



1

NFPA 72 FIRE ALARMS

**NFPA 13, 13D AND 13R
FIRE SPRINKLER
SYSTEMS**



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Office of State Fire Marshal

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2

INTRODUCTIONS:

Marc Veilleux, Fire Inspector III, Plans Review Supervisor overseeing the Plans Division:

Sprinklers, Above Ground Storage Tanks, Auto Racing, Amusement Rides

- NFPA & ICC CFI-II, CFPE, NFPA 99 Med Gas Inspector, CMS Life Safety Surveyor, Fire Science degree

- Certified Building Code Official

- 29+ years in the fire service. Maine Certified Level 1 Fire Chief, 22 yrs. 10 as Deputy Chief, 7 as a Chief. NASB.

- Self Employed Plumbing Contractor 25+yrs



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3

INTRODUCTIONS:

Gerald Leach, Fire Inspector II, Plans Review Fire Sprinkler Division:

Regulating the fire sprinkler industry, performing fire sprinkler plan reviews, licensing, and inspections

- NFPA Certified Fire Protection Specialist, NFPA CFI-1, among other degrees and certifications.
- Adjunct instructor for the National Fire Academy teaching bachelor and doctorate classes and providing technical training across the country for the IBC and NFPA codes and standards.
- Fire sprinkler industry as an owner, installer, and designer for over 40 yrs.



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4

INTRODUCTIONS:

Bradley Loon, Fire Inspector II, Plans Review

- 1 ½ year with the Fire Marshals Office
- Fire Science degree
- Other relevant backgrounds



- Investigations
- Inspections
- Plan Review
- Planning and Research



- Law enforcement
- Investigate fires for cause and origin
- Monitor outdoor pyrotechnics
- Monitor blasting



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7

- 8 Road inspectors
- 2 Supervisors
- Inspect Hospitals ,nursing homes, residential care facilities, daycares, nursery schools, foster homes, bars with dancing, Theaters
- Monitor Indoor and Outdoor pyrotechnics
- Handle building complaints



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8

- 4 Inspectors
- 1 supervisor
- Review plans for new construction and renovations of commercial buildings
- Review for ADA compliance
- Inspect mechanical rides
- Inspect motor vehicle racing venues
- Inspect and permit Aboveground storage tanks



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9

Review & Enforcement of State Fire & Life Safety Codes.

And 55 adopted NFPA codes

Keep in mind that some codes are adopted by reference in NFPA 1 and 101 as well!

Maine Adopted versions:

NFPA 1 and 101	2018 edition
NFPA 13	2016 edition
NFPA 72	2019 edition
NFPA 96	2021 edition
NFPA 220	2018 edition
NFPA 221	2018 edition

For a complete list of adopted NFPA codes visit our website at
www.maine.gov/dps/fmo/fire-service-laws/nfpa



Fire Alarm Systems

NFPA 72 National Fire Alarm and Signaling Code, 2019 Edition





Detection and Alarm Systems

Statute vs Code vs Standard

- Code tells you when to do something or what shall be done
- Standard tells you how to do something
- Statute is a law Title 25 sec 2452

Title 25 §2452. Life safety and property protection The Commissioner of Public Safety shall adopt and may amend rules governing the safety to life from fire in or around all buildings or other structures and mass outdoor gatherings, as defined in Title 22, section 1601, subsection 2, within the commissioner's jurisdiction.

A public safety inspector for the purpose of enforcing section 2452, relating to statewide enforcement powers of the National Fire Protection Association No. 101, Life Safety Code, has the right to execute or serve criminal and civil violation process against offenders who violate the National Fire Protection Association No. 101, Life Safety Code.

- What happens if you violate code or law or standard

3. Violation. A person who violates a rule issued by the commissioner under this section commits a Class E crime



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12

Detection and Alarm Systems

Requirements for installation of detection and alarm systems in specific occupancies, or structures, are found in:

- NFPA 1, *Fire Code*
- NFPA 72, *National Fire Alarm and Signaling Code* ®
 - It should be mentioned that NFPA 72 in *principle* is a Standard. It has been renamed Code for 'stand-alone' purposes.
- NFPA 101, *Life Safety Code*®
- NFPA special occupancy/process standards
- Applicable Building Code





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13

Detection and Alarm Systems

Smoke Detection:

- First in code in 1976 required near bedroom and hardwired
- 1981 required activation of detector to be audible in bedroom
- 1994 detectors required to be interconnected on each level
- 1997 required in bedrooms outside bedrooms on all levels and interconnected
- Power supply as per NFPA 72
- State statute governs carbon monoxide detection and smoke detection title 25 sec. 2464 and 2468





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14

Detection and Alarm Systems

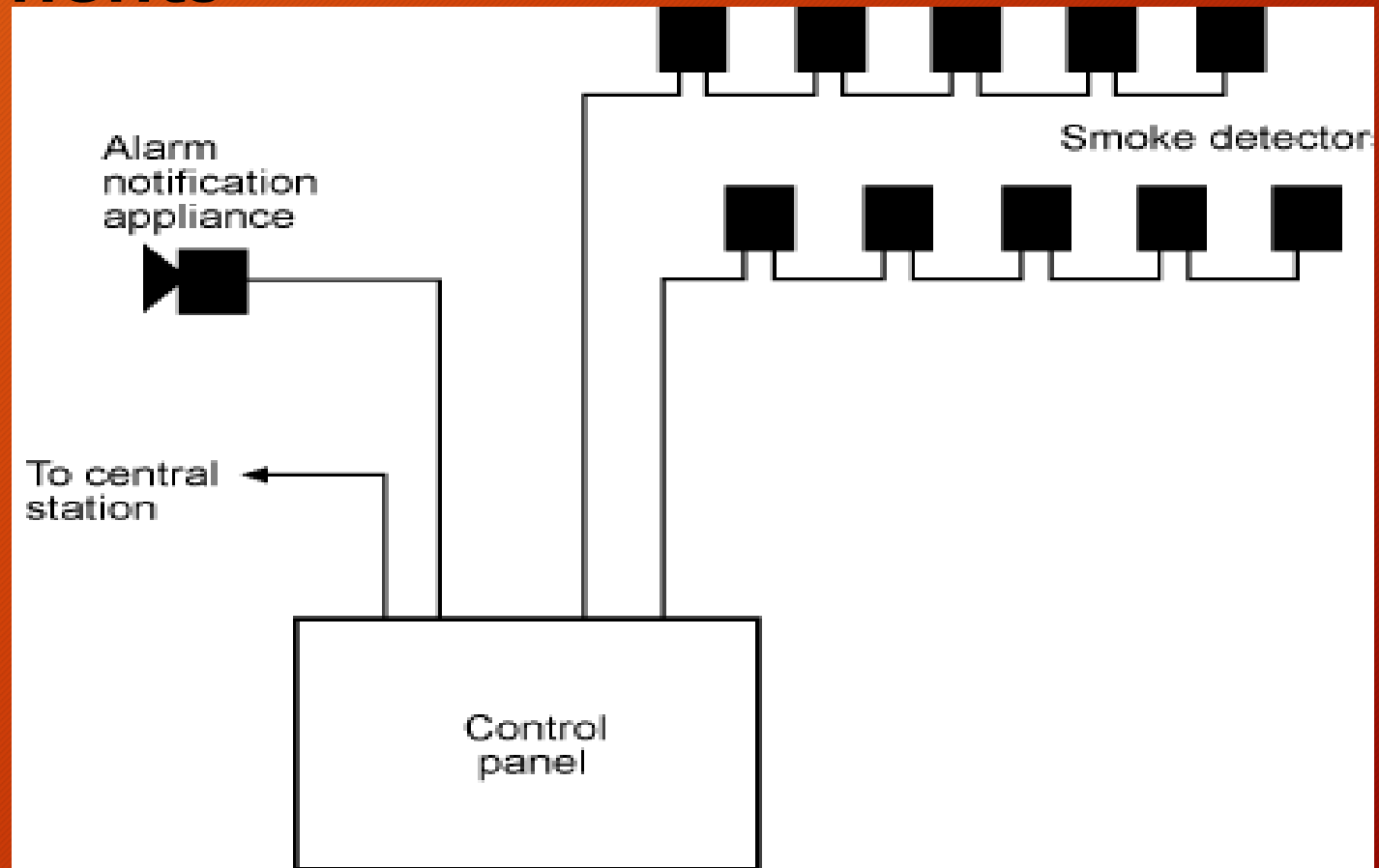
In addition to the standard documents that would require detection and alarm systems, documents developed for specific occupancies may require the installation of detection or alarm systems.

For instance, *NFPA 75, Standard for the Protection of Information Technology Equipment*, contains requirements for the installation of automatic detection systems. The document also requires that any installed special detection system be actuated by the installed detectors. NFPA 1 Section 13.7 provides an overview of detection and alarm systems.



Detection and Alarm Systems

Basic Components





Detection and Alarm Systems

Fire Alarm Devices

- Initiation Devices:
 - Manual
 - Automatic
 - Supervisory
- Notification Devices
- Processing: Fire Alarm Control Panel (FACP)



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17

Detection and Alarm Systems

Initiation: Manual

- Only used for fire alarm initiating purposes
- Mounted between 42 in. and 48 in. above floor level
- Located within 5 ft. of the exit doorway opening at each exit on each floor





Detection and Alarm Systems

Initiation: Manual

- Only used for fire alarm initiating purposes
- Mounted between 42 in. and 48 in. above floor level
- **NFPA 72:17.14.5** The operable part of each manual fire alarm box shall be not less than 42 in and not more than 48 in above floor level.
- Located within 5 ft. of the exit doorway opening at each exit on each floor
- **NFPA 101:9.6.2.3** A manual fire alarm box shall be provided as follows, unless modified by another section of this Code:
 1. For new alarm system installations, the manual fire alarm box shall be located within 5 ft of exit doorways.
 2. For existing alarm system installations, the manual fire alarm box either shall be provided in the natural exit access path near each required exit or within 5 ft of exit doorways.





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19

Detection and Alarm Systems

Initiation: Manual

- Additional boxes added so that travel distance to nearest box is not in excess of 200 ft.
- Mounted on both sides of grouped openings over 40 ft. in width, and within 60 in. of each side of the opening





Detection and Alarm Systems

Initiation: Manual

- Additional boxes added so that travel distance to nearest box is not in excess of 200 ft.
- Mounted on both sides of grouped openings over 40 ft. in width, and within 60 in. of each side of the opening

NFPA 72:17.14.8.5* Additional manual fire alarm boxes shall be located so that, on any given floor in any part of the building, no horizontal distance on that floor exceeding 200 ft shall need to be traversed to reach a manual fire alarm box.

NFPA 72:14.8.6 Manual fire alarm boxes shall be mounted on both sides of grouped openings over 40 ft in width, and within 5 feet of each side of the opening.





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21

Detection and Alarm Systems

Initiation: Automatic

- Smoke Detectors
- Heat Detectors
- Flow Switches will be discussed in later slides





Detection and Alarm Systems

Smoke Detector Spacing

17.7.3.1.1 The location and spacing of smoke detectors shall be based upon the anticipated smoke flows due to the plume and ceiling jet produced by the anticipated fire, as well as any pre-existing ambient airflows that could exist in the protected compartment.

17.7.3.2.3.2 requires the designer to always follow the manufacturer's instructions for placement and installation. The following slides provide a sample of what 72 can offer as guidelines.

17.7.3.1.2 The design shall account for the contribution of the following factors in predicting detector response to the anticipated fires to which the system is intended to respond:

- (1) Ceiling shape and surface
- (2) Ceiling height
- (3) Configuration of contents in the protected area
- (4) Combustion characteristics and probable equivalence ratio of the anticipated fires involving the fuel loads within the protected area
- (5) Compartment ventilation
- (6) Ambient temperature, pressure, altitude, humidity, and atmosphere

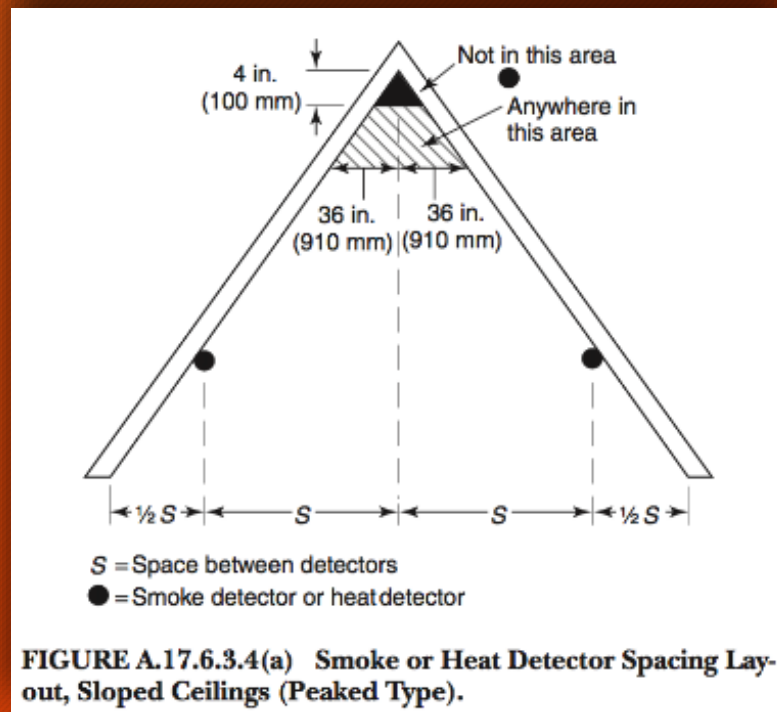
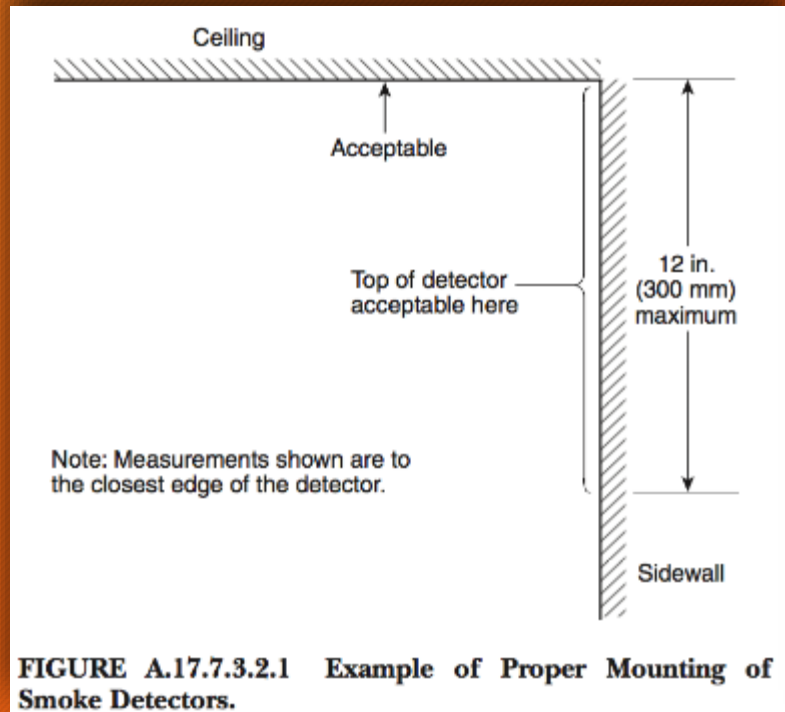
17.7.3.2.3.1* In the absence of specific performance-based design criteria, one of the following requirements shall apply:

- (1) The distance between smoke detectors shall not exceed a nominal spacing of 30 ft (9.1 m) and there shall be detectors within a distance of one-half the nominal spacing, measured at right angles from all walls or partitions extending upward to within the top 15 percent of the ceiling height.
- (2)*All points on the ceiling shall have a detector within a distance equal to or less than 0.7 times the nominal 30 ft (9.1 m) spacing (0.7S).



Detection and Alarm Systems

Smoke Detector Spacing



The following examples are found within the Annex. Again, there are many variables and exceptions that need to be considered, including manufacturer's installation instructions and ceiling heights, as well as the impact HVAC systems can have on air movement.



Detection and Alarm Systems

Heat Detector Spacing

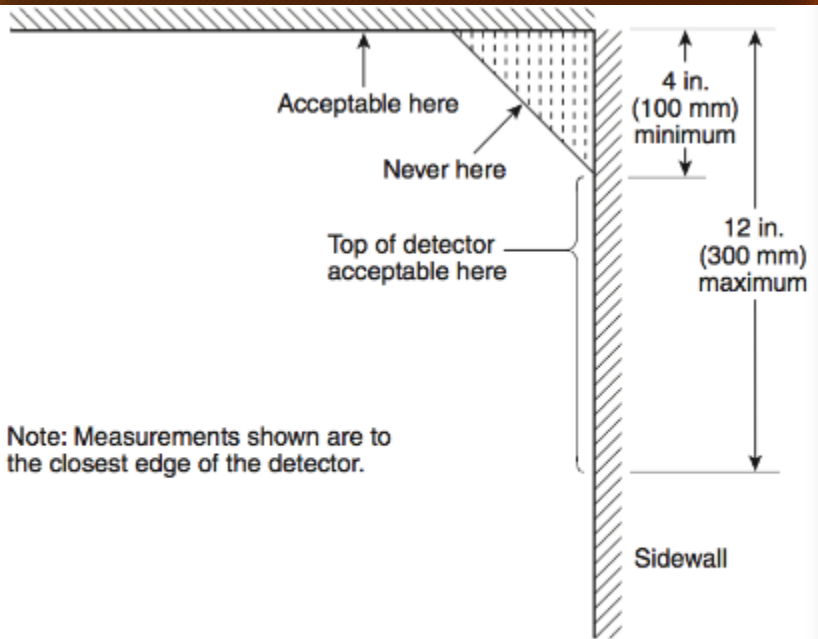


FIGURE A.17.6.3.1.3.1 Example of Proper Mounting for Heat Detectors.

Table 17.6.3.5.1 Heat Detector Spacing Reduction Based on Ceiling Height

Ceiling Height Greater than (>)		Up to and Including		Multiply Listed Spacing by
ft	m	ft	m	
0	0	10	3.0	1.00
10	3.0	12	3.7	0.91
12	3.7	14	4.3	0.84
14	4.3	16	4.9	0.77
16	4.9	18	5.5	0.71
18	5.5	20	6.1	0.64
20	6.1	22	6.7	0.58
22	6.7	24	7.3	0.52
24	7.3	26	7.9	0.46
26	7.9	28	8.5	0.40
28	8.5	30	9.1	0.34

A few examples for heat detector spacing, using similar concepts from smoke detector spacing. Due to the very nature of convection and heat rising, Table 17.6.3.5.1 shows us that the values for spacing change as we go up in elevation.



Detection and Alarm Systems

Supervisory Devices

Devices intended to provide indications of trouble or off-normal conditions from a fire protection or life safety system

NFPA 72, 17.16 - Examples of these devices include:

- Valve supervisory switches
- Water level indicators
- Low-air pressure switches

- Gerry will discuss these in greater detail during the fire sprinkler presentation





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26

Detection and Alarm Systems

Notification Appliances



Notification Devices, or sometimes referred to as NAC's, (Notification Appliance Circuit), or Horn/Strobes, are the devices that notify the occupants of a fire alarm activation.





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27

Detection and Alarm Systems

Audibility

Public mode - anywhere in building, except mechanical rooms and those defined as private mode or sleeping area

Private mode - areas where trained staff work who are responsible to aid in the evacuation of occupants

Sleeping areas - rooms where people sleep





Detection and Alarm Systems

Public Mode

NFPA 72 - 18.4.3.1

- 15 dBA over average ambient sound or 5 dBA above maximum level having duration of at least 60 seconds, whichever is greater

NFPA 72 - 18.4.1.1

- Where average sound levels greater than 105 dBA, visible appliance required

The above can be found in NFPA 72:18.4.3 Public Mode Audible Requirements

- **18.4.3.1 *** To ensure that audible public mode signals are clearly heard, unless otherwise permitted by [18.4.3.2](#) through [18.4.3.5](#), they shall have a sound level at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft above the floor in the area required to be served by the system using the A-weighted scale (dBA).
- **18.4.1.1 *** An average ambient sound level greater than 105 dBA shall require the use of a visible notification appliance(s) in accordance with Section [18.5](#) where the application is public mode or Section [18.6](#) where the application is private mode.





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29

Detection and Alarm Systems

Private Mode

NFPA 72 - 18.4.4

- Not less than 45 dBA at 10 feet or more than 120 dbA, and
- Average sound level of at least 10 dBA above average ambient or 5 dBA above maximum sound level with duration of at least 60 seconds, whichever is greater
- Where average sound levels greater than 105 dBA, visible appliance required





Detection and Alarm Systems

Sleeping Areas

NFPA 72 - 18.4.5 / 18.5.5

- At least 15 dBA above average ambient, or 5 dBA above maximum sound having duration of at least 60 seconds, or
- Sound level of at least 75 dBA, at the pillow level of room, whichever is greater
- Visible indicating appliances shall be installed in sleeping rooms per Table 18.5.5.7.2

18.4.5.2 If any barrier, such as a door, curtain, or retractable partition, is located between the notification appliance and the pillow, the sound pressure level shall be measured with the barrier placed between the appliance and the pillow.

Table 18.5.5.7.2 Effective Intensity Requirements for Sleeping Area Visible Notification Appliances.





Detection and Alarm Systems

Locations

- In public mode, operating effect must be seen regardless of viewers' location
- If more than one appliance can be seen, syncing must take place

NFPA 72:18.5.5.4.2 discusses synchronization of visible appliances. The figure above is used for room spacing of wall mounted visible appliances.

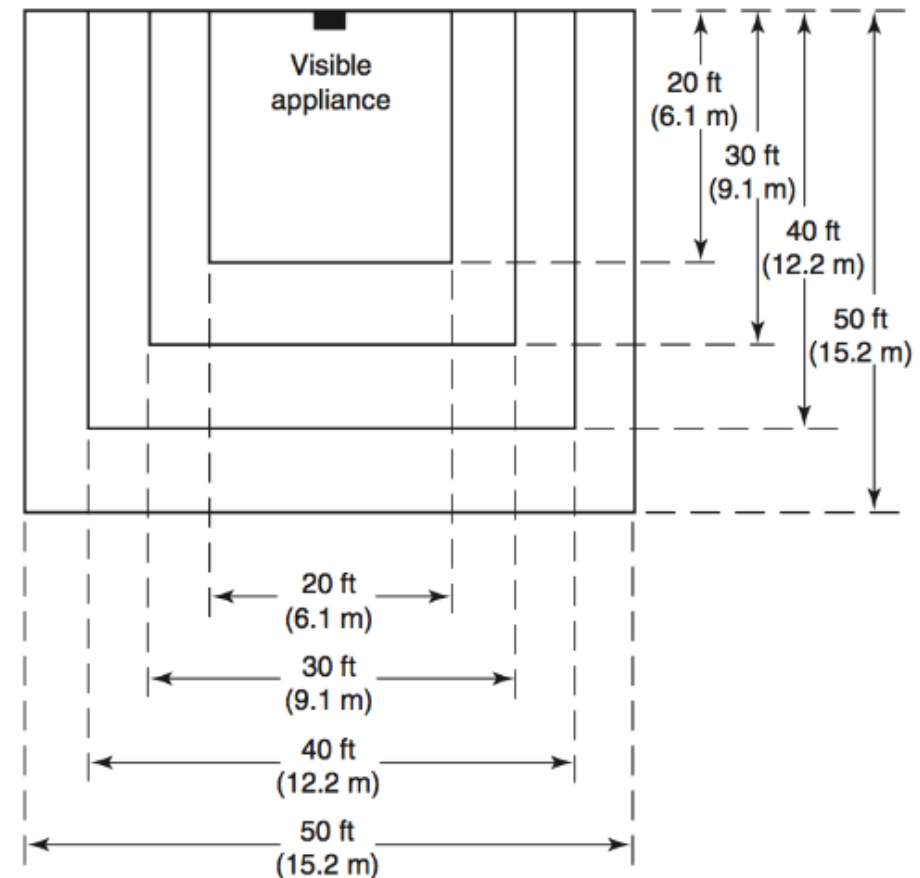


FIGURE 18.5.5.4.1 Room Spacing for Wall-Mounted Visible Appliances.



Detection and Alarm Systems

Locations

Spacing of appliances in rooms shall be in accordance with NFPA 72: 18.5.5.4.1 (a) and (b). These tables go in tandem with the prior slide's table, and are located on the same page in NFPA 72.

Table 18.5.5.4.1(a) Room Spacing for Wall-Mounted Visible Appliances

Maximum Room Size		Minimum Required Light Output [Effective Intensity (cd)]	
		One Light per Room	Four Lights per Room (One Light per Wall)
ft	m		
20 × 20	6.10 × 6.10	15	NA
28 × 28	8.53 × 8.53	30	NA
30 × 30	9.14 × 9.14	34	NA
40 × 40	12.2 × 12.2	60	15
45 × 45	13.7 × 13.7	75	19
50 × 50	15.2 × 15.2	94	30
54 × 54	16.5 × 16.5	110	30
55 × 55	16.8 × 16.8	115	30
60 × 60	18.3 × 18.3	135	30
63 × 63	19.2 × 19.2	150	37
68 × 68	20.7 × 20.7	177	43
70 × 70	21.3 × 21.3	184	60
80 × 80	24.4 × 24.4	240	60
90 × 90	27.4 × 27.4	304	95
100 × 100	30.5 × 30.5	375	95
110 × 110	33.5 × 33.5	455	135
120 × 120	36.6 × 36.6	540	135
130 × 130	39.6 × 39.6	635	185

NA: Not allowable.

Table 18.5.5.4.1(b) Room Spacing for Ceiling-Mounted Visible Appliances

Maximum Room Size		Maximum Lens Height*		Minimum Required Light Output (Effective Intensity); One Light (cd)
20 × 20	6.1 × 6.1	10	3.0	15
30 × 30	9.1 × 9.1	10	3.0	30
40 × 40	12.2 × 12.2	10	3.0	60
44 × 44	13.4 × 13.4	10	3.0	75
20 × 20	6.1 × 6.1	20	6.1	30
30 × 30	9.1 × 9.1	20	6.1	45
44 × 44	13.4 × 13.4	20	6.1	75
46 × 46	14.0 × 14.0	20	6.1	80
20 × 20	6.1 × 6.1	30	9.1	55
30 × 30	9.1 × 9.1	30	9.1	75
50 × 50	15.2 × 15.2	30	9.1	95
53 × 53	16.2 × 16.2	30	9.1	110
55 × 55	16.8 × 16.8	30	9.1	115
59 × 59	18.0 × 18.0	30	9.1	135
63 × 63	19.2 × 19.2	30	9.1	150
68 × 68	20.7 × 20.7	30	9.1	177
70 × 70	21.3 × 21.3	30	9.1	185

*This does not preclude mounting lens at lower heights.





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33

Detection and Alarm Systems

Off Premises Notification

- Beyond the local function of occupant notification
 - Central station
 - Proprietary supervising station
 - Remote supervising station
- Requirements for installation in Chapter 26





Detection and Alarm Systems

Fire Safety Functions

- Elevator control
- Door release
- Emergency Stairway pressurization
- Smoke management
- Initiation of special suppression systems
- lighting
- Unlocking egress doors
- Emergency power or fuel shut off

Chapter 21 provides the requirements for special fire safety functions that are performed by the fire alarm system.

The Inspector will find fire detection and alarm systems in newer buildings that have many interfaces with other building systems. The system can be very complex. It is very important for the building owner/operator to maintain documentation of the systems and the interfaces between building systems and to properly test those interfaces.

When changes are made to any of the systems within the building those changes could have an impact on any number of critical systems or functions of a system. Again, good documentation, testing and maintenance will minimize potential failures.

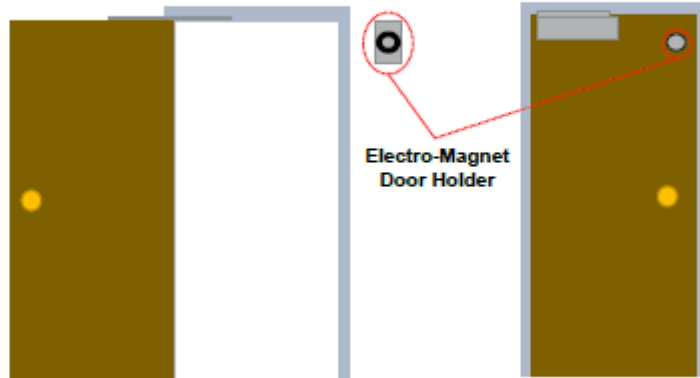


Detection and Alarm Systems

Fire Safety Functions

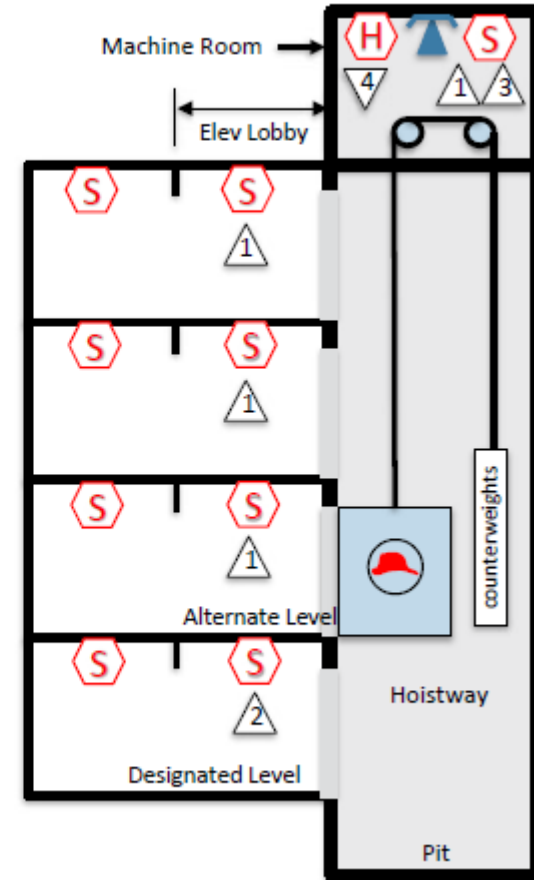
- Elevator control
- Door release

Automatic Door Closer



Elevator Recall / Shutdown

- △ 1 Recall to Designated Level
- △ 2 Recall to Alternate Level
- △ 3 Activate In-Car Warning
- ▽ 4 Activate Shunt Trip Disconnect
- ⬡ S Smoke Detector
- ⬡ H Heat Detector
- ⬡ Sprinkler
- ⬡ In-Car Warning

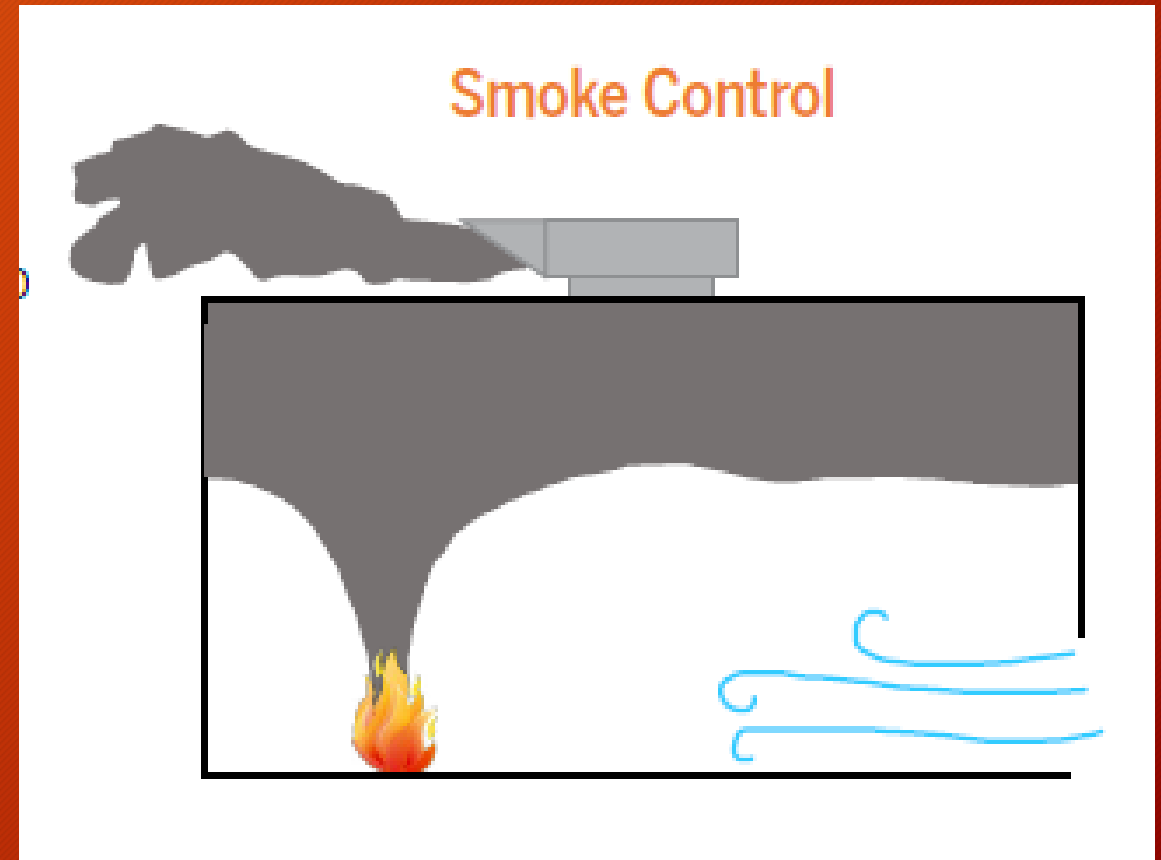




Detection and Alarm Systems

Fire Safety Functions

- Elevator control
- Door release
- Emergency Stairway pressurization
- Smoke management
- Initiation of special suppression systems
- lighting
- Unlocking egress doors
- Emergency power or fuel shut off

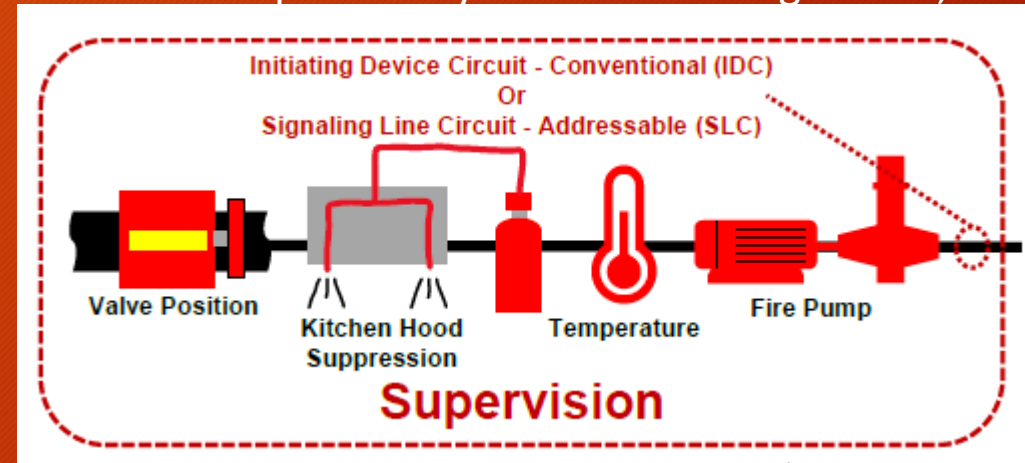




Detection and Alarm Systems

Fire Safety Functions

- **Supervisory:** A supervisory condition means there is an issue with a system, process, or equipment that is monitored by the fire alarm control unit. An example of this would be a sprinkler system valve being closed, this would show up as a supervisory signal on the control unit.



- **Trouble:** A trouble condition means there is an issue or fault with the fire alarm system. An example would be a break in an initiating device circuit. This would show up as a trouble signal on the control unit.

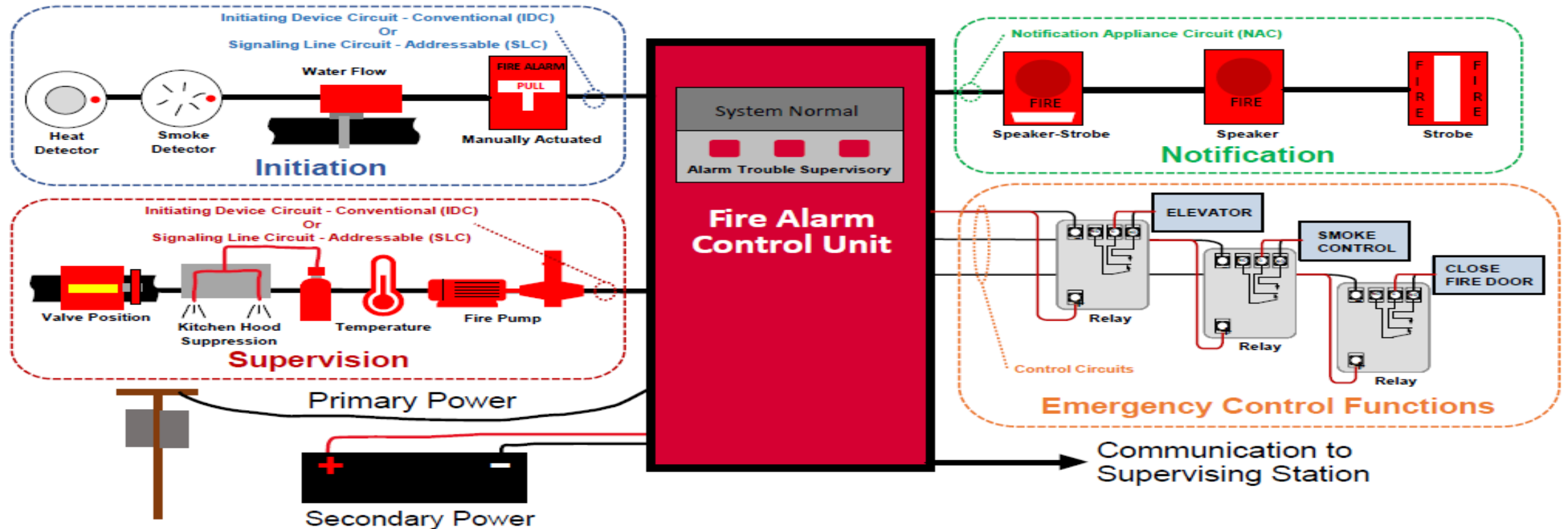


Detection and Alarm Systems

Fire Safety Functions

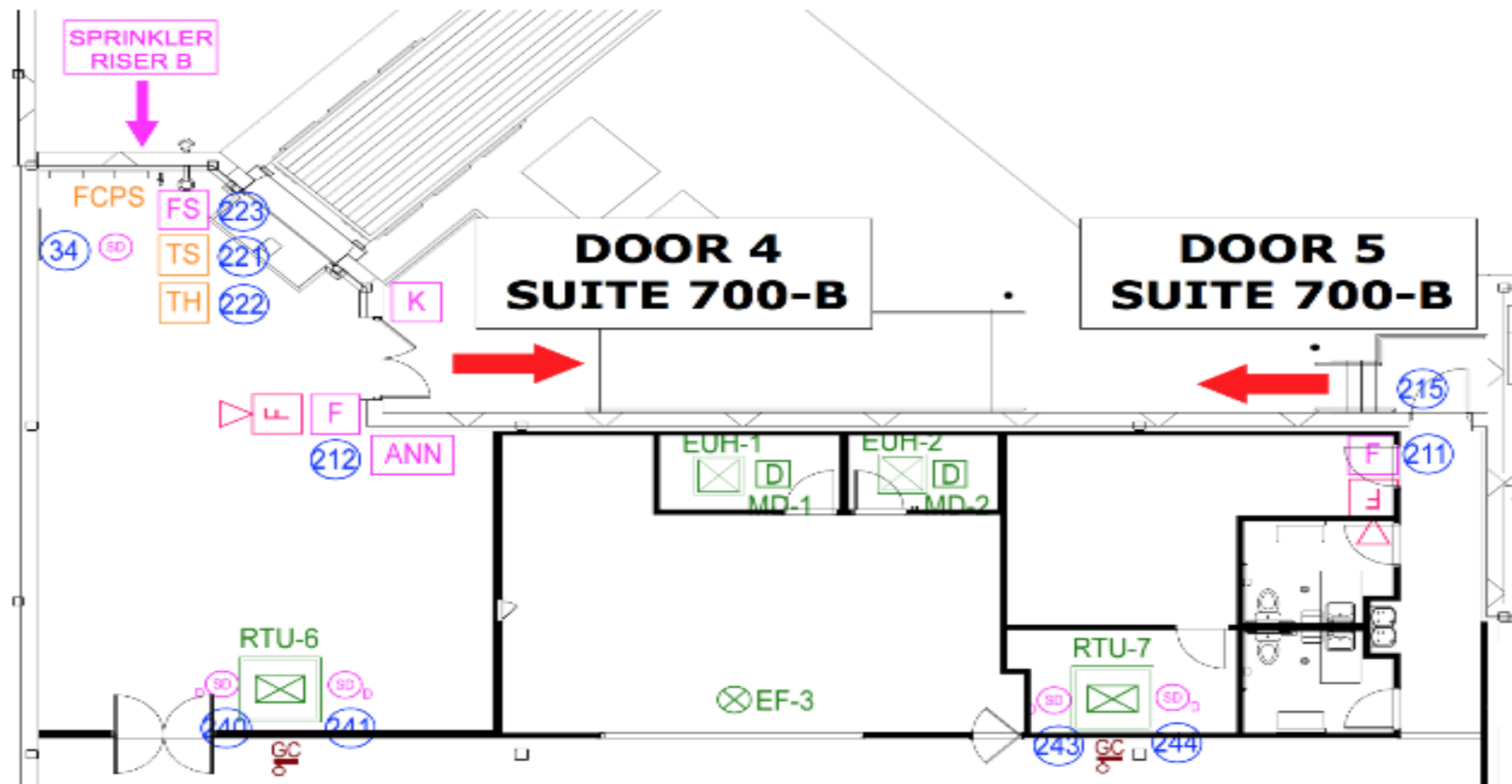


FIRE ALARM SYSTEMS | DIAGRAM





Detection and Alarm Systems



LEGEND:

	DIRECTION OF TRAVEL		DUCT SMOKE DETECTOR
	ADA STROBE ONLY DEVICE		SYSTEM SMOKE DETECTOR
	ADA HORN/STROBE DEVICE		KNOCK BOX
	EXTERIOR HORN/STROBE		FLOW SWITCH
	MANUAL PULLSTATION		PRESSURE SWITCH
	FIRE ALARM CONTROL PANEL		FIRE DEPT CONNECTION
	ANNUNCIATOR PANEL		BOOSTER PANEL
	TAMPER - STREET SIDE		FIRE ALARM POINT
	TAMPER - HOUSE SIDE		GAS METER
			GAS DOCK (SHUT-OFF)





Detection and Alarm Systems

Documentation

- Record of Completion
- Owner's manual and installation instructions covering all system equipment
- Record drawings
- For software-based systems, a record copy of the site-specific software

SYSTEM RECORD OF COMPLETION

This form is to be completed by the system installation contractor at the time of system acceptance and approval. It shall be permitted to modify this form as needed to provide a more complete and/or clear record. Leave blank in all unused areas.

Attach additional sheets, data, or calculations as necessary to provide a complete record.

Form Completion Date: _____ Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____
 Address: _____
 Description of property: _____
 Name of property representative: _____
 Address: _____
 Phone: _____ Fax: _____ E-mail: _____

2. INSTALLATION, SERVICE, TESTING, AND MONITORING INFORMATION

Installation contractor: _____
 Address: _____
 Phone: _____ Fax: _____ E-mail: _____
 Service organization: _____
 Address: _____
 Phone: _____ Fax: _____ E-mail: _____
 Testing organization: _____
 Address: _____
 Phone: _____ Fax: _____ E-mail: _____
 Retest date for test and inspection contract: _____
 Monitoring organization: _____
 Address: _____
 Phone: _____ Fax: _____ E-mail: _____
 Account number: _____ Phone line 1: _____ Phone line 2: _____
 Means of transmission: _____
 Facility to which alarms are transmitted: _____ Phone: _____

3. DOCUMENTATION

On-site location of the required record documents and site-specific software: _____

4. DESCRIPTION OF SYSTEM OR SERVICE

This is a: New system Modification to existing system Form number: _____
 NFPA 72 edition: _____

4.1 Control Unit

Manufacturer: _____ Model number: _____

4.2 Software and Firmware

Firmware revision number: _____

4.3 Alarm Verification

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

This system does not incorporate alarm verification.

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NFPA 72 (2-1-10)

FIGURE 7.8.2(a) System Record of Completion. (SIG-100)



Detection and Alarm Systems

Detection and Alarm Systems

The inspection, testing and maintenance of a fire alarm system is critical to the continued efficient operation of the system once it is installed.

Many of the components in a fire alarm or detection system are electronic and over time they will fail. Most buildings are dynamic because there are constant renovations, moves, etc. These functions can also render part or all of a detection or alarm system inoperative. Proper testing by the property owner and good oversight by the Fire Inspector can help to keep systems operating at the level that they were intended to operate when they were designed, approved and installed.

Requirements found in NFPA 72 Chapter 14 Inspection, Testing and Maintenance and NFPA 1 Section 13.7 Detection, Alarm, and Communications Systems.





Detection and Alarm Systems

Detection and Alarm Systems

The inspection, testing and maintenance of a fire alarm system is critical to the continued efficient operation of the system once it is installed.

Table 14.3.1 Visual Inspection

Component	Initial Acceptance	Periodic Frequency	Method	Reference
1. All equipment	X	Annual	Ensure there are no changes that affect equipment performance. Inspect for building modifications, occupancy changes, changes in environmental conditions, device location, physical obstructions, device orientation, physical damage, and degree of cleanliness.	14.3.4
2. Control equipment: (1) Fire alarm systems monitored for alarm, supervisory, and trouble signals (a) Fuses (b) Interfaced equipment (c) Lamps and LEDs (d) Primary (main) power supply (e) Trouble signals (2) Fire alarm systems unmonitored for alarm, supervisory, and trouble signals (a) Fuses (b) Interfaced equipment (c) Lamps and LEDs (d) Primary (main) power supply (e) Trouble signals	X X X X X X X X X X	Annual Annual Annual Annual Semiannual Weekly Weekly Weekly Weekly Weekly	Verify a system normal condition. Verify a system normal condition.	
3. Reserved				
4. Supervising station alarm systems — transmitters (1) Digital alarm communicator transmitter (DACT) (2) Digital alarm radio transmitter (DART) (3) McCulloh (4) Radio alarm transmitter (RAT) (5) All other types of communicators	X X X X X	Annual Annual Annual Annual Annual	Verify location, physical condition, and a system normal condition.	
5. In-building fire emergency voice/ alarm communications equipment	X	Semiannual	Verify location and condition.	
6. Reserved				
7. Reserved				
8. Reserved				
9.* Batteries (1) Valve-regulated lead-acid (VRLA) batteries (a) General (b) Marking (2) Primary (dry cell) other than those used in low-power radio (wireless) systems in accordance with Chapter 23	X N/A X	N/A Semiannual Semiannual	Ensure month and year of manufacture is marked in the month/year format on each battery cell/unit. Verify tightness of battery connections. Inspect terminals for corrosion, excessive container/cover distortion, cracks in cell/unit or leakage of electrolyte. Replace any battery cell/unit if corrosion, distortion, or leakage is observed. Verify marking of the month/year of manufacture on each battery cell/unit. Replace any cell/unit if alarm equipment manufacturer's replacement date has been exceeded. Verify marking of the month/year of manufacture. Replace if alarm equipment/battery manufacturer's replacement date has been exceeded. Replacement date not to exceed 12 months. Verify tightness of connections. Inspect for corrosion or	10.6.10





Detection and Alarm Systems

Detection and Alarm Systems

The inspection, testing and maintenance of a fire alarm system is critical to the continued efficient operation of the system once it is installed.

Table 14.4.3.2 Testing

Component	Initial Acceptance	Periodic Frequency	Method
1. All equipment	X		See Table 14.3.1.
2. Control equipment and transponder			
(1) Functions	X	Annually	Verify correct receipt of alarm, supervisory, and trouble signals (inputs); operation of evacuation signals and auxiliary functions (outputs); circuit supervision, including detection of open circuits and ground faults; and power supply supervision for detection of loss of ac power and disconnection of secondary batteries.
(2) Fuses	X	Annually	Verify rating and supervision.
(3) Interfaced equipment	X	Annually	Verify integrity of single or multiple circuits providing interface between two or more control units. Test interfaced equipment connections by operating or simulating operation of the equipment being supervised. Verify signals required to be transmitted at the control unit.
(4) Lamps and LEDs	X	Annually	Illuminate lamps and LEDs.
(5) Primary (main) power supply	X	Annually	Disconnect all secondary (standby) power and test under maximum load, including all alarm appliances requiring simultaneous operation. Reconnect all secondary (standby) power at end of test. Test redundant power supplies separately.
3. Alarm control unit trouble signals			
(1) Audible and visual	X	Annually	Verify operation of control unit trouble signals. Verify ring-back feature for systems using a trouble-silencing switch that requires resetting.
(2) Disconnect switches	X	Annually	If control unit has disconnect or isolating switches, verify performance of intended function of each switch. Verify receipt of trouble signal when a supervised function is disconnected.
(3) Ground-fault monitoring circuit	X	Annually	If the system has a ground detection feature, verify the occurrence of ground-fault indication whenever any installation conductor is grounded.
(4) Transmission of signals to off-premises location	X	Annually	Actuate an initiating device and verify receipt of alarm signal at the off-premises location. Create a trouble condition and verify receipt of a trouble signal at the off-premises location. Actuate a supervisory device and verify receipt of a supervisory signal at the off-premises location. If a transmission carrier is capable of operation under a single- or multiple-fault condition, actuate an initiating device during such fault condition and verify receipt of an alarm signal and a trouble signal at the off-premises location.
4. Supervising station alarm systems — transmission equipment			
(1) All equipment	X	Annually	*Test all system functions and features in accordance with the equipment manufacturer's published instructions for correct operation in conformance with the applicable sections of Chapter 26. Except for DACT, actuate initiating device and verify receipt of the correct initiating device signal at the supervising station within 90 seconds. Upon completion of the test, restore the system to its functional operating condition. If test jacks are used, conduct the first and last tests without the use of the test jack.
(2) Digital alarm communicator transmitter (DACT)	X	Annually	Except for DACTs installed prior to adoption of the 2013 edition of NFPA 72 that are connected to a telephone line (number) that is also supervised for adverse conditions by a derived local channel, ensure connection of the DACT to two separate means of transmission. Test DACT for line seizure capability by initiating a signal while using the telephone line (primary line for DACTs using two telephone lines) for a telephone call. Ensure that the call is interrupted and that the communicator connects to the digital alarm receiver. Verify receipt of the correct signal at the supervising station. Verify each transmission attempt is completed within 90 seconds from going off-hook to on-hook. Disconnect the telephone line (primary line for DACTs using two telephone lines) from the DACT. Verify indication of the DACT trouble signal occurs at the premises fire alarm control unit within 4 minutes of detection of the fault. Verify receipt of the telephone line trouble signal at the supervising station. Restore the telephone line (primary line for DACTs using two telephone lines), reset the fire alarm control unit, and verify that the telephone line fault trouble signal returns to normal. Verify that the supervising station receives the restoral signal from the DACT.

(continues)





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44

Detection and Alarm Systems

Causes of Failures

Why?





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45

Detection and Alarm Systems

Causes of Failures

Why?

Number 1 reason for failure is normally lack of maintenance.

- Faulty flow switch
- Lack of maintenance
- Water in conduit
- Power failure
- Telephone line trouble
- Detector failure
- Vandalism
- Battery failure
- Detectors too sensitive
- Poor installation





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46

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Summary

- It is important to remember that NFPA 101 tells us when a fire alarm system is required.
- NFPA tells us how to install it (standard)
- Inspection, testing and maintenance is required for fire alarm systems and their components.



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47

Detection and Alarm Systems

Thank you for attending this session.

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