications.

### **2.3.1** ASA Publications.

Acoustical Society of America, ~~35 Pinelawn Road, Suite 114 E~~ 1305 Walt Whitman Road, Suite 110, Melville, NY 11747-3177 4300.

ANSI/ASA S1.4/Part 1, *Electroacoustics — Sound Level Meters — Part 1: Specifications*, 2014.

ANSI/ASA S3.41, *Audible Emergency Evacuation (E2) and Evacuation Signals with Relocation Instructions (ESRI)*, 2015.

### **2.3.2** ASCE Publications.

American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191.

ASCE/SEI 7, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, ~~2016~~ 2022.

### **2.3.3** ASME Publications.

American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME A17.1/CSA B44, *Safety Code for Elevators and Escalators*, 2019.

### **2.3.4** ICC Publications.

International Code Council, 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001.

ICC/ANSI A117.1, *Accessible and Usable Buildings and Facilities*, 2017.

### **2.3.5** IEEE Publications.

IEEE Operations Center, ~~3 Park Avenue, 17th Floor, New York, NY 10016-5997~~ 445 Hoes Lane, Piscataway, NJ 08854-4141.

IEEE 450, *Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications*, ~~2010~~ 2020.

IEEE 1106, *Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications*, 2015.

ANSI/IEEE C2, *National Electrical Safety Code*, 2017.

### **2.3.6** ISA Publications.

International Society of Automation, 3252 S. Miami Boulevard, #102, Durham, NC 27703.

ANSI/ISA/IEC-62443-2-3, *Security for Industrial Automation and Control Systems, Part 2-3: Patch Management in the IACS Environment*, 2015.

ANSI/ISA/IEC-62443-3-3, *Security for Industrial Automation and Control Systems, Part 3-3: System Security Requirements and Security Levels*, 2013.

ANSI/ISA/IEC-62443-4-2, *Security for Industrial Automation and Control Systems, Part 4-2: Technical Security Requirements for IACS Components*, 2019.

### **2.3.7** ISO Publications.

International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals*, 2003 (reconfirmed 2015).

ISO/IEC 27001, *Information Security Management*, 2013.

### **2.3.8** NIST Publications.

National Institute of Standards and Technology, 100 Bureau Drive, Stop 1070, Gaithersburg, MD 20899-1070.

NIST Framework for Improving Critical Infrastructure Cybersecurity Version 1.1, 2018.

**2.3.9** Telcordia Publications.

Telcordia Technologies, One Telcordia Drive, Piscataway, NJ 08854.

*GR-506-CORE, LATA Switching Systems Generic Requirements: Signaling for Analog Interface*, 2011.

*GR-909-CORE, Generic Criteria for Fiber in the Loop Systems~~Generic Requirements~~*, 2004.

**2.3.10** TIA Publications.

Telecommunications Industry Association, ~~4320~~ 1310 North Courthouse Road, Suite ~~200~~ 890, Arlington, VA 22201.

ANSI/TIA-568.3, *Optical Fiber Cabling and Components Standard*, 2016.

**2.3.11** UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 38, *Manual Signaling Boxes for Fire Alarm Systems*, 2008, revised 2018.

UL 217, *Smoke Alarms*, ~~8th edition, 2015~~ 2020, revised ~~2016~~ 2022.

UL 268, *Smoke Detectors for Fire Alarm Systems*, ~~7th edition, 2016~~, revised 2021.

UL 521, *Heat Detectors for Fire Protective Signaling Systems*, 1999, revised ~~2017~~ 2021.

UL 827, *Central-Station Alarm Services*, 2014, revised ~~2019~~ 2021.

UL 864, *Control Units and Accessories for Fire Alarm Systems*, 2014, revised ~~2018~~ 2020.

UL 985, *Household Fire Warning System Units*, 2015, revised 2018.

UL 1484, *Residential Gas Detectors*, 2016, revised ~~2017~~ 2022.

UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories*, ~~2016~~ 2017.

UL 1730, *Smoke Detector Monitors and Accessories for Individual Living Units of Multifamily Residences and Hotel/Motel Rooms*, 2006, revised 2017.

UL 1971, *Signaling Devices for the Hearing Impaired*, 2002, revised 2018.

UL 1981, *Central Station Automation Systems*, 2014, revised ~~2015~~ 2019.

UL 2017, *General-Purpose Signaling Devices and Systems*, 2008, revised 2018.

UL 2034, *Single and Multiple Station Carbon Monoxide Alarms*, 2017, revised 2018.

UL 2075, *Gas and Vapor Detectors and Sensors*, 2013, revised ~~2017~~ 2021.

UL 2525, *Two-way Emergency Communications Systems for Rescue Assistance*, 2020.

UL 2572, *Mass Notification Systems*, 2016, revised 2018.

CAN/UL 2900-2-3, *Software Cybersecurity for Network-Connectable Products Part 2-3: Particular Requirements for Security and Life Signaling Systems*, 2020.

UL 60950-1, *Information Technology Equipment — Safety — Part 1: General Requirements*, 2007, revised 2019.

UL 62368-1, *Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements*, 2019, revised 2021.

**2.3.12** Other Publications.

*Merriam-Webster's Collegiate Dictionary*, 11th edition, Merriam-Webster, Inc., Springfield, MA, ~~2003~~ 2020.



**2.4** References for Extracts in Mandatory Sections.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, ~~2022~~ 2025 edition.

NFPA 70<sup>®</sup>, *National Electrical Code*<sup>®</sup>, ~~2020~~ 2023 edition.

NFPA 101<sup>®</sup>, *Life Safety Code*<sup>®</sup>, ~~2021~~ 2024 edition.

NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids*, 2020 edition.

~~NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2019 edition.~~

NFPA 1225, *Standard for Emergency Services Communications*, 2022 edition.

NFPA 5000<sup>®</sup>, *Building Construction and Safety Code*<sup>®</sup>, ~~2021~~ 2024 edition.

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5205_Chapter_2.docx	For staff use.	

**Submitter Information Verification**

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 15:58:32 EDT 2022

**Committee Statement**

**Committee Statement:** The references are updated in accordance with the Manual of Style.

**Response Message:** FR-5205-NFPA 72-2022

[Public Input No. 552-NFPA 72-2022 \[Section No. 2.4\]](#)

[Public Input No. 550-NFPA 72-2022 \[Section No. 2.2\]](#)

[Public Input No. 455-NFPA 72-2022 \[Section No. 2.2\]](#)

[Public Input No. 551-NFPA 72-2022 \[Section No. 2.3.3\]](#)

[Public Input No. 559-NFPA 72-2022 \[Section No. 2.3.9\]](#)

[Public Input No. 333-NFPA 72-2022 \[Section No. 2.2\]](#)

[Public Input No. 493-NFPA 72-2022 \[Global Input\]](#)

[Public Input No. 55-NFPA 72-2022 \[Global Input\]](#)



## First Revision No. 5211-NFPA 72-2022 [ Section No. 3.3.2 ]

### **3.3.2** Accessible (as applied to wiring methods).

Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure, other electrical equipment, other building systems, or finish of the building. [~~70~~: 400 70, 2023] (SIG-FUN)

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 16:10:24 EDT 2022

### Committee Statement

**Committee Statement:** The extract is updated in accordance with the 2023 edition of the NEC.

**Response Message:** FR-5211-NFPA 72-2022



## First Revision No. 5199-NFPA 72-2022 [ New Section after 3.3.185 ]

### **3.3.188** Network Connectable Equipment.

System components that connect to the internet or external systems through wired or wireless pathways using various protocols.

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 15:20:51 EDT 2022

### Committee Statement

**Committee Statement:** The term “Network Connectable Equipment” is now used as part of the cybersecurity changes and the definition is added to help the reader understand how the new term is being used.

**Response Message:** FR-5199-NFPA 72-2022

**Message:**

Public Input No. 334-NFPA 72-2022 [New Section after 3.3.65.2]

Public Input No. 494-NFPA 72-2022 [Section No. 3.3.66]



## First Revision No. 5007-NFPA 72-2022 [ Section No. 7.4.3 ]

### 7.4.3

Shop drawings for fire alarm or emergency communications systems shall provide ~~basic information and shall provide the basis for the record (as-built) drawings required in accordance with 7.5.2.~~ both of the following:

- (1) Basic information
- (2) The basis for the record (as-built) drawings required in accordance with ~~7.5.2~~ 7.5.5

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 09:53:46 EDT 2022

### Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

Also, the 2022 edition has the section for Record Drawings (As-Builts) in section 7.5.5, not 7.5.2. Changed the section of reference to be most relevant.

**Response Message:** FR-5007-NFPA 72-2022

**Message:**

Public Input No. 76-NFPA 72-2022 [Section No. 7.4.3]



## First Revision No. 5009-NFPA 72-2022 [ Section No. 7.4.7 ]

### 7.4.7 Control Unit Diagrams.

~~Control unit diagrams shall 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 shall include the following information:~~

~~Identification of the control equipment depicted~~

~~Location(s) of control equipment~~

~~All field wiring terminals and terminal identifications~~

~~All circuits connected to field wiring terminals and circuit identifications~~

~~All indicators and manual controls~~

~~Field connections to supervising station signaling equipment, releasing equipment, or emergency safety control interfaces, where provided~~

#### 7.4.7.1

Control unit diagrams shall 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.

#### 7.4.7.2

Control unit diagrams shall include the following information:

- (1) Identification of the control equipment depicted
- (2) Location(s) of control equipment
- (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
- (6) Field connections to supervising station signaling equipment, releasing equipment, or emergency safety control interfaces, where provided

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
FR_5009.docx	For Staff Use	

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 10:02:11 EDT 2022

## Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5009-NFPA 72-2022

**Message:**

[Public Input No. 144-NFPA 72-2022 \[Section No. 7.4.7\]](#)

[Public Input No. 146-NFPA 72-2022 \[New Section after 7.4.7\]](#)

[Public Input No. 145-NFPA 72-2022 \[New Section after 7.4.7\]](#)



## First Revision No. 5014-NFPA 72-2022 [ Section No. 7.5.4 ]

### 7.5.4

For new emergency communications systems, an owner's manual ~~shall be provided and shall contain~~ containing the following documentation shall be provided :

- (1) Detailed narrative description of the system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations
- (2) Written sequence of operation for the system including an operational input/output matrix
- (3) Operator instructions for basic system operations, including alarm acknowledgment, system reset, interpretation of system output (LEDs, CRT display, and printout), operation of manual evacuation signaling and ancillary function controls, and change of printer paper
- (4) Detailed description of routine maintenance and testing as required and recommended and as would be provided under a maintenance contract, including testing and maintenance instructions for each type of device installed, which includes the following:
  - (a) Listing of the individual system components that require periodic testing and maintenance
  - (b) Step-by-step instructions detailing the requisite testing and maintenance procedures, and the intervals at which those procedures ~~shall are to~~ be performed, for each type of device installed
  - (c) Schedule that correlates the testing and maintenance procedures that are required by this section
- (5) Service directory, including a list of names and telephone numbers of those who provide service for the system
- (6) Product data sheets for all system equipment

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5014_7.5.4.docx	For staff use	

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 10:31:54 EDT 2022

### Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5014-NFPA 72-2022

**Message:**

Public Input No. 78-NFPA 72-2022 [Section No. 7.5.4]



## First Revision No. 5017-NFPA 72-2022 [ Section No. 7.5.6.2 ]

### **7.5.6.2\*** Record of Completion Documentation.

~~The record of completion documentation shall be completed by the installing contractor and submitted to the authority having jurisdiction and the owner at the conclusion of the job. The record of completion documentation shall be permitted to be part of the written statement required in 7.5.2 and part of the documents that support the requirements of 7.5.8. When more than one contractor has been responsible for the installation, each contractor shall complete the portions of the documentation for which that contractor has responsibility.~~

#### **7.5.6.2.1**

The record of completion documentation shall be completed by the installing contractor and submitted to the authority having jurisdiction and the owner at the conclusion of the job.

#### **7.5.6.2.2**

The record of completion documentation shall be permitted to be part of the written statement required in 7.5.2 and part of the documents that support the requirements of 7.5.8.

#### **7.5.6.2.3**

When more than one contractor has been responsible for the installation, each contractor shall complete the portions of the documentation for which that contractor has responsibility.

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 10:41:31 EDT 2022

## Committee Statement

**Committee Statement:** Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5017-NFPA 72-2022

**Message:**

[Public Input No. 79-NFPA 72-2022 \[Section No. 7.5.6.2\]](#)



## First Revision No. 5020-NFPA 72-2022 [ Section No. 7.5.6.6 ]

### 7.5.6.6 Revisions.

#### 7.5.6.6.1

All modifications made after the initial installation shall be recorded on a revised version of the original completion documents, ~~which shall serve as a supplement to the original, unaltered completion documents.~~

#### 7.5.6.6.2

The revised version of the original documents shall serve as a supplement to the original, unaltered completion documents.

#### 7.5.6.6.3

The revised record of completion document shall include a revision date.

#### 7.5.6.6.4\*

Where the original or the latest overall system record of completion cannot be obtained, a new system record of completion shall be provided that documents the system configuration as discovered during the current project's scope of work.

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 10:45:09 EDT 2022

## Committee Statement

**Committee** Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section  
**Statement:** 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response** FR-5020-NFPA 72-2022

**Message:**

[Public Input No. 83-NFPA 72-2022 \[Section No. 7.5.6.6.2\]](#)

[Public Input No. 82-NFPA 72-2022 \[Section No. 7.5.6.6.1\]](#)

[Public Input No. 84-NFPA 72-2022 \[Section No. 7.5.6.6.3\]](#)

[Public Input No. 85-NFPA 72-2022 \[Section No. A.7.5.6.6.3\]](#)





## First Revision No. 5022-NFPA 72-2022 [ Section No. 7.5.6.7.2 ]

### 7.5.6.7.2

If filed electronically, the record of completion document shall ~~be comply with accessible with standard software and shall be backed up.~~ both of the following:

- (1) Be accessible with standard software
- (2) Be backed up

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 10:49:34 EDT 2022

### Committee Statement

**Committee Statement:** Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5022-NFPA 72-2022

**Message:**

[Public Input No. 86-NFPA 72-2022 \[Section No. 7.5.6.7.2\]](#)



## First Revision No. 5027-NFPA 72-2022 [ Section No. 7.5.8.3 ]

### 7.5.8.3

Verification shall ensure ~~that~~ the following :

- (1) All components and functions are installed and operate per the approved plans and sequence of operation.
- (2) All required system documentation is complete and is archived on site.

~~For new supervising station systems, the verification shall also ascertain proper arrangement, transmission, and receipt of all signals required to be transmitted off-premises and shall meet the requirements of 14.4.1 and 14.4.2 :~~

~~For existing supervising station systems that are extended, modified, or reconfigured, the verification shall be required for the new work only, and reacceptance testing in accordance with Chapter 14 shall be acceptable.~~

- (3) Written confirmation has been provided that any required corrective actions have been completed.

### 7.5.8.4

Verification for new supervising station systems shall comply with both of the following:

- (1) Ascertain proper arrangement, transmission, and receipt of all signals required to be transmitted off-premises
- (2) Installation to meet requirements of 14.4.1 and 14.4.2

### 7.5.8.5

Verification for existing supervising station systems that are extended, modified, or reconfigured shall comply with both of the following:

- (1) Ascertain proper arrangement, transmission, and receipt of all signals required to be transmitted off-premises
- (2) Complete reacceptance testing in accordance with Chapter 14

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
Chapter_7_7_5_8_3_FR_5027.docx	Staff Use	

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 11:27:08 EDT 2022

## Committee Statement

**Committee Statement:** Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text

**Response:** FR-5027-NFPA 72-2022

**Message:**

[Public Input No. 89-NFPA 72-2022 \[New Section after 7.5.8.3\]](#)

[Public Input No. 87-NFPA 72-2022 \[Section No. 7.5.8.3\]](#)

[Public Input No. 90-NFPA 72-2022 \[New Section after 7.5.8.3\]](#)



**First Revision No. 5033-NFPA 72-2022 [ Section No. 7.7.1.2 ]**

**7.7.1.2\***

The records shall be available for examination and, if required, reported to the authority having jurisdiction. ~~Archiving of records by any means shall be permitted if hard copies of the records can be provided promptly when requested.~~

**7.7.1.3**

Archiving of records by any means shall be permitted if hard copies of the records can be provided promptly when requested.

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72-FR5033_7.7.1.2.docx	For staff use	
72_FUN_FR-5033_7.7.1.2_FINAL.docx		

**Submitter Information Verification**

**Committee:** SIG-FUN  
**Submittal Date:** Mon Jul 18 12:39:21 EDT 2022

**Committee Statement**

**Committee Statement:** Section 1.8.3 of the July 2004 edition of The Manual of Style for NFPA Technical Committee Documents, requires sections containing multiple requirements to be subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response Message:** FR-5033-NFPA 72-2022

- [Public Input No. 95-NFPA 72-2022 \[Section No. 7.7.1.5\]](#)
- [Public Input No. 94-NFPA 72-2022 \[Section No. 7.7.1.4\]](#)
- [Public Input No. 96-NFPA 72-2022 \[Section No. 7.7.1.6\]](#)
- [Public Input No. 92-NFPA 72-2022 \[New Section after 7.7.1.2\]](#)
- [Public Input No. 93-NFPA 72-2022 \[Section No. 7.7.1.3\]](#)
- [Public Input No. 91-NFPA 72-2022 \[Section No. 7.7.1.2\]](#)



## First Revision No. 5035-NFPA 72-2022 [ Section No. 7.7.2.3 ]

### 7.7.2.3\*

All record documentation shall ~~be stored in the documentation cabinet. No record documentation shall be stored in the control unit.~~ comply with the following:

- (1) Stored in the documentation cabinet
- (2) ~~No record documentation shall be~~ Not stored in the control unit

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 13:05:05 EDT 2022

### Committee Statement

**Committee** Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section  
**Statement:** 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response** FR-5035-NFPA 72-2022

**Message:**

[Public Input No. 97-NFPA 72-2022 \[Section No. 7.7.2.3\]](#)



## First Revision No. 5051-NFPA 72-2022 [ Section No. 10.4.4 ]

### 10.4.4\*

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

- (1) The distance to the highest switch, lamp, or textual display does not exceed 6 ft (1.8 m) above the finished floor.
- (2) The distance to the lowest switch, lamp, or textual display ~~shall is~~ not ~~be less than~~ within 15 in. (375 mm) ~~above of~~ the finished floor.

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 14:15:02 EDT 2022

### Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5051-NFPA 72-2022

**Message:**

Public Input No. 98-NFPA 72-2022 [Section No. 10.4.4]



## First Revision No. 5057-NFPA 72-2022 [ Section No. 10.5.1.3 ]

### 10.5.1.3

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

- (1) Registration, licensing, or certification by a state or local authority
- (2) Certification by an organization acceptable to the authority having jurisdiction
- (3) ~~Manufacturer's certification for the specific type and brand of system provided~~ Certification by the manufacturer(s) of the specific equipment used in the system

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 14:38:20 EDT 2022

## Committee Statement

**Committee Statement:** The text is revised to clarify that certification by a manufacturer is specific for the equipment that the manufacturer provides.

**Response Message:** FR-5057-NFPA 72-2022

[Public Input No. 505-NFPA 72-2022 \[Section No. 10.5.1.3\]](#)

[Public Input No. 465-NFPA 72-2022 \[Section No. 10.5.1.3\]](#)

[Public Input No. 380-NFPA 72-2022 \[Section No. 10.5.1.3\]](#)



## First Revision No. 5067-NFPA 72-2022 [ Section No. 10.5.2.1 ]

### 10.5.2.1

Installation personnel shall be ~~qualified or shall be supervised by persons who are qualified in the installation, inspection, and testing of the systems.~~ at least one of the following:

- (1) Qualified in the installation, inspection, and testing of the systems
- (2) Supervised by persons who are qualified in the installation, inspection, and testing of the systems:

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 15:16:41 EDT 2022

### Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5067-NFPA 72-2022

**Message:**

[Public Input No. 99-NFPA 72-2022 \[Section No. 10.5.2.1\]](#)



## First Revision No. 5072-NFPA 72-2022 [ Section No. 10.5.2.3 ]

### 10.5.2.3

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

- (1) Registration, licensing, or certification by a state or local authority
- (2) Certification by an organization acceptable to the authority having jurisdiction
- (3) ~~Manufacturer's certification for the specific type and brand of system provided~~ Certification by the manufacturer(s) of the specific equipment used in the system

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 15:32:59 EDT 2022

### Committee Statement

**Committee Statement:** The text is revised to clarify that certification by a manufacturer is specific for the equipment that the manufacturer provides.

**Response Message:** FR-5072-NFPA 72-2022

[Public Input No. 506-NFPA 72-2022 \[Section No. 10.5.2.3\]](#)

[Public Input No. 466-NFPA 72-2022 \[Section No. 10.5.2.3\]](#)

[Public Input No. 382-NFPA 72-2022 \[Section No. 10.5.2.3\]](#)





## First Revision No. 5080-NFPA 72-2022 [ Section No. 10.6.3.1 ]

### 10.6.3.1\*

Power shall be supplied in accordance with ~~either 10.6.3.2 or~~ , 10.6.4, or 23.16.2 .

### 10.6.3.2

Unless configured in compliance with 10.6.4 or 23.16.2 , at least two independent and reliable power supplies shall be provided, one primary and one secondary.

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 16:26:09 EDT 2022

## Committee Statement

**Committee Statement:** The text is revised to include the use of primary batteries as the power supply for low-power radio (wireless) systems permitted by 23.16.2

**Response Message:** FR-5080-NFPA 72-2022

[Public Input No. 383-NFPA 72-2022 \[Sections 10.6.3.1, 10.6.3.2\]](#)

[Public Input No. 467-NFPA 72-2022 \[Section No. 10.6.3.1\]](#)

[Public Input No. 507-NFPA 72-2022 \[Sections 10.6.3.1, 10.6.3.2\]](#)



## First Revision No. 5085-NFPA 72-2022 [ Section No. 10.6.7.2.17 ]

### 10.6.7.2.17

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

- (1) ~~The~~ secondary power supply shall have sufficient capacity to operate the carbon monoxide detection system under quiescent load (system operating in a nonalarm condition) for a minimum of 24 hours.
- (2) ~~At~~ the end of ~~that~~ the 24-hour period, the secondary power supply shall be capable of operating the carbon monoxide detection system and all notification appliances for 5 minutes.

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 16:41:05 EDT 2022

### Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5085-NFPA 72-2022

**Message:**

[Public Input No. 114-NFPA 72-2022 \[Section No. 10.6.7.2.17\]](#)



## First Revision No. 5094-NFPA 72-2022 [ Section No. 10.6.9.1.6 ]

### 10.6.9.1.6

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

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 08:27:16 EDT 2022

### Committee Statement

**Committee Statement:** The text is revised to correlate with Chapter 14.

**Response Message:** FR-5094-NFPA 72-2022

[Public Input No. 185-NFPA 72-2022 \[Section No. 10.6.9.1.6\]](#)



## First Revision No. 5095-NFPA 72-2022 [ Section No. 10.6.10.1.3 ]

### 10.6.10.1.3\*

Effective January 1, 2024, ~~rechargeable batteries for the secondary power supply used in control units, devices, and accessories~~ Rechargeable batteries used for secondary power supplies shall be listed or component recognized by a nationally recognized testing laboratory.

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 08:29:35 EDT 2022

### Committee Statement

**Committee Statement:** The effective date is removed because it will be past when the standard is issued. The text is revised to clarify that the paragraph refers to all rechargeable batteries used as secondary power throughout this code.

**Response Message:** FR-5095-NFPA 72-2022

[Public Input No. 252-NFPA 72-2022 \[Section No. 10.6.10.1.3\]](#)



## First Revision No. 5256-NFPA 72-2022 [ Section No. 10.6.11.7 ]

### 10.6.11.7 Battery and Charger.

#### 10.6.11.7.1

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

#### 10.6.11.7.2

The separate storage battery automatic charger shall not be used for any other purpose.

#### 10.6.11.7.3

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

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Wed Jul 20 14:10:26 EDT 2022

## Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response** FR-5256-NFPA 72-2022

**Message:**

[Public Input No. 115-NFPA 72-2022 \[Section No. 10.6.11.7.1\]](#)

[Public Input No. 116-NFPA 72-2022 \[New Section after 10.6.11.7.1\]](#)

[Public Input No. 117-NFPA 72-2022 \[Section No. 10.6.11.7.2\]](#)



## First Revision No. 5098-NFPA 72-2022 [ Section No. 10.10.4 ]

### 10.10.4\* Audible Characteristics.

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

#### 10.10.4.1

~~An audible notification appliance on a control unit, on multiple control units that are interconnected to form a system, or at a remote location, shall be permitted to have the same audible characteristics for all alerting functions.~~

#### 10.10.4.2

~~The audible notification appliance described in 10.10.4.1 is not limited to; alarm, trouble, and supervisory; alerting, provided that the distinction between signals shall be by other means.~~

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 08:41:02 EDT 2022

## Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5098-NFPA 72-2022

**Message:**

[Public Input No. 118-NFPA 72-2022 \[Section No. 10.10.4\]](#)

[Public Input No. 119-NFPA 72-2022 \[New Section after 10.10.4\]](#)

[Public Input No. 120-NFPA 72-2022 \[New Section after 10.10.4\]](#)



## First Revision No. 5099-NFPA 72-2022 [ Section No. 10.10.5 ]

### 10.10.5\* Supervisory Signals.

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

#### 10.10.5.1

Supervisory signals shall be distinctive in sound from other signals.

#### 10.10.5.2

The distinctive supervisory signal shall not be used for any other purpose except as permitted in 10.10.4.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5099_10.10.5.docx	for staff use	

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 08:45:20 EDT 2022

### Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5099-NFPA 72-2022

**Message:**

[Public Input No. 121-NFPA 72-2022 \[Section No. 10.10.5\]](#)

[Public Input No. 123-NFPA 72-2022 \[New Section after 10.10.5\]](#)

[Public Input No. 122-NFPA 72-2022 \[New Section after 10.10.5\]](#)



## First Revision No. 5101-NFPA 72-2022 [ Section No. 10.10.6 ]

### 10.10.6 Trouble Signals.

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

#### **10.10.6.1**

Trouble signals required to indicate at the protected premises shall be indicated by distinctive audible signals.

#### **10.10.6.2**

Trouble signals described in 10.10.6.1 shall be distinctive from alarm signals except as permitted in 10.10.4.

#### **10.10.6.3**

The audible trouble signals described in 10.10.6.1 shall be permitted to be used for other purposes as permitted by 10.10.4 .

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5101_10.10.6.docx	For staff use	

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 08:48:15 EDT 2022

## Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response Message:** FR-5101-NFPA 72-2022

**Message:**

[Public Input No. 124-NFPA 72-2022 \[Section No. 10.10.6\]](#)

[Public Input No. 127-NFPA 72-2022 \[New Section after 10.10.6\]](#)

[Public Input No. 125-NFPA 72-2022 \[New Section after 10.10.6\]](#)

[Public Input No. 126-NFPA 72-2022 \[New Section after 10.10.6\]](#)



## First Revision No. 5104-NFPA 72-2022 [ Section No. 10.10.7 ]

### 10.10.7 Alarm Evacuation Signals.

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

#### 10.10.7.1

Alarm evacuation signals shall be distinctive in sound from other signals.

#### 10.10.7.2

Alarm evacuation signals shall comply with the requirements of 18.4.2.

#### 10.10.7.3

Alarm evacuation signals described in 10.10.7.1 and 10.10.7.2 shall not be used for any other purpose.

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5104_10.10.7.docx	For staff use	

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 08:51:21 EDT 2022

## Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

Public Input No. 131-NFPA 72-2022 [New Section after 10.10.7]

Public Input No. 128-NFPA 72-2022 [Section No. 10.10.7]

Public Input No. 130-NFPA 72-2022 [New Section after 10.10.7]

Public Input No. 129-NFPA 72-2022 [New Section after 10.10.7]





## First Revision No. 5107-NFPA 72-2022 [ Section No. 10.10.8 ]

### 10.10.8 Pre-Alarm Signals.

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

#### 10.10.8.1

Pre-alarm signals shall be distinctive in sound from other signals.

#### 10.10.8.2

Pre-alarm signals described in 10.10.8.1 shall not be used for any other purpose except as permitted in 10.10.4.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5107_10.10.8.docx	For staff use	

### Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 08:57:23 EDT 2022

### Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text.

**Response:** FR-5107-NFPA 72-2022

**Message:**

[Public Input No. 133-NFPA 72-2022 \[New Section after 10.10.8\]](#)

[Public Input No. 134-NFPA 72-2022 \[New Section after 10.10.8\]](#)

[Public Input No. 132-NFPA 72-2022 \[Section No. 10.10.8\]](#)



## First Revision No. 5140-NFPA 72-2022 [ Section No. 10.21.1 ]

### 10.21.1

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

### 10.21.2

Impairments to systems shall include out-of-service events.

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 10:20:36 EDT 2022

## Committee Statement

**Committee Statement:** The Manual of Style for NFPA Technical Committee Documents, July 2004 Edition section 1.8.3 requires sections containing multiple requirements subdivided into subsections, which shall be further subdivided into paragraphs of text

**Response:** FR-5140-NFPA 72-2022

**Message:**

[Public Input No. 136-NFPA 72-2022 \[New Section after 10.21.1\]](#)

[Public Input No. 139-NFPA 72-2022 \[Section No. 10.21.4\]](#)

[Public Input No. 143-NFPA 72-2022 \[Section No. 10.21.6\]](#)

[Public Input No. 141-NFPA 72-2022 \[Section No. 10.21.5\]](#)

[Public Input No. 135-NFPA 72-2022 \[Section No. 10.21.1\]](#)

[Public Input No. 137-NFPA 72-2022 \[Section No. 10.21.2\]](#)

[Public Input No. 138-NFPA 72-2022 \[Section No. 10.21.3\]](#)

[Public Input No. 140-NFPA 72-2022 \[Section No. A.10.21.4\]](#)

[Public Input No. 142-NFPA 72-2022 \[Section No. A.10.21.5\]](#)



## First Revision No. 5188-NFPA 72-2022 [ Chapter 11 ]

### Chapter 11 Cybersecurity

#### 11.1 Cybersecurity Provisions .

##### 11.1.1\*

Where required by governing laws, codes, or standards, or other parts of this Code, cybersecurity shall be provided in accordance with Chapter 11 for equipment; software, firmware; system support tools, installation methods, physical security of and access to equipment, data pathways, testing, and maintenance.

##### 11.1.2\*

No minimum cybersecurity level shall be required for systems that meet both of the following conditions:

- (1) No network connectable equipment
- (2) No uploadable software configuration

##### **A.11.1.2**

An example of a system that requires no cybersecurity is a dip-switch configurable control unit with no network connection.

#### 11.2 Network Connectable Equipment Software Development and Production Environments.

Development and production environments used to develop and manufacture network connectable equipment shall employ cybersecurity safeguards that are consistent with one or more of the following standards:

- (1) NIST Cybersecurity Framework
- (2) ISO/IEC 27001 Information Security Management
- (3) IASME Consortium Cyber Essentials
- (4) Other equivalent standards acceptable to a Nationally Recognized Testing Laboratory.

#### 11.3\* Security Levels for Network Connectable Equipment.

All interfaces used to communicate with network connectable equipment shall be protected using the following minimum security levels:

- (1) For non-internet-facing wired interfaces that do not employ internet protocol, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 1 or UL 2900 Security Level 1 or the equivalent level associated with 11.2(4).
- (2) For all cellular, Bluetooth, wireless interfaces, and other accessible interfaces that do not employ internet protocol, IEC 62443-4-2/3-3 Security Level 2 or UL 2900 Security Level 2 or the equivalent level associated with 11.2(4).
- (3) For all non-internet-facing wired interfaces and those non-internet-facing wireless interfaces that employ internet protocol, ANSI/ISA/IEC 62443-4-2/3-3 Security Level 2 or UL 2900 Security Level 2 or the equivalent level associated with 11.2(4).
- (4) For all wired or wireless internet facing interfaces or publicly accessible networks, ANSI/ISA/IEC 62443-4-2/2-3 Security Level 3 or UL 2900 Security Level 3 or the equivalent level associated with 11.2(4).

**A.11.3**

In general, there could be overlap in what this section requires and the end user's IT department's requirements. That overlap could require additional coordination in the case of Class N networks or internet communications, as IT departments could have more stringent requirements and certifications than listed in this Code. In those instances, IT compliance beyond this Code could be required for the owner.

An example of a Security Level 1 (SL1) system consists of a fire alarm system with notification appliances and initiating devices that are connected using a proprietary protocol two-wire interface and that is not connected to the internet.

An example of a Security Level 2 (SL2) system consists of a signaling system with devices connected to a control unit using internet protocol communications on a dedicated network that do not connect to the internet.

An example of a Security Level 3 (SL3) system consists of internet gateway module for off-premises transmission of signals from a fire alarm system with notification appliances and initiating devices that are connected using a proprietary protocol two-wire interface. In this case the gateway is SL3, and the remainder of the system is SL1.

**11.4\*** Interconnecting Conductors, Cables, or Other Physical Pathways.

Interconnecting conductors, cables, or other physical pathways for use in Security Level 2 or higher applications in locations accessible to the public shall be protected by metal raceways or metal armored cables.

**A.11.4**

An assumption is often made that attacks are launched remotely from the internet. However, there are many examples of attackers gaining access to a facility to enable an attack. For example, a system that has no networking capability, with only a RS-232 serial port can be connected to an RS-232-to-Ethernet adapter. This could be intended benignly, as a way of enabling remote monitoring or remote service, but it is a risk that should be considered nonetheless.

The protection by metal raceways or metal armored cables of interconnecting conductors, cables, or other physical pathways is also recommended for use in Security Level 1 applications. For improved physical security in systems where control units and data access points are not installed in restricted areas, using security tamper switches to produce a tamper signal for notification when an enclosure is opened should be considered. Tamper resistant fasteners can be employed on junction box covers to provide additional physical protection.

**11.5\*** Unused Physical Data Ports.

All unused physical data ports shall be protected by at least one of the following:

- (1) Physically protected from unauthorized access
- (2) Administratively disabled
- (3) Configured to require a token-based authentication, certificate-based authentication, password, or other method that is consistent with the security requirements of the system

**A.11.5**

There might be data that a life safety system(s) maintains that could be considered confidential. It is necessary to protect information that could be used to aid in compromising a system(s) — for example, information such as online documentation that reveals system maintenance status, locations and IP addresses of devices, wiring information, network switch port numbers, riser information, cabling pathways, encryption keys, or user credentials. If compromised, all could be used to attack the life safety system or other connected systems. Different types of cybersecurity attacks attempt to compromise user and system accounts, especially privileged accounts. It is common industry practice to find networkable devices that have limited account management, use common account names and passwords (e.g., *admin*, *password*), and are configured with built-in accounts that have no individual users (requiring multiple users to share passwords), no levels of access (effectively making any access privileged access), no ability to apply permissions based on the user’s job functions, no ability to disable specific accounts (necessary when users change jobs), and no centralized management of these accounts (accounts might be isolated to specific devices and must be managed one device at a time). These devices rely upon specific actions to change these parameters that could occur without being known to the system owners. This should be considered when selecting security levels for various elements of the system.

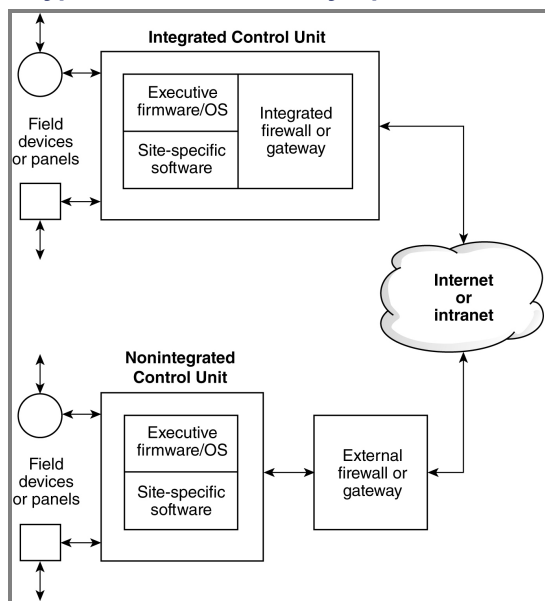
**11.6\*** Data Connections to External Networks.

When any data connection is made from the system to an external network, the connection shall be protected by a gateway or firewall that ensures that only trusted traffic is allowed to pass.

**A.11.6**

Figure A.11.6 depicts system typical firewall/gateway operation. Such functionality, when deployed, could take the form of physical hardware, firmware, or both. The firewall/gateway might be physically integrated into the control unit, as shown in the integrated control unit graphic, or a separate device/service that interacts with the control unit, as shown in the nonintegrated control unit.

**Figure A.11.6 System Typical Firewall/Gateway Operation.**



**11.7** Network Connectable Equipment Cybersecurity-Related Updates.

### **11.7.1**

At least quarterly, the equipment manufacturer(s) shall do the following until the equipment is no longer supported by the manufacturer:

- (1) Evaluate all relevant cybersecurity threats
- (2) Determine if a software update is required to maintain the cybersecurity level achieved in compliance with Section 11.2

### **11.7.2**

The system installer shall provide the name and contact information of the system owner or their representative to the equipment manufacturer(s) at the time of system acceptance testing.

### **11.7.3\***

The equipment manufacturer(s) shall notify the system owner or their representative of all required software security updates required to maintain the cybersecurity level achieved in compliance with Sections 11.2 , 11.3 , and 11.4 .

#### **A.11.7.3**

As security vulnerabilities are discovered, existing systems could be affected. It is important for manufacturers to provide solutions when vulnerabilities are discovered. Likewise, it is important to carefully manage the update and patch management infrastructure to ensure that corrections are available, have not been modified or spoofed, and are applied successfully.

### **11.7.4**

Software for network connectable devices shall be maintained by installing software security updates as required by the equipment manufacturer(s) to maintain the cybersecurity level achieved in compliance with Sections 11.2 , 11.3 , and 11.4 .

### **11.7.5**

Software security updates that are deemed necessary by the equipment manufacturer(s) for compliance with Section 11.3 shall be installed at least annually.

### **11.7.6**

Cybersecurity-related only software updates applied to barrier gateways or firewalls that do not affect the system site-specific or system executive software shall not be required to comply with 14.4.2 .

### **11.7.7**

Cybersecurity-related only software changes to systems or system components shall be permitted to be made by remote access in accordance with Chapter 23 .

### **11.8 Notification of Termination of Cybersecurity Update Support.**

The manufacturer shall notify the system owner or their representative of the termination of software cybersecurity-related software update support required by Section 11.7 for any element of the system.

### **11.9 Cybersecurity for System Support Tools.**

A system support tool and the support tool interfaces shall comply with the requirements of Sections 11.2 through 11.8 .

### **11.10 Evidence of Compliance.**

**11.10.1**

Evidence of cybersecurity compliance shall include one or more of the following:

- (1) Certification of compliance by a Nationally Recognized Testing Laboratory
- (2) Manufacturer certification for the specific type and brand of system provided by the manufacturer
- (3) An assessment or certification program acceptable to the authority having jurisdiction

**11.10.2**

The validity of cybersecurity certificates shall be verified annually by the person testing the system.

**11.11 Documentation.**

The standards used and security levels employed in complying with Chapter 11 shall be identified in the system documentation required by Chapter 7 .

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5188_Chapter_11.docx	For Staff Use	

**Submitter Information Verification**

**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 14:35:52 EDT 2022

**Committee Statement**

**Committee Statement:** Building systems are increasingly networked and/or accessible to public facing networks. Evidence has been identified in multiple case studies including the Fire Protection Research Foundation (FPRF) report. The FPRF conducted research that has identified gaps and assessed the appropriateness of the existing provisions and guidance related to cybersecurity.

Their report lists gaps that include:

**\*Configuration**

-Interconnection of external systems (call centers, service providers) could allow for unauthorized activity if those external systems are not secure.

-Interconnection with other building systems with no access/restriction to prevent unintended communications.

-If one interconnected system is compromised and life safety is connected, it would be safe to assume that all are compromised.

**\*Implementation**

-Systems that have remote access for maintenance or monitoring could introduce vulnerabilities if not properly implemented.

-Using secure gateways and configuring devices with only the necessary communication mechanisms can reduce exposure.

-The use of insecure wireless devices, or lack of wireless device authentication can be a weakness.

\*Security

-Complexity of cybersecurity threats and solutions are increasing, making systems more vulnerable to highly sophisticated arson (terrorist) attacks, industrial espionage, and insider threats. Because of this, it is becoming more difficult to defend against these attacks and new solutions need to be implemented.

\*Access

-Weak logical and physical access to 3rd party networks and systems.

-Easy to implant hardware or software devices into environment

The revised chapter addresses the above gaps by requiring industry accepted cybersecurity practices.

**Response** FR-5188-NFPA 72-2022

**Message:**

[Public Input No. 390-NFPA 72-2022 \[Section No. A.11.1\]](#)

[Public Input No. 533-NFPA 72-2022 \[Chapter 11\]](#)

[Public Input No. 272-NFPA 72-2022 \[Section No. 11.1\]](#)

[Public Input No. 384-NFPA 72-2022 \[Section No. 11.1\]](#)

[Public Input No. 469-NFPA 72-2022 \[Section No. 11.1\]](#)

[Public Input No. 508-NFPA 72-2022 \[Section No. 11.1\]](#)





## First Revision No. 5042-NFPA 72-2022 [ Section No. A.7.3.2 ]

### A.7.3.2

Design (layout) documents should contain information related to the system that could include specifications, shop drawings, ~~input/output matrix~~ sequence of operation, battery calculations, notification appliance voltage drop calculations for visual notification appliances and loudspeakers, and product technical data sheets.

Design (layout) documents could include such items as preliminary plans issued as guidance and direction, risk analysis, emergency response plan, or a combination of these.

Deviations from requirements of governing laws, codes, standards, or preliminary plan requirements specified by an engineer should be clearly identified and documented as such.

Documentation of equivalency, where applicable, should be provided in accordance with Section 1.5 and be included with the record drawings.

It is the intent that existing systems that are altered should have design (layout) documents prepared that are applicable only to the portion(s) of the system being altered.

## Submitter Information Verification

**Committee:** SIG-FUN

**Submittal Date:** Mon Jul 18 13:52:31 EDT 2022

## Committee Statement

**Committee Statement:** Sequence of Operation is a more technically accurate phrase that includes input/output matrix in addition to narrative description.

**Response Message:** FR-5042-NFPA 72-2022

[Public Input No. 375-NFPA 72-2022 \[Section No. A.7.3.2\]](#)



**First Revision No. 5192-NFPA 72-2022 [ Section No. A.7.3.6 ]**

**A.7.3.6**



The Risk Analysis Checklist in Figure A.7.3.6 is not mandatory, but it can be used to initiate the thought process for identifying hazards in a facility. System risk analysis as described for technological events should at a minimum qualitatively identify risks, likelihoods, impacts and consequences, controls, countermeasures, and mitigations for the following:

- (1) Account management, including default passwords; user account management; privileged account management; system, service, and operating system accounts; authentication and authorization; multifactor authentication; session limitations; and access failed attempt retry rates and limits, including account timeouts and lockout settings
- (2) Personally identifiable information (PII) maintained by the system
- (3) Data that might be considered confidential in nature such as floor plans, system wiring, IP addresses and ports, or diagnostic information
- (4) Logging and audit trail management and access
- (5) Software bill of materials (SBOM) as it relates to third- party code modules, libraries, open-source software (OSS), and commercial off-the-shelf (COTS) software
- (6) Software and firmware development methodologies and known system code vulnerabilities, including deployed encryption methodologies
- (7) Update and patch management
- (8) Known cybersecurity vulnerabilities inherent to or affecting the system
- (9) Configuration management
- (10) Known or expected external system threats, including risks associated with malware, open communications ports, and configuration
- (11) Potential insider threats due to intentional or unintentional access privilege abuse or leakage
- (12) Common controls such as firewalls
- (13) Components hosted on any non-life-safety dedicated equipment, such as shared use computers or the cloud
- (14) System monitoring capabilities, including monitoring for integrity, monitoring of system components and assets, and system status monitoring
- (15) System communication pathway vulnerabilities, including physical and wireless pathway susceptibility to disconnection, interception and insertion of data, and jamming

**Figure A.7.3.6 Risk Analysis Checklist.**

**RISK ANALYSIS CHECKLIST**  
**DELETED**

Facility name: \_\_\_\_\_ Facility location: \_\_\_\_\_  
 Prepared by: \_\_\_\_\_ Date prepared: \_\_\_\_\_  
 Title and contact information: \_\_\_\_\_  
 ECS system type: \_\_\_\_\_

**PART ONE: Identification of Assets or Operations at Risk**  
*Use Part One of this checklist to identify the following assets or operations at risk at your facility.*

**People**

- Employees
- Visitors and guests
- Contractors working on site
- Emergency responders
- Community surrounding the facility

**Property**

- Physical property
  - Corporal offices
  - Manufacturing facilities
  - Call center
  - Distribution centers
  - Data-processing center
  - Research and development labs
  - Property on the premises of others
  - Vital papers, records, and drawings
- Intellectual property
  - Copyright and patent infringement
  - Trademark infringement
  - Theft of intellectual property
  - Theft of information
- Utilities
  - Telecommunications
  - Electricity
  - Water
  - Gas
  - Steam
  - Heating/ventilation/air conditioning
  - Pollution control
  - Sewerage system
  - Other critical infrastructure
- Computers and computer networks
  - Software applications
  - Electronic data
- Inventory
  - Raw materials
  - Finished product

**Operations**

- Manufacturing processes
- Delivery of services
- Administrative support services
- Research and development
- Supply chain

**Environment**

- Air
- Water
- Ground

**Organization**

- Economic and financial condition
- Licenses, patents, or trademarks
- Reputation and image as well-managed company
- Contractual obligations
- Community relationships
- Regional and national impact
- Regulatory compliance and relationships with vendors

© 2021 National Fire Protection Association NFPA 72 (p. 1 of 2)

**RISK ANALYSIS CHECKLIST (continued)**  
**DELETED**

**PART TWO: Determination of Facility Hazards**  
*Use Part Two of this checklist to determine the potential hazards that might impact your facility.*

**Natural Hazards—Geological**

- Earthquake
- Tsunami
- Volcano
- Landslide, mudslide, subsidence
- Glacier, iceberg

**Natural Hazards—Meteorological**

- Flood, flash flood, tidal surge
- Drought
- Windstorm, tropical cyclone, hurricane, tornado, water spout, dust/dust storm
- Extreme temperatures (heat, cold)
- Lightning strikes
- Famine
- Geomagnetic storm
- Snow, ice, hail, sleet, avalanche

**Natural Hazards—Biological**

- Diseases (pandemic)
- Animal or insect infestation or damage

**Human-Caused Accidental Events**

- Hazardous material (explosive, flammable liquid, flammable gas, flammable solid, oxidizer, poison, radiological, corrosive) spill or release
- Natural gas leak
- Nuclear power plant incident
- Hazmat incident off site
- Explosion/fires
- Wildfires (forest, range, urban, wildland, urban interface)
- Transportation accident (motor vehicle, railroad, watercraft, aircraft pipeline)
- Building/structure failure or collapse
- Entrapment
- Mechanical breakdown
- Energy/power/utility failure
- Fuel/resource shortage
- Air/water pollution, contamination
- Water control structure/dam/levee failure
- Communications systems interruptions
- Financial issues, economic depression, inflation, financial system collapse
- Misinformation

**Human-Caused Intentional Events**

- Terrorism (explosive, chemical, biological, radiological, nuclear, cyber)
- Sabotage or vandalism
- Civil disturbance, public unrest, mass hysteria, riot
- Enemy attack, war
- Insurrection
- Strike or labor dispute
- Demonstration
- Bioinformerations
- Criminal activity (vandalism, arson, theft, fraud, embezzlement, data theft)
- Electromagnetic pulse
- Physical or information security breach
- Sniper incident
- Crime, theft, or robbery
- Product defect or contamination
- Harassment
- Arson
- Bomb threat
- Lost person
- Child abduction
- Kidnap
- Extortion
- Hostage incident
- Workplace violence

**Technological-Caused Events**

- Telecommunications
- Central computer, mainframe, software, or application (internal/external)
- Energy/power/utility
- Ancillary support equipment

© 2021 National Fire Protection Association NFPA 72 (p. 2 of 2)

**RISK ANALYSIS CHECKLIST**

Facility name: \_\_\_\_\_ Facility location: \_\_\_\_\_  
 Prepared by: \_\_\_\_\_ Date prepared: \_\_\_\_\_  
 Title and contact information: \_\_\_\_\_  
 ECS system type: \_\_\_\_\_

**PART ONE: Identification of Assets or Operations at Risk**  
*Use Part One of this checklist to identify the following assets or operations at risk at your facility.*

**People**

- Employees
- Visitors and guests
- Contractors working on site
- Emergency responders
- Community surrounding the facility

**Property**

- Physical property
  - Corporate offices
  - Manufacturing facilities
  - Call center
  - Distribution centers
  - Data-processing center
  - Research and development labs
  - Property on the premises of others
  - Vital papers, records, and drawings
- Utilities
  - Telecommunications
  - Electricity
  - Water
  - Gas
  - Steam
  - Heating/ventilation/air conditioning
  - Pollution control
  - Sewerage system
  - Other critical infrastructure
- Intellectual property
  - Copyright and patent infringement
  - Trademark infringement
  - Theft of intellectual property
  - Theft of information
- Computers and computer networks
  - Software applications
  - Electronic data
- Inventory
  - Raw materials
  - Finished product

**Operations**

- Manufacturing processes
- Delivery of services
- Administrative support services
- Research and development
- Supply chain

**Environment**

- Air
- Water
- Ground

**Organization**

- Economic and financial condition
- Licenses, patents, or trademarks
- Reputation and image as well-managed company
- Contractual obligations
- Community relationships
- Regional and national impact
- Regulatory compliance and relationships with vendors

© 2024 National Fire Protection Association NFPA 72 (p. 1 of 2)

**RISK ANALYSIS CHECKLIST (continued)**

**PART TWO: Determination of Facility Hazards**  
*Use Part Two of this checklist to determine the potential hazards that might impact your facility.*

**Natural Hazards—Geological**

- Earthquake
- Tsunami
- Volcano
- Landslide, mudslide, subsidence
- Glacier, iceberg

**Natural Hazards—Meteorological**

- Flood, flash flood, tidal surge
- Drought
- Windstorm, tropical cyclone, hurricane, tornado, water spout, dust/sand storm
- Extreme temperatures (heat, cold)
- Lightning strikes
- Hail
- Geomagnetic storm
- Snow, ice, hail, sleet, avalanche

**Natural Hazards—Biological**

- Diseases (pandemic)
- Animal or insect infestation or damage

**Human-Caused Accidental Events**

- Hazardous material (explosive, flammable liquid, flammable gas, flammable solid, oxidizer, poison, radiological, corrosive) spill or release
- Natural gas leak
- Nuclear power plant incident
- Hazmat incident off site
- Explosion/fire
- Wildfire (forest, range, urban, wildland, urban interface)
- Transportation accident (motor vehicle, railroad, watercraft, aircraft pipeline)
- Building/structure failure or collapse
- Entrapment
- Mechanical breakdown
- Energy/power/utility failure
- Fuel/resource shortage
- Air/water pollution, contamination
- Water control structure/dam/levee failure
- Communications systems interruptions
- Financial issues, economic depression, inflation, financial system collapse
- Misinformation

**Human-Caused Intentional Events**

- Terrorism (explosive, chemical, biological, radiological, nuclear, cyber)
- Sabotage or vandalism
- Civil disturbance, public unrest, mass hysteria, riot
- Enemy attack, war
- Insurrection
- Strike or labor dispute
- Demonstration
- Disinformation
- Criminal activity (vandalism, arson, theft, fraud, embezzlement, data theft)
- Electromagnetic pulse
- Physical or information security breach
- Sniper incident
- Crime, theft, or robbery
- Product defect or contamination
- Harassment
- Arson
- Bomb threat
- Lost person
- Child abduction
- Kidnap
- Extortion
- Hostage incident
- Workplace violence

**Technological-Caused Events**

- Telecommunications
- Central computer, mainframe, software, or application (internal/external)
- Energy/power/utility
- Ancillary support equipment

© 2024 National Fire Protection Association NFPA 72 (p. 2 of 2)

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5192_A.7.3.6.docx	For staff use	

**Submitter Information Verification**

**Committee:** SIG-FUN  
**Submission Date:** Tue Jul 19 14:53:08 EDT 2022

**Committee Statement**

**Committee Statement:** This keeps the risk analysis documentation in one location in this code and expands on current technological analysis to incorporate cybersecurity risks/threats.  
**Response Message:** FR-5192-NFPA 72-2022



## First Revision No. 5373-NFPA 72-2022 [ Section No. A.11.1.1 ]

### A.11.1.1

Cybersecurity is not required for every system or application; it is only required when other sections of this Code, authorities, or regulations mandate that cybersecurity be incorporated into the system(s). Generally, there are greater cybersecurity concerns when systems are connected to external networks.

~~Cybersecurity recommendations are contained in Annex J.~~

## Submitter Information Verification

**Committee:** SIG-FUN  
**Submittal Date:** Fri Sep 23 11:18:33 EDT 2022

## Committee Statement

**Committee Statement:** Annex J was deleted and the cybersecurity requirements moved to Chapter 11.  
**Response Message:** FR-5373-NFPA 72-2022



## First Revision No. 5195-NFPA 72-2022 [ Chapter J ]

### ~~J-deleted~~ Guidelines for Cybersecurity-DELETED

*This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.*

#### ~~J.1~~ Introduction:

~~NFPA 72~~ contains requirements for fire alarm and emergency communications systems that can be impacted by cybersecurity threats. Coordination of cybersecurity frameworks to protect the functions of systems is essential in order to prevent unwanted impacts on the system. Where the system would need to interface with the internet or other systems, it would make sense to provide a secure firewall or gateway. In any case, protection from cybersecurity threats is essential.

The Technical Committee has determined that, in lieu of establishing requirements in Chapter 11 on cybersecurity at this time, it is appropriate to provide such guidance and framework in this annex. This allows the industry and the public the ability to gain experience with cybersecurity measures and provide constructive feedback for future editions of this Code.

#### ~~J.2~~ Cybersecurity Provisions:

Where cybersecurity provisions are required, manufacturers, system designers, system installers, inspection personnel, testing personnel, and service technicians involved in the design, installation, testing, and maintenance of cybersecurity provisions should provide cybersecurity measures as outlined in this annex.

#### ~~J.3~~ Cybersecurity Standards:

Systems should be designed, installed, and maintained in accordance with one or more of the following cybersecurity standards:

~~ANSI/ISA/IEC 62443-4-2, Security for Industrial Automation and Control Systems, Part 4-2: Technical Security Requirements for IACS Components~~

~~NISTIR 8259, Foundational Cybersecurity Activities for IoT Device Manufacturers~~

~~NIST Framework for Improving Critical Infrastructure Cybersecurity~~

~~UL 2900-2-3, Software Cybersecurity for Network-Connectable Products Part 2-3: Particular Requirements for Security and Life Signaling Systems~~

~~Other standard(s) or published documents acceptable to the authority having jurisdiction~~

#### ~~J.4~~ Evidence of Compliance:

Evidence of cybersecurity compliance should include one or more of the following:

~~Certification of compliance by a nationally recognized test laboratory~~

~~Manufacturer certification for the specific type and brand of system provided~~

~~An assessment or certification program acceptable to the authority having jurisdiction~~

#### ~~J.5~~ Documentation:

~~All system-related documentation associated with the use of the selected standard(s) is included as part of the system documentation required by Chapter 7 .~~

#### ~~J.6~~ Cybersecurity Certificate Maintenance:



**J.6.1 Certificate Validation:**

Where a system is provided with a cybersecurity certificate document as evidence of compliance, the validity of the certificate should be checked annually.

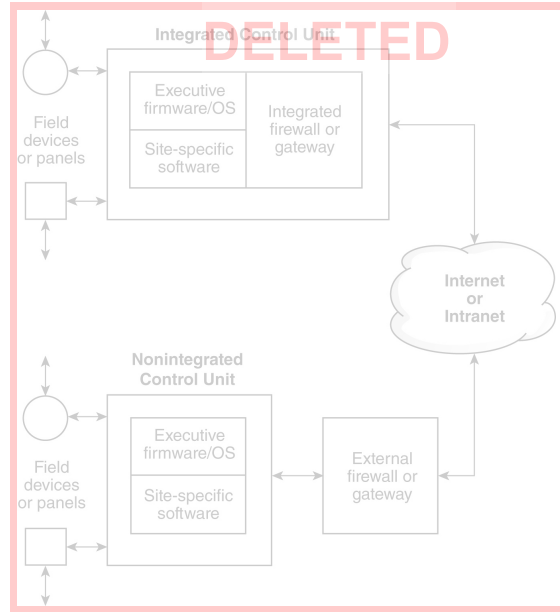
**J.6.2 Cybersecurity Software Revisions:**

Software changes made only for cybersecurity purposes to firewalls or barrier gateways should not require the functional test of the system that is otherwise required by 14.4.2.4 and 14.4.2.5 where all the following are true:

- The changes do not affect the function of the executive or site-specific software.
- The integrity of the software update installed in the firewall or barrier gateway is verified to ensure complete and intact software delivery.
- The software is digitally signed by the manufacturer.
- The digital signature of the software is verified prior to execution by the system or system components using secure signing keys.

Figure J.6.2 depicts system typical firewall/gateway operation. Such functionality is not mandated but when deployed might take the form of physical hardware, firmware, or a combination of both. The firewall/gateway might be physically integrated into the control unit as shown in the integrated control unit graphic, or a separate device/service that interacts with the control unit as shown in the nonintegrated control unit. If the firewall/gateway is segmented from the executive firmware and site-specific software and if security software changes to the firewall/gateway are made, these changes should not require system retesting. If changes are made in a firewall/gateway that is not segmented from the executive firmware and site-specific software, the system should be retested.

**Figure J.6.2 System Typical Firewall/Gateway Operation:**



**J.6.3 Remote Software Changes:**

Software changes to systems or system components made only for cybersecurity purposes should be permitted to be made by remote access in accordance with Chapter 23 :

**Submitter Information Verification**

**Committee:** SIG-FUN  
**Submittal Date:** Tue Jul 19 15:07:30 EDT 2022

**Committee Statement**

**Committee Statement:** Annex J is no longer needed because the material has been incorporated into Chapter 11 and Annex A.  
**Response Message:** FR-5195-NFPA 72-2022

[Public Input No. 388-NFPA 72-2022 \[Sections J.1, J.2, J.3, J.4, J.5, J.6\]](#)

[Public Input No. 509-NFPA 72-2022 \[Sections J.1, J.2, J.3, J.4, J.5, J.6\]](#)



## First Revision No. 5206-NFPA 72-2022 [ Chapter K ]

### **Annex J** Informational References

#### **J.1** Referenced Publications.

The documents or portions thereof listed in this annex are referenced within the informational sections of this Code and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

**J.1.1 NFPA Publications.**

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 3, *Standard for Commissioning of Fire Protection and Life Safety Systems*, ~~2024~~ 2024 edition.

NFPA 4, *Standard for Integrated Fire Protection and Life Safety System Testing*, ~~2024~~ 2024 edition.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2022 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, ~~2022~~ 2025 edition.

NFPA 70<sup>®</sup>, *National Electrical Code*<sup>®</sup>, ~~2020~~ 2023 edition.

NFPA 72E, *Standard for Automatic Fire Detectors*, 1984 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, ~~2022~~ 2025 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, ~~2024~~ 2024 edition.

NFPA 90B, *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*, ~~2024~~ 2024 edition.

NFPA 92, *Standard for Smoke Control Systems*, ~~2024~~ 2024 edition.

NFPA 101<sup>®</sup>, *Life Safety Code*<sup>®</sup>, ~~2024~~ 2024 edition.

NFPA 105, *Standard for Smoke Door Assemblies and Other Opening Protectives*, ~~2022~~ 2025 edition.

NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*, ~~2022~~ 2025 edition.

NFPA 170, *Standard for Fire Safety and Emergency Symbols*, ~~2024~~ 2024 edition.

NFPA 551, *Guide for the Evaluation of Fire Risk Assessments*, ~~2019~~ 2022 edition.

NFPA 730, *Guide for Premises Security*, ~~2020~~ 2023 edition.

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, ~~2020~~ 2023 edition.

NFPA 909, *Code for the Protection of Cultural Resource Properties — Museums, Libraries, and Places of Worship*, 2021 edition.

NFPA 914, *Code for Fire Protection of Historic Structures*, ~~2019~~ 2023 edition.

~~NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2019 edition.~~

~~NFPA 1225, *Standard for Emergency Services Communications*, 2022 edition.~~

NFPA 1600<sup>®</sup>, *Standard on Continuity, Emergency, and Crisis Management*, 2019 edition.

NFPA 5000<sup>®</sup>, *Building Construction and Safety Code*<sup>®</sup>, ~~2024~~ 2024 edition.

Fire Protection Research Foundation, *Elevator Messaging Strategies*, 2011.

Fire Protection Research Foundation, *Optimizing Fire Alarm Notification for High Risk Groups*, 2007.

Fire Protection Research Foundation, *Review of Alarm Technologies for Deaf and Hard of Hearing Populations*, August 2021.

Fire Protection Research Foundation (FPRF) Report, *Development of a Technical Basis for Carbon Monoxide Detector Siting*, prepared by C. Beyler and D. Gottuk, 2007.

**J.1.2 Other Publications.**

**J.1.2.1** ASA Publications.

Acoustical Society of America, ~~35 Pinelawn Road, Suite 114 E~~ 1305 Walt Whitman Road, Suite 110, Melville, NY 11747-3477 ~~4300~~.

ANSI/ASA S3.2, *Method for Measuring the Intelligibility of Speech Over Communications Systems*, ~~2009 (R2014)~~ 2020.

ANSI/ASA S3.41, *Audible Emergency Evacuation (E2) and Evacuation Signals with Relocation Instructions (ESRI)*, 2015.

**J.1.2.2** ASME Publications.

American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME A17.1/CSA B44, *Safety Code for Elevators and Escalators*, 2019.

ASME A.17.2, *Guide for Inspection of Elevators, Escalators, and Moving Walks*, ~~2017~~ 2020.

**J.1.2.3** FEMA Publications.

Federal Emergency Management Agency, U.S. Department of Homeland Security, 500 C Street, SW, Washington, DC 20024.

FEMA Technical Bulletin, *Outdoor Warning Systems*, Version 2.0, January 2006.

**J.1.2.4** FM Approvals LLC.

FM Approvals LLC, 1151 Boston-Providence Turnpike, P.O. Box 9102, Norwood, MA 02062.

FM Approval Standard 3210, *Heat Detectors for Automatic Fire Alarm Signaling*, ~~2018~~ 2021.

~~ANSI~~ FM Approval Standard 3260, *Radiant Energy-Sensing Fire Detectors for Automatic Fire Alarm Signaling*, ~~2018~~ 2021.

**J.1.2.5** IEC Publications.

International Electrotechnical Commission, 3 rue de Varembé, P.O. Box 131, CH-1211 Geneva 20, Switzerland. IEC documents are available through ANSI.

IEC 60268-16, *Sound system equipment — Part 16: Objective rating of speech intelligibility by speech transmission index*, ~~2014~~ 2020.

~~Keating, John P. and Loftus, Elizabeth F., "People Care in Fire Emergencies — Psychological Aspects, 1975," SFPE, 1975.~~

**J.1.2.6** IEEE Standards Association Publications.

IEEE Operations Center, ~~3 Park Avenue, New York, NY 10016-5997~~; 445 Hoes Lane, Piscataway, NJ 08854-4141

IEEE 485, *Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications*, ~~2010~~ 2020.

IEEE 1188, *Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*, 2005 (R2010).

IEEE 802.3, *Standard for Information Technology — Telecommunications and Information Exchange Between Systems — Local and Metropolitan Area Networks — Specific Requirements — Part 3*, ~~2006~~ 2018.

IEEE 802.3bt™, *IEEE Standard for Ethernet, Amendment 2: Physical Layer and Management Parameters for Power over Ethernet over 4 pairs*, 2018.

**J.1.2.7** IES Publications.

Illuminating Engineering Society of North America, 120 Wall Street, 17th floor, New York, NY 10005.

*Lighting Handbook Reference and Application*, 2011.

**J.1.2.8** ISA Publications.

International Society of Automation, ~~67 T.W. Alexander Drive, PO Box 12277, Research Triangle Park, NC 27709.~~ 3252 S. Miami Boulevard, #102, Durham, NC 27703.

ANSI/ISA 62443, *Security for Industrial Automation and Control Systems Series*, ~~2019~~ 2020 .

~~ANSI/ISA/IEC-62443-4-2, Security for Industrial Automation and Control Systems, Part 4-2: Technical Security Requirements for IACS Components , 2019.~~

**J.1.2.9** ISO Publications.

International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

ISO 7240-19, *Fire detection and alarm systems — Part 19: Design, installation, commissioning, and service of sound systems for emergency purposes*, 2007 (R2018).

ISO 8201, *Alarm systems — Audible emergency evacuation signal — Requirements* , 2017.

ISO/IEC 14763-3, *Informational technology — Implementation and operation of customer premises cabling — Part 3: Testing of optical fibre cabling*, 2014.

**J.1.2.10** NEMA Publications.

National Electrical Manufacturers Association, 1300 North 17th Street, Suite 900, Arlington, VA 22209.

NEMA SB-7, *Applications Guide for Carbon Monoxide Alarms and Detectors*, 2018.

ANSI/NEMA SB-40, *Communications Systems for Life Safety in Schools*, 2015.

NEMA SB-50, *Emergency Communications Audio Intelligibility Applications Guide*, ~~2014~~ 2021 .

**J.1.2.11** NIST Publications.

National Institute of Standards and Technology, 100 Bureau Drive, Stop 1070, Gaithersburg, MD 20899-1070.

Kuligowski, Erica D., NIST Technical Note 1779, *General Guidance on Emergency Communications Strategies for Buildings*, February 2013.

NIST Framework for Improving Critical Infrastructure Cybersecurity Version 1.1, 2018.

~~NISTIR 8259, Foundational Cybersecurity Activities for IoT Device Manufacturers , 2020.~~

~~Stone, William C., NISTIR 6055, Electromagnetic Signal Attenuation in Construction Materials , 1997.~~

**J.1.2.12** OASIS Publications.

Organization for the Advancement of Structured Information Standards (OASIS), ~~25 Corporate Drive, Suite 103, Burlington, MA 01803.~~ 400 Trade Center, Suite 5900, Woburn, MA 01801.

OASIS Standard CAP-V1.2, *OASIS Common Alerting Protocol*, Version 1.2, 2010 .

**J.1.2.13** SFPE Publications.

Society of Fire Protection Engineers, 9711 Washingtonian Blvd. ~~Boulevard~~ , Suite 380, Gaithersburg, MD 20878.

*SFPE Engineering Guide: Evaluation of the Computer Fire Model DETACT QS*, 2002.

*SFPE Engineering Guide to Fire Risk Assessment*, 2006.

*SFPE Engineering Guide to Human Behavior in Fire*, 2019.

*SFPE Engineering Guide to Performance-Based Fire Protection*, 2nd edition, 2007.

*SFPE Handbook of Fire Protection Engineering*, 5th edition, 2016.

“Projected Beam Smoke Detectors — More Than Just a Substitute for Spot Detectors”; *Fire Protection Engineering*, Issue No. 23, Summer 2004, SFPE.

**J.1.2.14** TIA Publications.

Telecommunications Industry Association, ~~4320~~ 1310 North Courthouse Road, Suite ~~200~~ 890, Arlington, VA 22201.

TIA-526, *Standard Test Procedures for Fiber Optic Systems*, September 1992.

**J.1.2.15** UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 217, *Smoke Alarms*, ~~8th edition, 2015~~ 2020, revised ~~2016~~ 2022.

UL 268, *Smoke Detectors for Fire Alarm Systems*, ~~7th edition, 2016~~ 2020, revised 2021.

UL 268A, *Smoke Detectors for Duct Application*, 2008, revised ~~2016~~ 2020.

UL 827, *Central-Station Alarm Services*, 2014, revised ~~2019~~ 2021.

UL 864, *Control Units and Accessories for Fire Alarm Systems*, 2014, revised ~~2018~~ 2020.

UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories*, 2016, revised 2017.

~~UL 1778, *Uninterruptible Power Source*, 2017.~~

UL 1971, *Signaling Devices for the Hearing Impaired*, 2002, revised 2018.

UL 1989, *Standby Batteries*, ~~2018~~ 2013, revised 2018.

UL 2034, *Single and Multiple Station Carbon Monoxide Alarms*, 2017, revised 2018.

UL 2054, *Household and Commercial Batteries*, ~~2004~~ 2021.

UL 2075, *Safety Gas and Vapor Detectors and Sensors*, 2013, revised ~~2017~~ 2021.

UL 2572, *Mass Notification Systems*, 2018.

~~UL 2900, *Software Cybersecurity for Network-Connectable Products*, 2017.~~

CAN/ ~~UL 2900-1, *Standard for Software Cybersecurity for Network-Connectable Products, Part 1: General Requirements*, 2017~~ 2020.

CAN/ ~~UL 2900-2-3, *Standard for Software Cybersecurity for Network-Connectable Products, Part 2-3: Particular Requirements for Security and Life Safety Signaling Systems*, 2020.~~

**J.1.2.16** ~~US~~ U.S. Government Publications.

~~US~~ U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

ADA-ABA-AG, *Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines*, 2010.

Federal Aviation Administration (FAA) Human Factors Awareness Course, <http://www.hf.faa.gov/webtraining/Intro/Intro1.htm>.

42 U.S.C. 5401-5426, "Manufactured Home Construction and Safety Standards."

NIST Technical Note 1455-1, *Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings*, February 2008.

~~Title 24, Code of Federal Regulations, Parts 3280, 3282, 3284, 3285, 3286, 3288, and 3800.~~

Title 29, Code of Federal Regulations, Part 1910.5.

Title 47, Code of Federal Regulations, Part 15, "Radio Frequency Devices."

**J.1.2.17** References Associated with Annex A.**J.1.2.17.1** Reference to A.17.6.3.5.1.

Schifiliti, R. and Pucci, W. "Fire Detection Modelling, State of the Art," 6 May 1996 sponsored by the Fire Detection Institute, Bloomfield, CT.

**J.1.2.17.2** Reference to A.18.4.8.2.

"How We Localize Sound," *Physics Today*, Volume 52, Issue 11, Page 24 (November 1999).

**J.1.2.17.3** Reference to A.18.5.5.7.1.

“Recommended Light Levels,” National Optical Astronomy Observatory, [www.noao.edu](http://www.noao.edu) <https://noirlab.edu/>.

**J.1.2.17.4** Reference to A.24.3.8.

Bruck, D., Thomas, I., and Ball M., *Optimizing Fire Alarm Notification for High Risk Groups Research Project — Waking effectiveness of alarms (auditory, visual and tactile) for the alcohol impaired*, Report to the Fire Protection Research Foundation, June 2007.

**J.1.2.17.5** References to A.24.3.12.

(1) *CARVER — Target Analysis and Vulnerability Assessment Methodology*, Washington, DC: U.S. Department of Defense (see Field Manual 34-36, Special Operation Forces Intelligence and Electronics Warfare Operation, Sept. 30, 1991), [www.defense.gov](http://www.defense.gov).

(2) *General Security Risk Assessment Guidelines*. Alexandria, VA: American Society for Industrial Security International, [www.asisonline.org](http://www.asisonline.org).

(3) *NFPA 1600<sup>®</sup>, Standard on Continuity, Emergency, and Crisis Management*, National Fire Protection Association, Quincy, MA, 2019 edition.

(4) *NFPA 730, Guide for Premises Security*, National Fire Protection Association, Quincy, MA, ~~2020~~ 2023 edition.

(5) *Responsible Care Security Code of Management Practices*, Washington, DC: American Chemistry Council, [www.americanchemistry.com](http://www.americanchemistry.com).

(6) *AWWA J100, Risk and Resilience Management of Water & Wastewater Systems*, American Water Works Association, Denver, CO, ~~2010~~ 2021, [www.awwa.org](http://www.awwa.org).

(7) *VAMCAP<sup>®</sup> Vulnerability Assessment Methodology for Critical Asset Protection*, Wilmington, DE: SafePlace Corporation, [www.safeplace.com](http://www.safeplace.com).

(8) *Vulnerability Assessment Methodologies*, Albuquerque, NM: Sandia National Laboratories, [www.sandia.gov](http://www.sandia.gov).

(9) *SFPE Engineering Guide to Fire Risk Assessment*, Society of Fire Protection Engineers, Gaithersburg, MD, 2006, [www.sfpe.org](http://www.sfpe.org).

**J.1.2.17.6** Reference to A.24.3.14.13.

*International Building Code (IBC)*, International Code Council, Falls Church, VA, 2018.

**J.1.2.17.7** References to A.24.4.8.

(1) Schifiliti, R.P., “To Leave or Not to Leave — That is the Question!”, National Fire Protection Association, World Fire Safety Congress & Exposition, May 16, 2000, Denver, CO.

(2) Ramachandran, G., “Informative Fire Warning Systems,” *Fire Technology*, Volume 47, Number 1, February 1991, National Fire Protection Association, 66–81.

(3) J. Bryan, “Psychological Variables That May Affect Fire Alarm Design,” *Fire Protection Engineering*, Society of Fire Protection Engineers, Issue No. 11, Fall 2001.

(4) Proulx, G., “Cool Under Fire,” *Fire Protection Engineering*, Society of Fire Protection Engineers, Issue No. 16, Fall 2002.

(5) General Services Administration, Proceedings of the Reconvened International Conference on Fire Safety in High Rise Buildings, Washington, D.C., October 1971.

(6) Proulx, G., “Strategies for Ensuring Appropriate Occupant Response to Fire Alarm Signals,” National Research Council of Canada, Ottawa, Ontario, *Construction Technology Update*, No. 43, 1–6, December 2000.



**J.1.2.17.8** References to A.24.4.8.3.2.

Kailes, J.I. and Enders, A., "Moving Beyond "Special Needs": A Function Based Framework for Emergency Management and Planning," *Journal of Disability Policy Studies*, SAGE Publications, March 2007.

Morrow, B.H., "Identifying and Mapping Community Vulnerability," *Disasters*, 23(1), 1–18, 1999.

Proulx, G., *Occupant Behaviour and Evacuation*, National Research Council of Canada, Ottawa, Ontario, 2001.

Shields, T.J., Boyce, K.E., and Silcock, G.W.H., *Client Report: Unannounced Evacuation of Marks & Spencer, Sprucefield Store*, Fire Safety Engineering Research and Technology Centre, University of Ulster, Northern Ireland, 1997.

**J.1.2.17.9** References to A.29.2.

"A Few Facts at the Household Level," NFPA Fire Analysis Division, *Fire Journal*, July 2009.

Ahrens, M. and Maheshwari, Radhika , "Home Structure Fires," NFPA Fire Analysis and Research Division, ~~September 2016~~ October 2021 .

Haynes, Hylton J.G., "Fire Loss in the United States during 2015," NFPA Fire Analysis and Research Division, September 2016.

*Injury Facts*, National Safety Council, Itasca, IL, 2011.

**J.1.2.17.10** References to A.29.5.8.

Bruck, D. and Thomas, I., "Smoke alarms for sleeping adults who are hard-of-hearing: comparison of auditory, visual, and tactile signals," *Ear and Hearing*, 30(1), February 2009, pp. 73–80.

Bruck, D., Thomas, I., and Ball, M., "Optimizing Fire Alarm Notification for High Risk Groups Research Project — Waking effectiveness of alarms (auditory, visual and tactile) for the alcohol impaired," Report to the Fire Protection Research Foundation, June 2007.

Fire Protection Research Foundation, *Review of Alarm Technologies for Deaf and Hard of Hearing Populations*, August 2021.

Roby, R., "Smoke Detector Alert for the Deaf," Phase II SBIR, Final Report, NIH Grant No. 2R44 DC004254-2, May 27, 2005.

**J.1.2.17.11** References to A.29.8.1.

NBS GCR 75-51, *Detector Sensitivity and Siting Requirements for Dwellings*, 1975.

NBS GCR 77-82, *Detector Sensitivity and Siting Requirements for Dwellings Phase 2*, 1977.

NIST Technical Note 1455-1, *Performance of Home Smoke Detectors, Analysis of the Response of Several Available Technologies in a Residential Setting*, 2007.

**J.1.2.17.12** References to A.29.8.2.1.1.

Green, M. A. and Andres, C., "2004–2005 National Sample Survey of Unreported Residential Fires," CPSC, 2009.

Ahrens, M., "Factors in Smoke Alarm Performance," National Fire Protection Association, December 2009.

Thomas, I. and Bruck, D., "Smoke Alarms in Dwellings: Timely Activation and Effective Notification," Victoria University, June 2010.

**J.1.2.17.13** References to A.29.11.3.

Kemano Fire Studies Part 1 of Residential Smoke Alarms, National Research Council Canada, April 2003.

Spacing Requirements for Complex Beamed and Sloped Ceilings Report, The Fire Protection Research Foundation, NFPA, April 2008.

**J.1.2.17.14** References to A.29.11.3.4(6).

Dinaburg, J. and Gottuk, D.T., "Smoke Alarm Nuisance Source Characterization: Experimental Results — Final Report," Fire Protection Research Foundation, 1 Batterymarch Park, Quincy, MA, 2015.

**J.1.2.17.15** References to A.29.11.3.4(8).

Gottuk, E.D. and Gottuk, D.T., "The Effect of Ceiling Fans on Smoke Alarm Performance," NFPA Research Foundation SUPDET Symposium presentation, 2015.

**J.1.2.18** Other Publications — Related to Carbon Monoxide Provisions.

Ashley, E., DuBois, J., "Waking Effectiveness of Audible, Visual, and Vibratory Emergency Alarms Across All Hearing Levels," Fire Suppression and Detection Research Symposium, Orlando, FL 2005.

Coburn, R. F., Forster, R. E., and Kane, P. G., "Considerations for the physiological variables that determine the blood carboxyhemoglobin concentration in man," *Journal of Clinical Investigation*, 1965, November; 44(11):1899–1910.

Fire Protection Research Foundation (FPRF) Report, Development of a Technical Basis for Carbon Monoxide Detector Siting, prepared by C. Beyler and D. Gottuk, 2007.

Report of research on emergency signaling devices for use by the hearing impaired (Subject 1971), Underwriters Laboratories, 1991 (Superseded; referenced for historical purposes).

Steinberg, S., and Nielson, G. D., "A proposal for evaluating human exposure to carbon monoxide contamination in military vehicles," AMCMS Code 672716.H700011, March 1977.

Title 47, Code of Federal Regulations, Part 15.

**J.1.2.19** References Associated with Annex B.

- (1) Alpert, R. "Ceiling Jets," *Fire Technology*, August 1972.
- (2) "Evaluating Unsprinklered Fire Hazards," *SFPE Technology Report* 83-2.
- (3) Babrauskas, V., Lawson, J. R., Walton, W. D., and Twilley, W. H. "Upholstered Furniture Heat Release Rates Measured with a Furniture Calorimeter," (NBSIR 82-2604) (Dec. 1982). National Institute of Standards and Technology (formerly National Bureau of Standards), Center for Fire Research, Gaithersburg, MD 20889.
- (4) Beyler, C. "A Design Method for Flaming Fire Detection," *Fire Technology*, Vol. 20, No. 4, November 1984.
- (5) Hurley, M. J., ed., Chapter 40, *SFPE Handbook of Fire Protection Engineering*, by R. Schifiliti, R. Custer, and B. Meacham, 2016.
- (6) Evans, D. D. and Stroup, D. W. "Methods to Calculate Response Time of Heat and Smoke Detectors Installed Below Large Unobstructed Ceilings," (NBSIR 85-3167) (Feb. 1985, issued Jul. 1986). National Institute of Standards and Technology (formerly National Bureau of Standards), Center for Fire Research, Gaithersburg, MD 20889.
- (7) Heskestad, G. "Characterization of Smoke Entry and Response for Products-of-Combustion Detectors" Proceedings, 7th International Conference on Problems of Automatic Fire Detection, Rheinisch-Westfalischen Technischen Hochschule Aachen (March 1975).
- (8) Heskestad, G. "Investigation of a New Sprinkler Sensitivity Approval Test: The Plunge Test," FMRC Tech. Report 22485, Factory Mutual Research Corporation, 1151 Providence Turnpike, Norwood, MA 02062.
- (9) Heskestad, G. and Delichatsios, M. A. "The Initial Convective Flow in Fire: Seventeenth Symposium on Combustion," The Combustion Institute, Pittsburgh, PA (1979).
- (10) Heskestad, G. and Delichatsios, M. A. "Environments of Fire Detectors — Phase 1: Effect of Fire Size, Ceiling Height and Material," Measurements Vol. I (NBS-GCR-77-86), Analysis Vol. II (NBS-GCR-77-95). National Technical Information Service (NTIS), Springfield, VA 22151.
- (11) Heskestad, G. and Delichatsios, M. A. "Update: The Initial Convective Flow in Fire," *Fire Safety Journal*, Vol. 15, No. 5, 1989.
- (12) International Organization for Standardization, *Alarm systems — Audible Emergency Evacuation Signal*, ISO 8201, 2017.
- (13) Klote, J. and Milke, J. "Principles of Smoke Management," American Society of Heating, Refrigerating and Air Conditioning Engineers, Atlanta, GA, 2002.
- (14) Lawson, J. R., Walton, W. D., and Twilley, W. H. "Fire Performance of Furnishings as Measured in the NBS Furniture Calorimeter, Part 1," (NBSIR 83-2787) (Aug. 1983). National Institute of Standards and Technology (formerly National Bureau of Standards), Center for Fire Research, Gaithersburg, MD 20889.
- (15) Morton, B. R., Taylor, Sir Geoffrey, and Turner, J. S. "Turbulent Gravitational Convection from Maintained and Instantaneous Sources," *Proc. Royal Society A*, 234, 1–23, 1956.
- (16) Schifiliti, R. "Use of Fire Plume Theory in the Design and Analysis of Fire Detector and Sprinkler Response," Master's Thesis, Worcester Polytechnic Institute, Center for Firesafety Studies, Worcester, MA, 1986.
- (17) Title 47, Code of Federal Regulations, Communications Act of 1934 Amended.
- (18) Schifiliti, R. and Pucci, W. "Fire Detection Modelling, State of the Art," 6 May, 1996 sponsored by the Fire Detection Institute, Bloomfield, CT.
- (19) Forney, G., Bukowski, R., Davis, W. "Field Modelling: Effects of Flat Beamed Ceilings on Detector and Sprinkler Response," Technical Report, Year 1. International Fire Detection Research Project, National Fire Protection Research Foundation, Quincy, MA. October, 1993.
- (20) Davis, W., Forney, G., Bukowski, R. "Field Modelling: Simulating the Effect of Sloped Beamed Ceilings on Detector and Sprinkler Response," Year 1. International Fire Detection Research Project Technical Report, National Fire Protection Research Foundation, Quincy, MA. October, 1994.

- (21) Brozovski, E. "A Preliminary Approach to Siting Smoke Detectors Based on Design Fire Size and Detector Aerosol Entry Lag Time," Master's Thesis, Worcester Polytechnic, Worcester, MA, 1989.
- (22) Cote, A. *NFPA Fire Protection Handbook*, 20th edition, National Fire Protection Association, Quincy, MA, 2008.
- (23) Tewarson, A., "Generation of Heat and Chemical Compounds in Fires," *SFPE Handbook of Fire Protection Engineering*, Second Edition, NFPA and SFPE, 1995.
- (24) Hollman, J. P. *Heat Transfer*, McGraw-Hill, New York, 1976.
- (25) Custer, R. L. P., and Meacham, B. "Introduction to Performance Based Fire Safety," SFPE, 1997.
- (26) Schifiliti, R. P., Meacham B., Custer, R. L. P. "Design of Detection Systems," *SFPE Handbook of Fire Protection Engineering*.
- (27) Marrion, C. "Correction Factors for the Heat of Combustion in NFPA 72," Appendix B, Fire Protection Engineering, SFPE, 1998.
- (28) Marrion, C. "Designing and Analyzing the Response of Detection Systems: An Update to Previous Correlations," 1988.
- (29) Custer, R. and Bright, R. "Fire Detection: The State-of-the-Art," NBS Tech. Note 839, National Bureau of Standards, Washington, 1974.
- (30) Meacham, Brian J. "Characterization of Smoke from Burning Materials for the Evaluation of Light Scattering-Type Smoke Detector Response," MS Thesis, WPI Center for Firesafety Studies, Worcester, MA, 1991.
- (31) Delichatsios, M. A. "Categorization of Cable Flammability, Detection of Smoldering, and Flaming Cable Fires," Interim Report, Factory Mutual Research Corporation, Norwood, MA, NP-1630, November 1980.
- (32) Heskestad, G. FMRC Serial Number 21017, Factory Mutual Research Corp., Norwood, MA, 1974.
- (33) Marrion, C. E. "Lag Time Modeling and Effects of Ceiling Jet Velocity on the Placement of Optical Smoke Detectors," MS Thesis, WPI Center for Firesafety Studies, Worcester, MA, 1989.
- (34) Kokkala, M. et al. "Measurements of the Characteristic Lengths of Smoke Detectors," *Fire Technology*, Vol. 28, No. 2, National Fire Protection Association, Quincy, MA, 1992.
- (34a) Yamauchi et al. "A Calculation Method for Predicting Heat and Smoke Detector's Response."
- (34b) Cleary et al. "Particulate Entry Lag in Spot Type Smoke Detectors," IAFSS Proceedings, Boston, MA 2000.
- (34c) Keski-Rahkonen, "Revisiting Modeling of Fluid Penetration into Smoke Detectors," AUBE 2001.
- (34d) Bjoerkman et al. "Determination of Dynamic Model Parameters of Smoke Detectors," *Fire Safety Journal*, No 37, pp. 395–407, 2002.
- (34e) Keski-Rahkonen, "A New Model for Time Lag of Smoke Detectors," International Collaborative Project to Evaluate Fire Models for Nuclear Power Plant Application, Gaithersburg, MD, May 2002.
- (35) UL 268, *Standard for Smoke Detectors for Fire Alarm Systems*, Underwriters Laboratories, Inc., Northbrook, IL, ~~2009~~ 2016, revised 2021 .
- (36) Deal, Scott. "Technical Reference Guide for FPEtool Version 3.2," NISTIR 5486-1 , National Institute for Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD, ~~Aug. 1994~~ April 1995 .
- (37) Mowrer, F. W. "Lag Times Associated with Detection and Suppression," *Fire Technology*, Vol. 26, No. 3, pp. 244–265, 1990.

- (38) Newman, J. S. "Principles for Fire Detection," *Fire Technology*, Vol. 24, No. 2, pp. 116–127, 1988.
- (39) Custer, R., Meacham, B., Wood, C. "Performance Based Design Techniques for Detection and Special Suppression Applications," Proceedings of the SFPE Engineering Seminars on Advances in Detection and Suppression Technology, 1994.
- (40) SFPE *Engineering Guide to Performance Based Fire Protection*, 2nd edition, 2007, SFPE, Gaithersburg, MD.
- (41) SFPE *Handbook of Fire Protection Engineering*, 5th edition, SFPE, Gaithersburg, MD, 2016.
- (42) Drysdale, Dougal, *An Introduction to Fire Dynamics*, John Wiley & Sons, New York, NY, ~~1998~~ 2011, ISBN ~~0-471-90643-1~~ 0470319038, ~~2nd~~ 3rd edition.
- (43) Nam S., Donovan L.P. and Kim S.G., "Establishing Heat Detectors Thermal Sensitivity Through Bench Scale Tests," *Fire Safety Journal*, Volume 39, Number 3, 191–215, April 2004.
- (44) Nam S., Thermal Response Coefficient TRC of Heat Detectors and Its Field Applications, Fire Detection and Research Applications Symposium, NFP Research Foundation, January 2003.
- (45) Nam S., Performance-Based Heat Detector Spacing, Interflam 2004, pp 883–892.
- (46) Geiman, J. A., "Evaluation of Smoke Detector Response Estimation Methods," Master of Science Thesis, University of Maryland, College Park, MD, December 2003.
- (47) [Reference removed.]
- (48) Geiman, J.A., and Gottuck, D.T., "Alarm Thresholds for Smoke Detector Modeling," *Fire Safety Science — Proceeding of the Seventh International Symposium*, 2003, pp. 197–208.
- (49) *The SFPE Code Official's Guide to Performance-based Design Review and Analysis of Buildings*, Society of Fire Protection Engineers, Bethesda, MD, 2004.
- (50) NFPA 101, *Life Safety Code*, National Fire Protection Association, Quincy, MA, ~~2009~~ 2024.
- (51) NFPA 909, *Code for the Protection of Cultural Resource Properties — Museums, Libraries, and Places of Worship*, National Fire Protection Association, Quincy, MA, ~~2010~~ 2025.
- (52) NFPA 914, *Code for Fire Protection of Historic Structures*, National Fire Protection Association, Quincy, MA, ~~2010~~ 2023.
- (53) Performance-based Building Design Concepts, International Code Council, Washington DC, 2004.
- (54) *Extreme Event Mitigation In Buildings — Analysis and Design*, Meacham, National Fire Protection Association, Quincy, MA, 2006.
- (55) Geiman, Gottuk, and Milke, "Evaluation of Smoke Detector Response Estimation Methods: Optical Density, Temperature Rise and Velocity at Alarm," *Journal of Fire Protection Engineering*, 2006.
- (56) Su et al., "Kemano Fire Studies — Part 1: Response of Residential Smoke Alarms," Research Report 108, NRCC, April 2003.
- (57) Davis, W., The Zone Model Jet, "A Model for the Prediction of Detector Activation and Gas Temperature in the Presence of a Smoke Layer," NISTIR 6324, NIST, May 1999.
- (58) *SFPE Engineering Guide to Human Behavior in Fire*, 2019.
- (59) *Guidelines for Peer Review in the Fire Protection Design Process*, Society of Fire Protection Engineers, Gaithersburg, MD, 2009.
- (60) *SFPE Engineering Guide: Guidelines for Substantiating a Fire Model for a Given Application*, Society of Fire Protection Engineers, Gaithersburg, MD, 2011.

**J.1.2.20** References Associated with Annex D.

- (1) Jacob, K. & Tyson, T., "Computer-Based Prediction of Speech Intelligibility for Mass Notification Systems," SUPDET 2008, Fire Protection Research Foundation, March 2008.
- (2) IEC 60268-16, "Sound system equipment — Part 16: Objective rating of speech intelligibility by speech transmission index," ~~2014~~ 2020 .
- (3) ANSI/ASA S3.5, *Methods for Calculation of the Speech Intelligibility Index*, Acoustical Society of America, 35 Pinelawn Road, Suite 114 E, Melville, NY 11747-3177, 1997 (R2017).
- (4) Barnett, P.W. and Knight, A.D., "The Common Intelligibility Scale," Proceedings of the Institute of Acoustics, Vol. 17, Part 7, 1995.
- (5) ISO 7240-16, *Fire detection and alarm systems – Part 16: Sound system control and indicating equipment*, International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, 2007.
- (6) Sander J. van Wijngaarden and Jan A. Verhave, Past Present and Future of the Speech Transmission Index, Chapter 9, Measurement and Prediction of Speech Intelligibility in Traffic Tunnels Using the STI, p113, TNO Human Factors, The Netherlands, 2002.
- (7) Mapp, P., "Systematic & Common Errors in Sound System STI and Intelligibility Measurements," Convention Paper 6271, Audio Engineering Society, 117th Convention, San Fran, CA, 28–31 October 2004.
- (8) Peter Mapp, Past Present and Future of the Speech Transmission Index, Chapter 8, Practical Application of STI to Assessing Public Address and Emergency Sound Systems, TNO Human Factors, The Netherlands, 2002.
- (9) UL 1480, *Speakers for Fire Alarm and Signaling Systems, Including Accessories*, 2016, revised 2017 .
- (10) Schifiliti, Robert P., "Fire Alarm Testing Strategies Can Improve Occupant Response and Reduce the 'Cry Wolf' Syndrome," NEMA Supplement in *Fire Protection Engineering*, Society of Fire Protection Engineers, Bethesda, MD, 2003.
- (11) Breznitz, S., *Cry Wolf: The Psychology of False Alarms*, Lawrence Erlbaum Associates, Hilldale, NJ, 1984.

**J.1.2.21** References Associated with Annex G.

- Kuligowski, E.D., S.M.V. Gwynne, K.M. Butler, B.L. Hoskins, and C.R. Sandler, *Developing Emergency Communication Strategies for Buildings*, NIST Technical Note 1733, National Institute of Standards and Technology, Gaithersburg, MD, 2012.
- Kuligowski, E.D. and Omori, H., *General Guidance on Emergency Communication Strategies for Buildings*, NIST Technical Note 1827, National Institute of Standards and Technology, Gaithersburg, MD, 2nd Edition, 2014.
- START (National Consortium for the Study of Terrorism and Responses to Terrorism), 2013. Task 2.9: Phase II Interim Report on Results from Experiments, Think-out-Louds, and Focus Groups. University of Maryland, College Park: College Park, MD.
- 2010 *ADA Standards for Accessible Design*, U.S. Department of Justice, Washington, DC, September 2010 ([http://www.ada.gov/2010ADASTandards\\_index.htm](http://www.ada.gov/2010ADASTandards_index.htm)).

**J.1.2.22** References Associated with Annex H.

- U.S. Consumer Product Safety Commission, *Responding to Residential Carbon Monoxide Incidents: Guidelines for Fire and Other Emergency Response Personnel*, Washington, DC, July 2002, <http://www.cpsc.gov/s3fs-public/coguide.pdf>.

**J.2** Informational References.

The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

**J.2.1** ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM E2292, *Standard Guide for Field Investigation of Carbon Monoxide Poisoning Incidents*, ~~2014~~ 2021 .

**J.2.2** EPRI Publications.

Electric Power Research Institute, 3420 Hillview Avenue, Palo Alto, CA 94304.

Technical Report 1002925, *Stationary Battery Monitoring by Internal Ohmic Measurement*, 2002.

Technical Report 1006757, *Stationary Battery Guide; Design, Application, and Maintenance*, 2002.

**J.2.3** IMSA Publications.

International Municipal Signal Association, 165 East Union Street, Newark, NY 14513-0539.

*IMSA Official Wire and Cable Specifications Manual*, 2012.

**J.2.4** NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1192, *Standard on Recreational Vehicles*, 2021 edition.

**J.2.5** UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 1973, *Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications*, ~~1st 3rd~~ edition, ~~2013~~, ~~revised 2016~~ 2022 .

UL 2054, *Household and Commercial Batteries*, ~~2nd edition, 2004~~, ~~revised 2011~~ 2021 .

UL 2075, *Gas and Vapor Detectors and Sensors*, 2013, revised ~~2017~~ 2021 .

UL 9540, *Outline of Investigation for Energy Storage Systems and Equipment*, 1st edition, 2016.

**J.2.6** Other Publications.

Keating, John P. and Loftus, Elizabeth F., "People Care in Fire Emergencies — Psychological Aspects, 1975," SFPE, 1975.

Stone, W. Electromagnetic Attenuation in Construction Materials, National Institute of Standards and Technology, NISTIR 6055, 1997.

**J.3** References for Extracts in Informational Sections.

NFPA 70<sup>®</sup>, *National Electrical Code*<sup>®</sup>, ~~2020~~ 2023 edition.

NFPA 92B, *Smoke Management Systems in Malls, Atria, and Large Spaces*, 1995 edition (withdrawn).

NFPA 101<sup>®</sup>, *Life Safety Code*<sup>®</sup>, ~~2021~~ 2024 edition.

~~NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2019 edition.~~

~~NFPA 1225, *Standard for Emergency Services Communications*, 2022 edition.~~

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72_FR5206_Annex_K.docx	For staff use	

**Submitter Information Verification**



**Committee:** SIG-FUN

**Submittal Date:** Tue Jul 19 16:00:31 EDT 2022

## Committee Statement

**Committee Statement:** The references are updated in accordance with the Manual of Style.

**Response Message:** FR-5206-NFPA 72-2022

[Public Input No. 560-NFPA 72-2022 \[Section No. K.1.2.15\]](#)

[Public Input No. 270-NFPA 72-2022 \[Section No. K.3\]](#)