

## NFPA 72

### 3.3.7.2

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**3.3.7.2 False Alarm.** Activation or reporting of an alarm for which no such alarm condition, fire or emergency actually exists. Additionally, False Alarm is the willful and knowing initiating or transmission of a signal, message or other notification of an event of fire when no such danger exists.

### 3.3.95.4.2

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**3.3.95.4.2 Dedicated Function Fire Alarm System.** A protected premises fire alarm system installed specifically to perform fire safety function(s) where a building fire alarm system is not required. Such systems include, but are not limited to sprinkler monitoring systems and elevator recall systems. (SIG-PRO)

### 10.5.5.1

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**10.5.5.1 Dedicated Branch Circuit.** A dedicated branch circuit ~~of one of the following:~~ shall supply primary power from a commercial light and power source.

~~(1) Commercial light and power.~~

**Exceptions:**

(1) When approved by the AHJ, an engine-driven generator or equivalent in accordance with 10.5.10.2, where a person specifically trained in its operation is on duty at all times may be used for a specified period of time.

(2) When approved by the AHJ, an engine-driven generator or equivalent arranged for cogeneration with commercial light and power in accordance with 10.5.10.2, where a person specifically trained in its operation is on duty at all times may be used.

### 10.15

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**10.15\* Protection of Fire Alarm System.** In areas that are not continuously occupied, automatic smoke detection shall be provided at the location of each fire alarm control unit(s), notification appliance circuit power extenders, and supervising station transmitting equipment to provide notification of fire at that location.

*Exception No. 1: Where ambient conditions prohibit installation of automatic smoke detection, automatic heat detection shall be permitted.*

*Exception No. 2: Dedicated function fire alarm systems shall not have smoke detectors installed above the dedicated function fire alarm control unit.*

### 10.16.1

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**10.16.1 Alarm Annunciation.** The location of an operated initiating device shall be displayed by an alphanumeric display at the fire alarm control unit. Unless otherwise approved, the alphanumeric display shall show the device type, floor level (if applicable), device address (if applicable), and a descriptive location for the operated device(s). The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances. Alarm annunciators shall comply with all of the following:

1. If a building has a main entrance/foyer, a remote annunciator shall be provided inside the building at the main entrance/foyer.  
Exception: When the fire alarm control unit is located inside the building at the main entrance/foyer, a remote annunciator is not required at the main entrance/foyer.
2. If a building has a fire riser room with an exterior door, a remote annunciator shall be provided within the fire riser room.  
Exception: When the fire alarm control unit is located within the fire riser room, a remote annunciator is not required within the fire riser room.
3. The location of an operated initiating device shall be displayed by alphanumeric display at the annunciator.
4. The alphanumeric display shall state the device type, the floor level (if applicable), the device address and a descriptive location for the operated device(s).
5. The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances.

~~10.16.1.1~~ Where required by other governing laws, codes or standards, the location of and operated initiating device shall be annunciated by visible means.

~~10.16.1.1.1~~ Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout or other approved means.

~~10.16.1.1.2~~ The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances.

#### 12.2.4

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**12.2.4\*** The installation of all pathway wiring, cable and equipment shall be in accordance with *NFPA 70, National Electric Code* and the applicable requirements of 12.2.4.1 through 12.2.4.5. In all occupancies, other than residential two stories or less, all wiring, including optical fiber cables, shall be in enclosed metallic conduit or shall be MI, MC, or AC cable. (SIG-FUN)

#### 17.5.3.1

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**17.5.3.1 Total (Complete) Coverage.** Where required by laws, codes, or standards, and unless otherwise modified by 17.5.3.1.1 through 17.5.3.1.5, total coverage shall include all rooms, halls, storage areas and basements, Attics, lofts, spaces above suspended ceilings, and other subdivisions and accessible spaces; and the inside of all closets, elevator shafts, enclosed stairways, dumbwaiter shafts, and chutes shall also have detectors if required by the authority having jurisdiction or to satisfy performance design criteria. Inaccessible areas may not be required to be protected by detectors.

#### 17.5.3.1.6

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**17.5.3.1.6** When area detectors are installed instead of duct smoke detectors to comply with the Uniform Mechanical Code total coverage is defined as the area served by the air-moving equipment.

#### 17.6.3.5.2

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~~17.6.3.5.2\*~~ The minimum spacing of heat detectors shall not be required to be less than 0.4 times the height of the ceiling.

### 17.7.3.1.3

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**17.7.3.1.3** If the intent is to protect against a specific hazard, and the detectors are not otherwise required by this code or other applicable codes, the detector(s) shall be permitted to be installed closer to the hazard in a position where the detector can intercept the smoke.

### 17.12.2

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**17.12.2** Activation of the initiating device shall occur within ~~90~~ 60 seconds of waterflow at the alarm-initiating device when flow occurs that is equal or greater than that from a single sprinkler of the smallest orifice size installed in the system.

### 18.3.2.4

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**18.3.2.4** Voltage drop calculations shall be performed using one of the following methods:

- (1) The lump sum calculation method, which shall be calculated as follows:
  - (a) Calculate the voltage drop using one of these formulas:
    - i.  $V_D = I * ((R * 2 * L) / 1,000)$  **OR**
    - ii.  $V_D = (2 * K * I * L) / CM$ .
  - (b) Subtract this calculated voltage drop from 20.4 volts ( $V_S$ ) in order to get the voltage value at the end of the circuit ( $V_S - V_D = V_{EOL}$ ). The value for  $V_{EOL}$  shall be a minimum of 16 volts (the minimum operating voltage required for a listed 24 vdc notification device).
- (2) The point-to point method, which requires a math-intensive approach where the voltage drop between each notification appliance is reiterated. This method is best done by utilizing a spreadsheet program. The calculated voltage at the last device on the circuit shall be a minimum of 16 volts (the minimum operating voltage required for a listed 24 vdc notification device).

Where:

$V_D$  = Voltage Drop

$V_S$  = Starting voltage (20.4vdc, or the end of useful battery life)

$V_{EOL}$  = Voltage at the end-of-line resistor

$I$  = Total load of the circuit in amperes utilizing current draws for each notification appliance @ 16vdc (the UL maximum draws at the minimum listed voltage).

$R$  = Resistance in ohms per 1,000 feet, with respect to conductor

$K$  = 10.64 ohms (the constant representing the mil-foot resistance of copper wire)

$L$  = length of circuit in feet (distance from panel to end-of-line resistor for class B circuits)

$CM$  = circular mill of wire, with respect to conductor.

$V_{SOURCE}$  = voltage calculated at the previous device

<u>Wire</u>	<u>R</u>	<u>CM</u>
<u>No 18</u>	<u>7.95</u>	<u>1,620</u>
<u>No 16</u>	<u>4.99</u>	<u>2,580</u>
<u>No 14</u>	<u>3.14</u>	<u>4,110</u>
<u>No 12</u>	<u>1.98</u>	<u>6,530</u>

#### 18.4.1.4

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**18.4.1.4** Audible notification appliances for alert and evacuation signal tones shall meet the requirements of ~~18.4.1.5, 18.4.3 (Public Mode Audible Requirements), 18.4.4 (Private Mode Audible Requirements), 18.4.5 (Sleeping Area Requirements), or 18.4.6 (Narrow Band Tone Signaling for Exceeding Masked Thresholds), as applicable.~~

#### 18.4.1.5

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**18.4.1.5** Voice messages shall ~~not~~ be required to meet the audibility requirements of ~~18.4.1.7, 18.4.3 (Public Mode Audible Requirements), 18.4.4 (Private Mode Audible Requirements), 18.4.5 (Sleeping Area Requirements), or 18.4.6 (Narrow Band Tone Signaling for Exceeding Masked Thresholds), but and~~ shall meet the intelligibility requirements of 18.4.10. ~~where voice intelligibility is required.~~

#### 18.4.1.7

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**18.4.1.7\*** The minimum sound level for alarm signals shall be 80 decibels, or a minimum of 15 decibels above ambient, whichever is greater, in all occupied areas for all occupancies. One of the two methods below shall be utilized to ensure that a minimum of 80 decibels, or a minimum of 15 decibels above ambient, whichever is greater, will be achieved:

- (1) Audible notification devices shall be installed in each occupied area, including but not limited to spaces such as bathrooms, walk-in closets, storage rooms, and walk-in coolers/freezers.
- (2) In lieu of providing audible notification devices within certain spaces, calculations may be performed in order to prove that the alarm signals from the proposed adjacent audible devices will achieve a minimum of 80 decibels, or a minimum of 15 decibels above ambient, whichever is greater, inside and throughout that space, where doors or other barriers between the space and the adjacent audibility device(s) are closed.

#### A.18.4.1.7

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**A.18.4.1.7** In terms of this context, occupied areas are spaces capable of having occupancy and of such size to reasonably allow a person inside the space.

#### 18.4.1.8

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**18.4.1.8** One- and Two-Family Dwellings are not required to meet the requirements of Section 18.4.1.7.

#### 18.4.1.9

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**18.4.1.9** Critical care areas of health care facilities shall be allowed to have visible notification appliances in lieu of audible notification appliances when approved by the authority having jurisdiction.

#### 18.4.1.10

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**18.4.1.10** Where occupants are incapable of evacuating themselves because of age, physical or mental disabilities, or physical restraint, the private mode as described in NFPA 72, National Fire Alarm Code, shall be permitted to be used when allowed by the AHJ. Only the attendants and other personnel required to evacuate occupants from a zone, area, floor, or building shall be required to be notified when allowed by the AHJ. The notification shall include means to readily identify the zone, area, floor, or building in need of evacuation.

#### 18.5.4.3.2

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**18.5.4.3.2** Visible notification appliances shall be installed in accordance with Table 18.5.4.3.1(a) or Table 18.5.4.3.1(b) using one of the following:

- (1) A single visible notification appliance
- (2) Two visible notification appliances located on opposite walls
- (3)\*Two groups of visible notification appliances, where visual appliances of each group are synchronized, in the same room or adjacent space within the field of view. This shall include synchronization of strobes operated by separate systems
- (4) More than two visible notification appliances or groups of synchronized appliances in the same room or adjacent space within the field of view that flash in synchronization

*Exception: Where a portion of a room or space is remodeled and new or existing strobes are within the area of the remodel, such strobes are required to synchronize with each other, but are not required to synchronize with existing strobes in the field of view if the existing strobes are outside of the remodel area and were installed prior to the adoption of the 1996, or later, edition of NFPA 72.*

#### 18.5.4.5.2

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**18.5.4.5.2** Documentation provided to the authority having jurisdiction shall be stamped by a licensed engineer and shall include the following:

- (1) Inverse Square Law calculations using each of the vertical and horizontal polar distribution angles in ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired*, or equivalent.
- (2) The calculations shall account for the effects of polar distribution using one of the following:

- a. The percentages from the applicable table(s) in ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired*, or equivalent.
- b. The actual results of laboratory tests of the specific appliance to be used as recorded by the listing organization.

### 18.5.6

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**18.5.6** In rooms and areas used for exhibition purposes, or in rooms and areas where racks or shelving that exceed 5' in height are expected to be installed, or in rooms and areas where wall-mounted devices may become obstructed, ceiling-mounted visual appliances shall be provided.

### 21.3.5

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**21.3.5\*** A lobby smoke detector shall be located on the ceiling within 21 ft (6.4 m) of the centerline of each elevator door within the elevator bank under control of the detector.

*Exception: For lobby ceiling configurations exceeding 15 feet (4.6 m) in height or that are other than flat and smooth, detector locations shall be determined in accordance with Chapter 17.*

### 21.7.2

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**21.7.2\*** If connected to the fire alarm system serving the protected premises, all detection devices used to cause the operation of HVAC systems smoke dampers, fire dampers, fan control, smoke doors, and fire doors shall be monitored for integrity in accordance with Section 10.17. Duct detectors connected to fire alarm systems shall be 24 vdc system-type detectors that are powered by the fire alarm system.

*Exception: When duct detectors are installed in locations such as rooftops or other similar areas where extreme temperatures are to be expected, 120 vac duct detectors that are listed for the expected temperatures may be allowed to be installed when approved by the code official, as long as the duct detectors are capable of generating a trouble signal to the FACU if the power is lost, and is capable of generating a supervisory signal to the FACU when the duct detector is activated.*

### 21.7.4

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**21.7.4** Smoke detectors mounted in the air ducts of HVAC systems shall initiate ~~either an alarm signal at the protected premises or~~ a supervisory signal at a constantly attended location or supervising station.

### 23.2.2.4

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**23.2.2.4** A permit is required prior to making any changes, except for room label changes.

### 23.7.4

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**23.7.4 Emergency Voice/Alarm Communication Notification Appliance Circuits.** Emergency voice/alarm communication notification appliance circuits shall be capable of full-load operation with a wiring power loss not to exceed 12.5% (0.5dB) as determined in accordance with Sections 23.7.4.1, 23.7.4.2 or 23.7.4.3.

**23.7.4.1 Power Loss Calculations.** A calculation for each circuit shall be provided to the authority having jurisdiction demonstrating simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB). Power loss calculations similar to the following shall be used:

$$P_{Loss} = 10 * \log [1 - ((2 * RL) / (2 * RL + (V_{Line}^2 / P_{Rated})))]$$

$$RL = (R_{Ref} / 1000) * D$$

With variables defined as follows:

D = length of wire used (in feet)

P<sub>Loss</sub> = power loss (in dB)

P<sub>Rated</sub> = power driven on line from the amplifier (in watts)

RL = wire gauge resistance (in ohms)

R<sub>Ref</sub> = wire resistance based on gauge of wire used (in ohms/ft.)

V<sub>Line</sub> = voltage on line (typically 25 volts or 70 volts)

Alternatively the distance may be calculated using a calculation similar to:

$$D = (61 / R_{Ref}) * (V_{Line}^2 / P_{Rated})$$

**23.7.4.2 Power Loss Tables.** To ensure circuits are capable of simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB), wiring shall be limited to the distance allowed in Tables 23.7.4.2.a and 23.7.4.2.b.

**Table 23.7.4.2.a, 25 V Circuit**  
**Loudspeaker Distribution Cable Length (in feet) and Gauge for 0.5-dB Loss**

Wire Gauge (AWG)	18	16	14	12	10
Cable Ohms*	7.77	4.89	3.07	1.93	1.21
Amplifier Power					
200	25	39	62	99	158
150	33	52	83	132	210
100	49	78	124	198	315
75	65	104	166	263	420
60	82	130	207	329	525
50	98	156	248	395	630
40	123	195	311	494	788
30	164	260	414	659	1050
25	196	312	497	790	1261

**Table 23.7.4.2.b, 70 V Circuit**  
**Loudspeaker Distribution Cable Length (in feet) and Gauge for 0.5-dB Loss**

Wire Gauge (AWG)	18	16	14	12	10
Cable Ohms*	7.77	4.89	3.07	1.93	1.21
Amplifier Power					
200	196	312	497	790	1260

150	262	416	662	1053	1680
100	392	624	993	1580	2520
75	523	832	1324	2107	3360
60	654	1039	1656	2633	4200
50	785	1247	1987	3160	5041
40	981	1559	2483	3950	6301
30	1308	2079	3311	5267	8401
25	1570	2495	3973	6320	10081

\*Cable Ohms is expressed in ohms per 1000 feet (2008 NEC Ch.9 Table 8, uncoated, single strand copper)

The length represented accounts for both wires in the circuit.

**23.7.4.3 Manufacturers Power Loss Calculator.** When allowed by the authority having jurisdiction manufacturers calculations showing circuits are capable of simultaneous full-load operation with a wiring power loss not to exceed 12.5% (0.5dB) are acceptable.

### 23.8.4.8

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**23.8.4.8\*** Fire Extinguisher Electronic Monitoring Devices and Systems. Signals from a fire extinguisher electronic monitoring device or fire extinguisher monitoring system transmitted to a fire alarm system shall be permitted to be supervisory signals. When in an off-normal condition, a fire extinguisher electronic monitoring control unit shall send one, and only one, supervisory alarm signal to a building's fire alarm control unit.

### 23.8.5.1.2

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**23.8.5.1.2\*** Where connected to a supervising station, fire alarm systems employing automatic fire detectors or waterflow detection devices shall include a manual fire alarm box to initiate a signal to the supervising station. The fire alarm box shall be located adjacent to the fire alarm control unit.

**Exception:** Fire alarm systems dedicated to elevator recall control and supervisory service as permitted in Section 21.3 or fire sprinkler monitoring systems.

### 23.8.5.9.1

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**23.8.5.9.1** Where fire pumps are required to be monitored and a building fire alarm system is installed, a pump running signal shall be permitted to be a supervisory or alarm signal.

### 23.8.5.9.3

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**23.8.5.9.3** Where fire pumps are required to be monitored and a building fire alarm system is installed, the fire alarm system shall monitor all fire pump signals required at a constantly attended location in accordance with NFPA 20.

#### 23.8.5.9.4

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**23.8.5.9.4** Where fire pumps are required to be monitored and a sprinkler monitoring system is installed, then the sprinkler monitoring system shall monitor all fire pump signals required at a constantly attended location in accordance with NFPA 20.

#### 23.8.6.2

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**23.8.6.2\*** Notification Appliances in Exit Stair Enclosures, Exit Passageways, and Elevator Cars. In buildings required to be provided with emergency voice/alarm communications systems ~~N~~notification appliances shall ~~not~~ be required in exit stair enclosures, exit passageways, and elevator cars in accordance with 23.8.6.2.1 through 23.8.6.2.4.

#### 23.8.6.2.3

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**23.8.6.2.3** The evacuation signal shall not be required to automatically operate in exit stair enclosures and exit passageways. Manually activated speakers shall be provided in exit stair enclosures and exit passageways in buildings required to have Emergency Voice/Alarm Communication systems in accordance with Section 24.4.

#### 23.8.6.2.4

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**23.8.6.2.4** The evacuation signal shall not be required to automatically operate in elevator cars. Manually activated speakers shall be provided in elevator cars in buildings required to have Emergency Voice/Alarm Communication systems in accordance with Section 24.4.

#### 23.8.6.3.2

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**23.8.6.3.2** The boundaries of notification zones shall be coincident with building outer walls, fire walls, fire barriers, or fire-resistance rated horizontal assemblies. ~~building fire or smoke compartment boundaries, floor separations, or other fire safety subdivisions.~~ Sprinkler systems serving a notification zone shall not cross over into another notification zone. For high-rise buildings, alarms shall activate on the floor of, floor below, and floor above the floor of incidence. For all other buildings, alarms shall activate throughout the notification zone of incidence.

#### 24.4.1.8.3

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**24.4.1.8.3** ~~Where provided, S~~speakers in each enclosed stairway, each exit passageway, and each group of elevator cabs within a common shaft shall be connected to ~~a~~ separate notification zones for manual paging only.

#### 24.4.1.9.4

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**24.4.1.9.4** The boundaries of notification zones shall be coincident with building outer walls, fire walls, fire barriers, or fire-resistance rated horizontal assemblies. Sprinkler systems serving a notification zone shall not cross over the notification zone boundary. For high-rise buildings, alarms shall activate on the floor of, floor below, and floor above the floor of incidence. For all other buildings, alarms shall activate throughout the notification zone of incidence.

#### 26.4.5.4

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**26.4.5.4\*** **Retransmission Means.** ~~The means of transmission shall be accepted by the Authority Having Jurisdiction and shall be in accordance with 26.3.6.1.6, 26.5.4.4 or Chapter 27.~~ Two means of retransmission

shall be provided. The primary means of retransmission shall be a land-line telephone. The secondary means of retransmission shall be a dedicated cellular telephone.

*Exception: Secondary power supply capacity shall be as required in Chapter 10.*

#### 26.4.6.1.1

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**26.4.6.1.1** A written log of all fire alarm signals shall be maintained in the Fire Command Center including:

1. the investigating person's name
2. the device address
3. the type of alarm
4. the date and time of receipt of fire alarm signals
5. the cause and disposition of fire alarm signals

#### 26.6.3.1.4.3

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##### **26.6.3.1.4.3 Internet Protocol Technology**

When utilizing network interface (Internet Protocol) signal transmission equipment, the supervising station shall regularly communicate (poll) with the transmitter at least once every 75 seconds and be allowed 15 seconds for the acknowledgment of such signals. Retry shall be 3 seconds between each communications attempt. A Secondary transmission means shall be provided per Section 26.6.3.2.1.4. The use of VOIP technology is not permitted.

#### 29.8.2.2

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**29.8.2.2** The interconnection of smoke or heat alarms shall comply with the following:

- (1) Smoke or heat alarms shall not be interconnected in numbers that exceed the manufacturer's published instructions.
- (2) In no case shall more than 18 initiating devices be interconnected (of which 12 can be smoke alarms) where the interconnecting means is not supervised.
- (3) In no case shall more than 64 initiating devices be interconnected (of which 42 can be smoke alarms) where the interconnecting means is supervised.
- (4) Smoke or heat alarms shall not be interconnected with alarms from other manufacturers unless listed as being compatible with the specific model.
- (5) When alarms of different types are interconnected, all interconnected alarms shall produce the appropriate audible response for the phenomena being detected or remain silent.
- (6) For applications that require supervision, a listed control unit shall be installed.