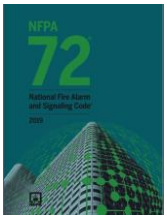
Sprinkler and Fire Alarm Acceptance Testing

19TH ANNUAL BUILDING CODES EDUCATION CONFERENCE

1

SPRINKLER AND FIRE ALARM ACCEPTANCE TESTING



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PRESENTER BIO: JOHN SWANSON

- Certified Fire Protection Specialist (NFPA)
- Codes & Standards Specialist-NFSA
- Former Deputy State Fire Marshal (MN)
- NFPA 72 Technical Committee
- Previous member – IBC Fire Safety Committee/IFC Interpretation Committee
- Instructor/SME for International Code Council and NFPA 72
- Appointed by MN Gov. Mark Dayton to MN Board of Architecture & Engineering (2013-2017)

3

INTRODUCTIONS

- Please introduce yourself:
  - Current position?
  - Years of experience in your industry?

4

MISCELLANEOUS INFORMATION

- Restrooms
- Breaks
- Roster
- Informal
- Participate
- Please ask questions

"You're not allowed to use the sprinkler system to keep your audience awake."

5

RELATIONSHIPS

Relationships matter

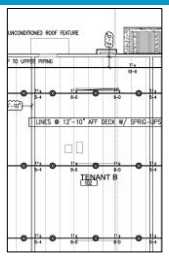
- Inspections – A cooperative effort
- Business relationships are similar to personal ones
  - Sprinkler contractor (foreman)
  - General contractor (superintendent)
- Working with other inspectors

6

TECHNIQUES

Inspection Tips

- Tag-a-long with other trades or vice versa.
- Use plan review checklist for on-site checklist
- Compare installation to approved plans
- Address changes to approved plans:
  - Minor changes – use your judgement
  - Major changes – what is their solution?



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TECHNIQUES

More Inspection Best Practices

- Walk the pipe, floor by floor
- Inspect the same each visit
- "Be the water"
  - Use what is best for you
    - Look at it all at once, or
    - Walk just the hangers, then the pipe, etc
- Review missed items on previous inspections, remedial action, corrections as required?

8

8

VIOLATIONS / DOCUMENTATION

Violations

- Document them
- Use code section numbers
- Use a checklist!
- Identify to closest "landmark", i.e. column, floor, etc

9

9

JOBSITE FAMILIARITY

Get to know the site!

- Familiarize yourself with the building project
- Previous inspection results of other trades
- Pre-inspection visitations

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IBC CHAPTER 3 – USE & OCCUPANCY CLASSIFICATION

Occupancy in the Building Code vs NFPA 13

- IBC Classifies the use of the building or space
- Does not correlate with NFPA hazard occupancies
  - Hazard in IBC = Occupant characteristics, materials, etc
  - Hazard in NFPA 13 = Fuel load, heat release, etc
- NFPA13 2019 – Chapter 4
  - Classification of occupancy hazard and commodities

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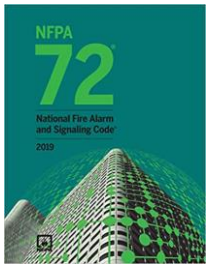
NFPA 72 ACCEPTANCE TESTING



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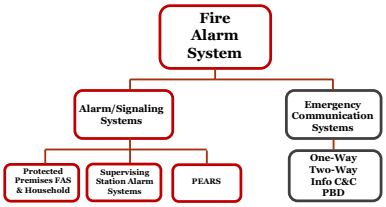
NFPA 72 ORGANIZATION



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CHAPTERS 1-2-3

- Chapter 1
  - Administration
- Chapter 2
  - Referenced Publications
- Chapter 3
  - Definitions

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CHAPTER 1 – SECTION 1.4

- Retroactivity
  - Continues language that the standard only applies once adopted.
  - Exception for conditions where the AHJ determines a distinct hazard
  - It is necessary for the AHJ to research previous editions when applicable.

Effective Date
Compliance Date

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DISTINCT HAZARD

- Most codes/standards have a "distinct hazard" clause.
- Gives the code official the authority to mandate compliance with "new" requirements.
- Use caution
  - Use good judgment
  - Be consistent

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CHAPTER 1 – SECTION 1.5

- Equivalency Section 1.5
  - Nothing in the standard shall prevent the use of systems, methods, devices, or appliances of equivalent or superior quality, strength, fire resistance, effectiveness, durability and safety over those prescribed in the standard
  - Fire alarm technology changes rapidly!

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CHAPTERS 1-2-3

- Chapter 1 (continued)
- ***1.6.5*** *The values presented for measurements in this Code are 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.*

18

CHAPTERS 1-2-3

- John's Interpretation
  - Use some common sense when measuring.
  - There is no exact science regarding many of the dimensions listed in the standard.

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CHAPTER 7 – DOCUMENTATION

- Document Storage Cabinet

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CHAPTER 10 - FUNDAMENTALS

- Protection of Fire Alarm Systems
- Primary/Secondary Power Supplies
- Annunciation and Annunciation Zoning
- Monitoring Integrity
- Documentation
- Impairments

21

FIRE PANEL LOCATION

- Compliant or not compliant?

22

CHAPTER 10 – FUNDAMENTALS

- Chapter contains requirements applicable to all fire alarm systems
  - Exception-Household systems must comply with Chapter 29

23

CHAPTER 10 - FUNDAMENTALS

- 10.4.5.1 Initiating Devices (manual and automatic) shall be selected and installed so as to minimize the possibility of nuisance alarms.
  - Pay attention to where initiating devices are being placed on plans.

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CHAPTER 10 – POWER SUPPLIES

- Two separate power supplies required:
  - Primary:
    - Usually normal building power,
    - Can also be a generator
  - Secondary:
    - Usually storage batteries,
    - Can also be a generator (auto start)
- Both power supplies must be reliable

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CHAPTER 10 – SECONDARY POWER

- Must include all loads,
- Must automatically provide power within 10 seconds:
  - Loss of power,
  - Low voltage conditions.
- Maximum loss of signal: 10 seconds.

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CHAPTER 10 – SECONDARY POWER SUPPLY

- Must be capable of operating the fire alarm system:
  - 24 hours in “normal” (non-alarm) condition,
  - Then for 5 minutes in alarm condition.
- Additional power supply requirements for voice evacuation and monitoring stations.

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CHAPTER 10 – DEDICATED BRANCH CIRCUIT

- A dedicated branch circuit shall be provided
- Location of dedicated circuit shall be permanently identified

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CHAPTER 10 – DEDICATED BRANCH CIRCUIT

- System circuits shall be identified as follows:
  - "FIRE ALARM"
  - "EMERGENCY COMMUNICATIONS"
  - "FIRE ALARM/ECS" for combination systems

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TROUBLE SIGNALS

- Visible and audible trouble signals and visible indication of their restoration to normal shall be indicated at the following locations:
  - Fire alarm control panel
  - Fire command center (when provided)
  - Central, proprietary, or remote station service (when system is monitored)

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TROUBLE SIGNALS

- An audible trouble signal that has been silenced at the protected premises shall comply with the following:
  - Signal shall automatically re-sound every 24 hours or less until fault condition is restored.
  - The signal shall sound until it is manually silenced or acknowledged.
  - The trouble signal shall be automatically retransmitted to the supervising station when provided

34

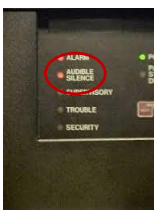
TROUBLE SIGNALS

- Unless prohibited by the AHJ, supervising station alarm systems shall be arranged to delay transmission of primary power failure (trouble signals) for a period ranging from 60 minutes to 180 minutes.

35

CHAPTER 10 -FUNDAMENTALS

- Alarm Signal Deactivation
  - Requirement to deactivate both audible and visible signaling when silencing a fire alarm system.
  - Silencing just the horns is a violation of ADA.



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NFPA 13 – WATERFLOW AND LATCHING SIGNALS

- Waterflow alarm devices
- Waterflow alarm signals at the fire panel should not be able to be silenced "until…flow stops"
- See NFPA 13 (19) Section 7.7.1

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CHAPTER 17 – INITIATING DEVICES

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CHAPTER 17 – INITIATING DEVICES

- Application
- Purpose
- Performance-Based Design
- General Requirements
- Requirements for Smoke and Heat Detectors
- Heat-Sensing Fire Detectors

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CHAPTER 17 – INITIATING DEVICES

- Smoke-Sensing Fire Detectors
- Radiant-Energy Sensing Fire Detectors
- Combination, Multi-Criteria and Multi-Sensor Detectors
- Gas Detection
- Other Fire Detectors

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CHAPTER 17 – INITIATING DEVICES

- Sprinkler Water-flow Alarm Initiating Devices
- Detection of the operation of Other Automatic Extinguishing Systems
- Manually Actuated Alarm-Initiating Devices
- Fire Extinguisher Electronic Monitoring Devices
- Supervisory Signal Initiating Devices

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CHAPTER 17 – INITIATING DEVICES

- Covers the installation criteria for all sensors or devices that are used to provide recognition of a fire
- Chapter covers any device that provides an incoming signal to the fire alarm control panel
- Installation criteria for single & multiple station smoke alarms are found in chapter 29.

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DETECTOR COVERAGE

- Total Coverage-When required by laws, codes, or standards, …includes all rooms, hallways, storage areas, basements, attics, spaces above suspended ceilings
  - Rare to require total coverage
- Partial/Selective-Where laws, codes, or standards require selected areas be covered
- Nonrequired-Devices installed to achieve a specific fire safety objective but not mandated by laws, codes or standards

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CHAPTER 17 – INITIATING DEVICES

- When subject to mechanical damage, an initiating device shall be protected.
  - Guard shall be listed for use with that detector.

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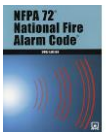
INITIATING DEVICE LOCATIONS – OLDER EDITIONS

- Initiating devices shall be installed in all areas, compartments, or locations where required by other NFPA codes and standards or as required by the authority having jurisdiction.



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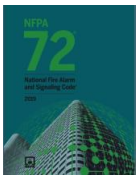
INITIATING DEVICE LOCATIONS – 2019 EDITION

- Initiating devices shall be installed in all areas, compartments, or locations where required by other governing laws, codes, or standards.



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HEAT DETECTORS

- Two types of heat detectors:
  - Spot-type
  - Line-type

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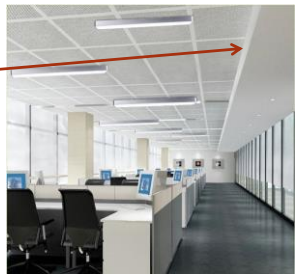
IMPORTANT TERMS DEFINED: SMOOTH CEILING

Smooth ceiling: Projections down from surface are 4 inches or less



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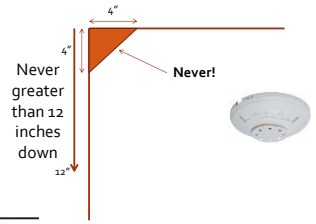
HEAT DETECTOR MOUNTING



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HEAT DETECTOR SPACING

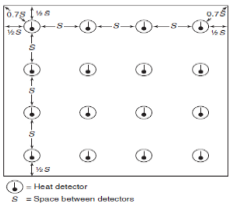

FIGURE A.17.6.3.1.1(a) Spot-Type Heat Detectors.

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HEAT DETECTORS

- Heat detectors should be installed where conditions are not favorable for smoke detectors such as kitchens, garages, boiler rooms, etc.
- The maximum ceiling temperature in the area where the heat detector is installed must be 20 degrees or more below the operating temperature of the heat detector.
- Heat detectors are not considered life safety equipment.

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HEAT DETECTORS & HIGH CEILINGS

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

Exception: Table 17.6.3.5.1 shall not apply to the following detectors, which rely on the integration effect:
(1) Line-type electrical conductivity detectors (see 3.3.66.11)
(2) Pneumatic rate-of-rise tubing heat detectors (see 3.3.66.15)
In these cases, the manufacturer's published instructions shall be followed for appropriate alarm point and spacing.

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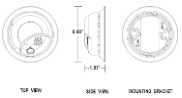
SMOKE DETECTORS



GROUND FLOOR
FIRE ALARM SCHEDULE

EQUIPMENT	QTY
FIRE ALARM PANEL	1
SMOKE SENSOR ON SOUNDER BASE	3
HEAT DETECTOR ON SOUNDER BEACON BASE	1
FIRE ALARM INTERFACE UNIT	0
DUCT SENSOR	0
MANUAL CALL POINT	0
SMOKE SENSOR ON SOUNDER BEACON BASE	19

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CHAPTER 17 – INITIATING DEVICES

- Unless specifically approved and listed for specific environmental conditions, smoke detectors shall not be installed in the following locations:
  - Where temperature is below 32°F
  - Where temperature is above 100°F
  - Where relative humidity is above 93%
  - Air velocity > 300 ft./min.

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CHAPTER 17 – INITIATING DEVICES

TABLE A.17.7.1.8 Environmental Conditions that Influence Smoke Detector Response

Protection	*Air Velocity >300 ft/min (>91.44 m/min)*	*Altitude >3000 ft (>914.4 m)*	*Humidity >93% RH*	*Temp. <32°F > 100°F (<0°C>37.8°C)*	*Color of Smoke*
Ion	X	X	X	X	O
Photo	O	O	X	X	X
Beam	O	O	X	X	O
Air sampling	O	O	X	X	O

X: Can affect detector response. O: Generally does not affect detector response.

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ENVIRONMENTAL FACTORS ON SMOKE DETECTORS

- Factors to consider that may affect smoke detector response:
  - Moisture
  - Combustion Products and Fumes
  - Atmospheric Contaminants
  - Engine Exhaust
  - Heating Elements and Abnormal Conditions

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ENVIRONMENTAL FACTORS ON SMOKE DETECTORS

- Factors to consider that may affect smoke detector response:

Moisture

- Live steam
- Steam tables
- Showers
- Humidifiers
- Slop sink
- Humid outside air
- Water spray

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ENVIRONMENTAL FACTORS ON SMOKE DETECTORS

- Factors to consider that may affect smoke detector response:

Combustion Products and Fumes

- Chemical fumes
- Cleaning fluids
- Cooking equipment
- Cutting/welding
- Fireplaces
- Ovens

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ENVIRONMENTAL FACTORS ON SMOKE DETECTORS

- Factors to consider that may affect smoke detector response:

Engine Exhaust

- Diesel engines
- Gas engines
- Gasoline forklifts

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ENVIRONMENTAL FACTORS ON SMOKE DETECTORS

- Factors to consider that may affect smoke detector response:

Heating Elements with Abnormal Conditions

- Dust accumulation
- Improper exhaust
- Incomplete Combustion

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ENVIRONMENTAL FACTORS ON SMOKE DETECTORS

- Factors to consider that may affect smoke detector response:

Electrical Noise and Mechanical Influences

- Vibration
- Radiation
- Intense light
- Electrostatic discharge

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ENVIRONMENTAL FACTORS ON SMOKE DETECTORS

- Factors to consider that may affect smoke detector response:

Airflow

- Gusts
- Excessive velocity

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CHAPTER 17 – CHANGES

- Protection During Construction
  - When smoke detectors are installed during construction, they need to be tested and calibrated or replaced.
  - When detectors are not required during construction, they shall not be installed until after all the other construction trades have completed cleanup.

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CHAPTER 17 – INITIATING DEVICES

- If the intent is to initiate action when smoke/fire threatens a specific object or space, the detector shall be permitted to be installed in close proximity to that object or space.

66

CHAPTER 17 – INITIATING DEVICES

- There are some applications that do not require full area protection where there are ceilings in excess of 15 feet:
  - Elevator landings
  - Protection of fire alarm control units
- Detection should be placed on the wall above and within 60 in. from the top of the elevator door(s) or FACU

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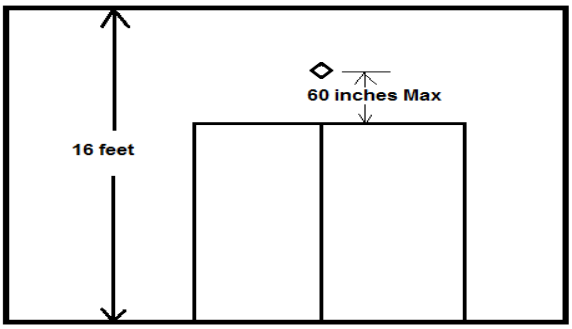

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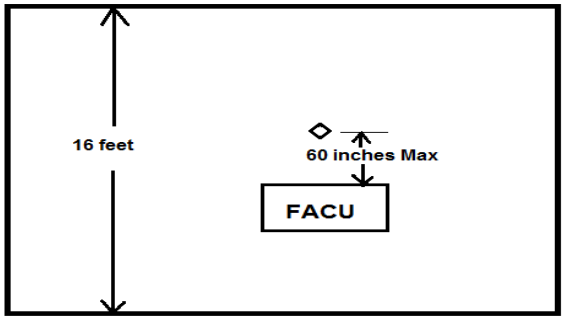

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SMOKE DETECTOR INSTALLATION CRITERIA

- Unlike heat detectors, beams and joists are treated the same for smoke detector spacing guidelines.
- For ceiling heights that exceed 28 feet, an engineering analysis is recommended to ensure proper smoke detector placement

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CHAPTER 17 – CHANGES

- Smoke detector (or alarm) installation
  - Wall mounting permitted within 12” of ceiling
  - 4” dead space no longer in the code for smoke detectors

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SMOOTH CEILINGS

- For smooth ceilings, all points on a ceiling shall be within 0.7 times the listed spacing for the detector.

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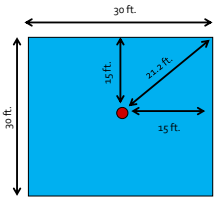
DETECTOR SPACING - "THE 0.7 RULE"

- The distance to the corner is more than 15 ft.
- $a^2 + b^2 = c^2$
- $15^2 = 225$
- $225 + 225 = 450$
- $\sqrt{450} = 21.2$ ft.
- 30 ft. x 0.7 = 21 ft.



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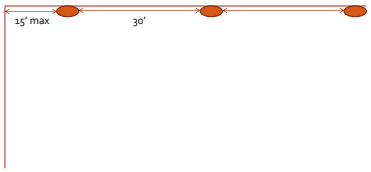
SMOOTH CEILINGS – SIDE VIEW

For smooth ceilings, the first row of smoke detectors must be located within ½ the listed spacing (15 feet) of the sidewall. Each consecutive row is based on listed spacing.



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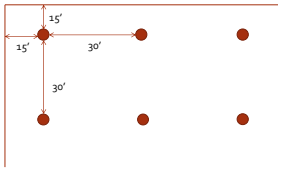
SMOOTH CEILINGS – TOP VIEW

For smooth ceilings, the first row of smoke detectors must be located within ½ the listed spacing (15 feet) of the sidewall. Each consecutive row is based on listed spacing.



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CHAPTER 17 – SMOKE DETECTOR SPACING

- Smoke Detector Spacing
  - NFPA 72 (19) – "In the absence of specific performance-based design criteria, smooth ceiling smoke detector spacing shall be a nominal 30 feet." OR
  - Use the "0.7 Rule"

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SMOKE DETECTORS AND THE 0.7 RULE

- For smooth ceilings, smoke detectors are required to be spaced so no point is more than 0.7 times the listed spacing from a detector.
  - 10 foot wide corridor = 41 feet
  - 15 foot wide corridor = 39 feet
  - 20 foot wide corridor = 37 feet
  - 25 foot wide corridor = 34 feet

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SMOKE DETECTORS FOR DOOR RELEASE

- NFPA 72 outlines two methods for controlling doors:
  - Door and shutter release mechanisms that are integral to the door hold-open release mechanism
  - Area smoke detectors

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SMOKE DETECTORS FOR DOOR RELEASE SERVICE

- If corridor is protected with smoke detection, no need for detection within 5 feet of door
- Specific installation requirements depend on the depth of wall section

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SMOKE DETECTORS FOR DOOR RELEASE

- If depth of wall section ≤ 24 in., one ceiling mounted smoke detector is required (on either side)
- If the depth of wall section is > 24 in. on both sides, two ceiling mounted smoke detectors are required

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SMOKE DETECTORS FOR DOOR RELEASE

- Smoke detectors that are part of an open area protection system covering the room, corridor, or enclosed space on each side of the smoke door and that are located and spaced as required by 17.7.3 shall be permitted to accomplish smoke door release service.

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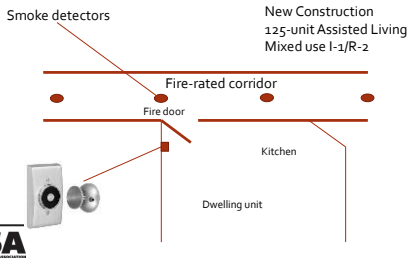
SMOKE DETECTORS FOR DOOR RELEASE-SCENARIO



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SMOKE DETECTORS FOR DOOR RELEASE SERVICE

- If separation between (multiple doorways is > 24 in., each doorway shall be treated separately

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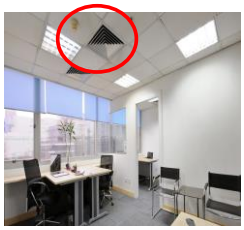
SMOKE DETECTORS IN HIGH AIR MOVEMENT AREAS

- Smoke detectors shall not be located directly in the airstream of supply registers.



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SMOKE ALARMS/DETECTORS & CEILING FANS

- Ceiling fans:
  - NFPA 72 regulates placement of smoke alarms in residential occupancies in section 29.8.3.4 #8.
    - 36" from ceiling fans
  - Language does not apply to commercial (detector) installations.

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WHY ARE HVLS FANS A CONCERN?

- Fire Test #1
  - Cartoned expanded Group A plastic
  - 15 ft. high storage on pallets
  - K = 11.2 sprinklers
  - Sprinkler system designed to NFPA 13
  - Fire started on lowest carton
  - 10 ft off center from HVLS fan

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WHY ARE HVLS FANS A CONCERN?

- Fire Test #1
  - Cartoned expanded Group A plastic
  - 15 ft. high storage on pallets
  - Ceiling height: 25 ft.
  - K = 11.2 sprinklers
  - Sprinkler system designed to NFPA 13
  - Fire started on lowest carton
  - 10 ft off center from HVLS fan
  - **73 sprinklers opened**
    - **Time: Between 3:26 – 7:35**

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WHY ARE HVLS FANS A CONCERN?

- Fire Test #2:
  - Class II commodity
  - Stored 12 ft. on pallets
  - Ceiling height: 25 ft.
  - K = 5.6
  - Sprinkler system designed to NFPA 13
  - Fire started on lowest carton
  - 10 ft off center from HVLS fan

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WHY ARE HVLS FANS A CONCERN?

- Fire Test #2:
  - Class II commodity
  - Stored 12 ft. on pallets
  - Ceiling height: 25 ft.
  - K = 5.6
  - Sprinkler system designed to NFPA 13
  - Fire started on lowest carton
  - 10 ft off center from HVLS fan
  - **21 sprinklers opened**

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VISUAL INSPECTIONS

- Initiating devices:
  - Are manual pull stations readily accessible, unobstructed and in good working order?

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CHAPTER 18 – NOTIFICATION APPLIANCES


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CHAPTER 18 – NOTIFICATION APPLIANCES

- Application
- General
- Audible Characteristics
- Visible Characteristics – public mode
- Visible Characteristics –private mode
- Graphic Visible Signaling Method

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NOTIFICATION SIGNAL

- The type of notification signal must match the evacuation scheme for the facility:
  - Total evacuation,
  - Zoned evacuation,
  - Occupant relocation,
  - Defend in place strategies.
- Notification zones shall be consistent with the emergency response or evacuation plan for the protected premises.

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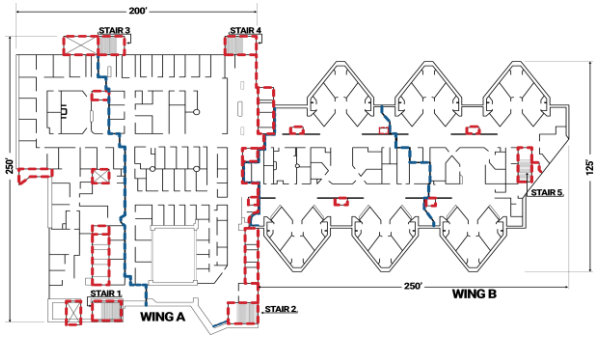


94

CHAPTER 18 – NOTIFICATION APPLIANCES

- The use of the T3 pattern shall only be used where evacuation of the building or relocation inside the building is desired.
- The T3 signal shall not be used where occupants are practicing defend-in-place.

95

CHAPTER 18 – NOTIFICATION APPLIANCES

- Physical Construction
  - Notification appliances used for other purposes than fire cannot say “FIRE” on them.

96

AUDIBLE ALARM SYNCHRONIZATION

- The three-pulse temporal pattern must be synchronized throughout the evacuation zone.
  - Separate patterns (lack of synchronization) is necessary to preserve the temporal pattern.

97

SOUND LEVELS – PUBLIC MODE

- 15 dBA above average ambient sound; or,
- 5 dBA above average ambient sound level lasting 60 seconds
- If ambient sound level is greater than 105 dBA, visual notification appliance is required,

98

SOUND LEVELS – PUBLIC MODE

- 110 dBA is maximum allowed

99

TABLE A.18.4.3 *Average Ambient Sound Level According to Location*

Location	*Average Ambient Sound Level (dBA)*
Business occupancies	55
Educational occupancies	45
Industrial occupancies	80
Institutional occupancies	50
Mercantile occupancies	40
Mechanical rooms	85
Piers and water-surrounded structures	40
Places of assembly	55
Residential occupancies	35
Storage occupancies	30
Thoroughfares, high-density urban	70
Thoroughfares, medium-density urban	55
Thoroughfares, rural and suburban	40
Tower occupancies	35
Underground structures and windowless buildings	40
Vehicles and vessels	50

100

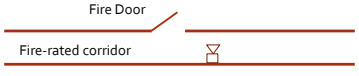
SOUND LEVELS – SLEEPING AREAS

- 15 dBA above ambient average sound level,
- 5 dBA above maximum sound level (lasting 60 seconds), or
- 75 dBA minimum measured at pillow level
- Whichever is greater.
- This will usually require an appliance in the dwelling unit.

101

ALERT TONES IN SLEEPING AREAS-INCORRECT

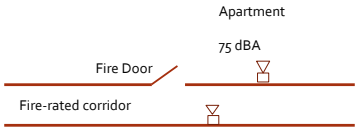
Apartment



102

102

ALERT TONES IN SLEEPING AREAS-CORRECT



NFSA

103

103

- 520 Hz Square Wave
  - Systems (Chapter 18) – effective January 1, 2014
  - Household (Chapter 29) – effective on adoption

NFSA

520 Hz Sq. Wave

3000 Hz

104

FPRF STUDY

The studies tested six signals:

1. 400 Hz Square wave signal
2. 520 Hz Square wave signal
3. 3000 Hz pure tone (standard)
4. Bed shaker (under mattress)
5. Pillow shaker
6. Strobe light in T-3 pulse

NFSA

105

FPRF CONCLUSIONS

- The low frequency signal with a fundamental frequency of 520 Hz is the most effective signal for waking people.
  - Low frequency signal woke 92% between 55 dBA and 75 dBA
  - 3000 Hz signal woke 56% between 55 dBA and 75 dBA
- The low frequency signal is superior to bed/pillow shakers and strobe lights.

106

SOUNDER BASE ACTIVATION

107

IN WHAT OCCUPANCIES WILL THIS APPLY?

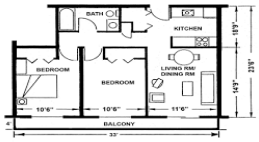
Low frequency sounders will be required for new fire alarm system installations in:

- Hotel/motels
- Assisted living
- Dormitories
- Apartments
- Not required in:
  - Hospitals*
  - Nursing homes
  - Prisons
  - Child Care Centers

108

QUESTION ???

- Do low frequency sounders need to be provided in the bedroom and the common areas of a dwelling unit or just the bedrooms?



109

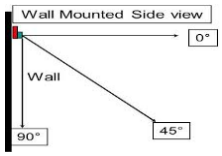
QUESTION ???

- The intent of this section is to require the low frequency signal in areas intended for sleeping and areas that might reasonably be used for sleeping.
- This would require low frequency in the bedroom and the living room area.

110

NOTIFICATION APPLIANCES-AUDIBLE

- If ceiling heights allow, wall-mounted audible appliances shall be not less than 90 inches above the floor, but not less than 6 inches below the finished ceiling.



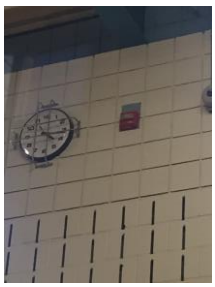
111

NOTIFICATION APPLIANCES-VISIBLE

- Wall mounted visible appliances shall be not less than 80 inches and not greater than 96 inches above the finished floor
- Performance-based design option for spacing and location
  - Must be designed by a licensed professional engineer
- Number and placement depends on the room size and light output of the strobe

112

NOTIFICATION APPLIANCES-VISIBLE



113

NOTIFICATION APPLIANCES-VISIBLE

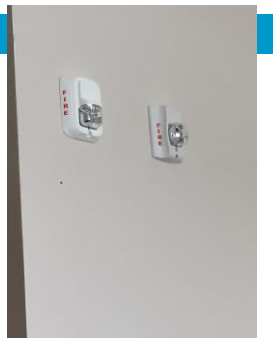
114

NOTIFICATION APPLIANCES

115

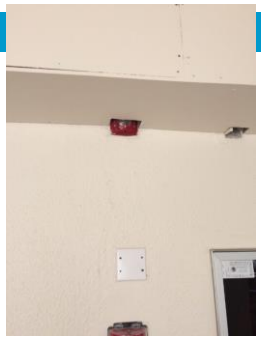
116

VISUAL NOTIFICATION

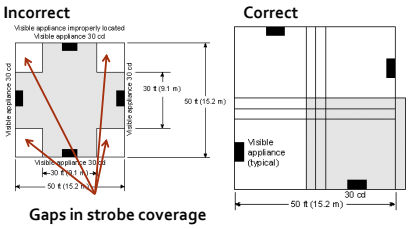


117

???



118



119

VISIBLE STROBES –SLEEPING AREAS

- Visible appliances ≥ 24” from the ceiling must be rated for a minimum of 110 cd
- Visible appliances < 24” from the ceiling must be a minimum of 177 cd rating

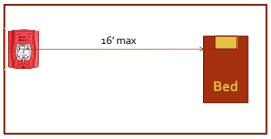
TABLE 18.5.5.7.2 Effective Intensity Requirements for Sleeping Area Visible Notification Appliances

Distance from Ceiling to Top of Lens		
in.	*mm*	*Intensity (cd)*
≥24	≥610	110
<24	<610	177

120

VISIBLE APPLIANCES-SLEEPING AREAS

- Rooms greater than 16 feet in any dimension shall have a visual appliance within 16 feet of the pillow.



121

VISIBLE STROBES

- Most visible appliances are installed in one of two orientations (some exceptions):
  - Wall mounted
  - Ceiling mounted

122

EVACS

- Emergency Voice Alarm Communication Systems
- IBC/IFC require EVACS for:
  - Group A with occupant load > 1,000
  - Group E
  - High-rise

123

VISIBLE ALARM-TEXTUAL SIGNS

124

CHAPTER 18 – CHANGES

- Voice Intelligibility
- Acoustically distinguishable spaces (ADS) are to be determined during design of a voice notification system.
- ADS shall be identified by the system designer as needing or not needing voice intelligibility.

125

AUDIBILITY VS. INTELLIGIBILITY

- Audibility – Can you hear the signal?
- Intelligibility – Can you understand the signal?

126

VOICE ALARM MESSAGES

- Voice messages shall not be required to meet the audibility requirements for public mode signaling, but shall meet intelligibility requirements.
  - Chapter 14 does not require voice signals to be measured for audibility.
  - Sound produced from a voice system is modulated and a meaningful measurement cannot be determined.

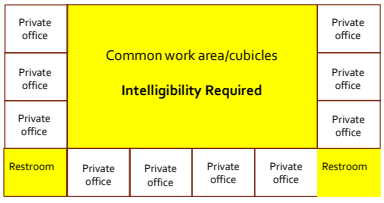
127

VOICE ALARM SYSTEMS

- Areas that may <u>not</u> require voice intelligibility:
  - Private office
  - Private bathrooms;
  - Mechanical/elevator equipment rooms or similar areas;
  - Elevator cars
  - Kitchen/storage rooms/closets

128

VOICE ALARM SYSTEMS-OFFICE BUILDING



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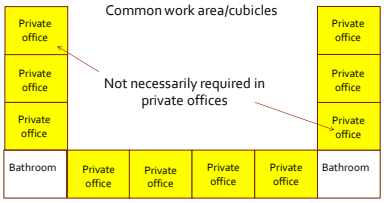
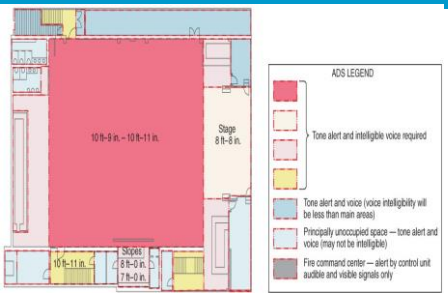
VOICE ALARM SYSTEMS-OFFICE BUILDING



130

VOICE ALARM – NIGHTCLUB EXAMPLE



131

CHAPTER 18 – CHANGES

- Light Color and Pulse Characteristics
  - Strobes for FIRE are to be clear or nominally white
  - Strobes for other than fire, or combination use strobes, are to be clear, white or other color

132

CHAPTER 21-EMERGENCY CONTROL FUNCTIONS/INTERFACES




133

CHAPTER 21

- Emergency Control Functions & Interfaces
- Previously titled “Fire Safety Functions”
- New Chapter-Relocated from Protected Premises Fire Alarm Systems
  - Application
  - General
  - Elevator Recall for Firefighters’ Service
  - Elevator Shutdown
  - First Responders Use of Elevators

134

CHAPTER 21 –ELEVATOR CONTROL FUNCTIONS

- All detectors used to initiate elevator control functions shall be connected to the building fire alarm system
- In buildings without a fire alarm system, detectors provided to control elevator equipment shall be connected to a dedicated function fire alarm control unit

135

CHAPTER 21 –ELEVATOR CONTROL FUNCTIONS

- Unless otherwise required by the AHJ, ONLY detectors associated with the elevator equipment (lobby, hoistway, & machine room) shall be used to recall elevators for firefighter's service.
- Lobby smoke detectors shall located on the ceiling within 21 feet of the centerline of each elevator door.
  - For lobby smoke detectors where ceiling height exceeds 15 feet, see chapter 17 (close proximity rule)

NFSA

136

CHAPTER 21 –ELEVATOR CONTROL FUNCTIONS

- If ambient conditions prohibit installation of smoke detectors, other automatic detection shall be permitted

NFSA

137

CHAPTER 21 –ELEVATOR CONTROL FUNCTIONS

- When approved by the AHJ, detectors associated with elevator control functions may be supervisory only.

NFSA

138

CHAPTER 21 –ELEVATOR CONTROL FUNCTIONS

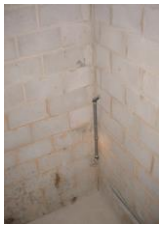
- When heat detectors are provided to shut down elevator power prior to sprinkler operation, the detector shall have a lower temperature rating and a higher sensitivity when compared to the sprinkler.

NFSA

139

CHAPTER 21 –ELEVATOR CONTROL FUNCTIONS

- Heat detectors shall:
  - Be placed within 24 inches of each sprinkler head; and,
  - In accordance with chapter 17; or,
  - Approved engineered methods (performance-based design)



NFSA

140

ASME A17.1

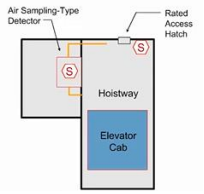
- Recall must occur under one of the following conditions:
  - Manual activation using fire department key, and
  - Fire alarm initiating device (FAID)

NFSA

141

NFPA 72 CHAPTER 21 – CHANGE (2019)

- Section 21.3.7 (19) – Fire alarm initiating devices required to be installed in elevator hoistways shall be accessible for service, testing and maintenance from outside the elevator shaft.



142

NFPA 13

- Sidewall sprinklers shall be installed at the bottom of each elevator hoistway not more than 2 ft. above the floor of the pit.

143

NFPA 13

- Sprinkler not required at the bottom of the shaft for enclosed, non-combustible elevator shafts not containing hydraulic fluids (traction elevators)

144

NFPA 13

- Sprinkler protection not required in:
  - Machine rooms
  - Machinery spaces
  - Control spaces
  - Hoistways
- …<u>for traction type elevators</u> when meeting NFPA 101 or applicable building code AND:

145

NFPA 13

- Upright, pendent, or sidewall spray sprinklers shall be installed at the top of elevator hoistways
- Sprinklers at the top of the elevator hoistway are not required for <u>passenger</u> elevators when:
  - Elevator is non-combustible or limited combustible materials AND
  - Car enclosure meets the requirements of ASME A17.1
- Required for <u>freight</u> elevators

146

NFPA 72 - TERMINOLOGY

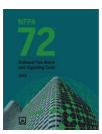
- Changes made to NFPA 72 2013 – 2022 editions were made primarily to clarify and coordinate terminology between codes and standards

<u>2013 edition</u>

21.3 Elevator Recall for Firefighters' Service

<u>2019 edition</u>

21.3 Elevator Phase I Emergency Recall Operation



147

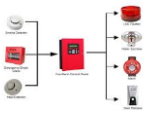
CHAPTER 23

- Protected Premises FA Systems
  - Application
  - General
  - System Features
  - System Performance & Integrity
  - Performance for Initiating Device Circuits
  - Performance for Signaling Line Circuits
  - Performance for Notification Appliance Circuits
  - System Requirements

148

CHAPTER 23 (CONT.)

- In-Building Fire Emergency Voice/Alarm Communications
- Prerecorded (Digital) Voice and Tone Fire Alarm Systems
- Two-Way Communication Service
- Signal Annunciation



149

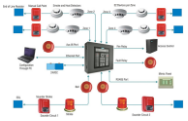
CHAPTER 23 (CONT.)

- Suppression System Actuation
- Off-Premises Signals
- Guard's Tour Supervisory Service
- Suppressed Signal Systems
- Protected Premises Fire Safety Functions
- Special Requirements for Low-Power Radio (Wireless) Systems

150

PROTECTED PREMISES FIRE ALARM SYSTEMS

- Features of non-required systems shall be established by the system designer based on the goals and objectives of the system owner.
- Non-required protected premises systems and components shall meet the requirements of this Code.



151

SECTION 901 – REQUIRED/NON-REQUIRED SYSTEMS

- Required systems (Section 901.4.1)
  - Installed, repaired, operated, tested and maintained in accordance with the IFC
- Non-required systems (Section 901.4.2)
  - Fire protection systems shall be permitted to be furnished for partial or complete protection when the system meets the requirements of the IFC

152

153

PROTECTED PREMISES FIRE ALARM SYSTEMS

- **Dedicated Function Fire Alarm Systems**
  - *"A protected premises fire alarm system installed specifically to perform fire safety function(s) where a building fire alarm system is not required"*
  - Intended to address "systems" where notification appliances and/or detectors are <u>not</u> required by model codes

154

PROTECTED PREMISES FIRE ALARM SYSTEMS

- Dedicated Function Fire Alarm Systems
  - Where codes, standards, or AHJs require monitoring of specific functions, but do not require a building fire alarm system, a dedicated function fire alarm system is appropriate.
    - Elevator recall
    - Sprinkler system
    - HVAC detectors
  - Other functions of the fire alarm system are not required.

155

PROTECTED PREMISES FIRE ALARM SYSTEMS

- Section 23.8.1.2-Systems may have a pre-signal feature when approved by the authority having jurisdiction.
  - A pre-signal feature must meet the following criteria:
    - FA sounds only in offices, control rooms, fire brigade stations or other constantly attended location (no general evacuation throughout)
    - Transmission to supervising station (when required) shall commence upon activation from the initial fire alarm signal

156

PROTECTED PREMISES FIRE ALARM SYSTEMS

- Pre-signal features:
  - Requires human action to activate the general fire alarm (manual pull)
  - Pre-signal should only be considered in limited cases when approved by the AHJ

157

PROTECTED PREMISES FIRE ALARM SYSTEMS

- Fire alarm systems may utilize positive alarm sequencing (PAS) when approved by the AHJ
- PAS must comply with the following:
  - FA signal must be acknowledged within 15 seconds of when the signal is received
  - If signal is not acknowledged within 15 seconds, notification signal and general evacuation shall commence.

158

PROTECTED PREMISES FIRE ALARM SYSTEMS

- PAS must comply with the following (cont.):
  - If signal is acknowledged, a delay of the evacuation signal of up to 180 seconds begins for staff to investigate the source of the alarm signal.
  - If FA system is not reset after 180 seconds ends, notification appliances commence, and general evacuation shall begin.

159

PROTECTED PREMISES FIRE ALARM SYSTEMS

- PAS must comply with the following (cont.):
  - If a second automatic fire detector is actuated during the investigation (180 second) phase, notification appliances and general evacuation shall be activated.
  - If any other FA initiating device is actuated (manual pull), notification signals and evacuation shall be activated
  - The FA system shall provide a means for bypassing the PAS

160

PROTECTED PREMISES FIRE ALARM SYSTEMS

- Pull Station
  - Where connected to a supervising station, FA systems employing automatic detection or water-flow monitoring shall include a manual alarm box to initiate a signal at the supervising station.
    - Not required for elevator recall control and supervisory control (duct detectors) dedicated function fire alarm systems.

161

PROTECTED PREMISES FIRE ALARM SYSTEMS

- Annex Material
- Pull station is intended to provide a backup means of communication with supervising station when system is out of service.
- Because system is out of service, pull station should be placed on a separate circuit that will not be placed on test with the main FA system.
- Should be located around FACP or sprinkler riser.

162

PROTECTED PREMISES FIRE ALARM SYSTEMS

- Notification Appliances
  - This section exempts visible signals and evacuation signaling in the following locations:
    - Exit stairwells
    - Exit passageways
    - Elevator cars

163

CHAPTER 24-EMERGENCY COMMUNICATION SYSTEMS

164

CHAPTER 24

- Emergency Communication Systems (ECS)
  - Application
  - Purpose
  - General
  - One-Way Emergency Communication Systems
  - Two-Way In-Building Emergency Communication Systems

COMMUNICATION SYSTEMS

165

EMERGENCY COMMUNICATION SYSTEMS

- Chapter was new in 2010 edition
- Chapter contains materials related to:
  - Emergency Voice Alarm Communication Systems
  - Mass Notification Systems

166

EMERGENCY COMMUNICATION SYSTEMS

- Emergency communication systems shall be capable of reproduction of prerecorded, synthesized, or live messages with voice intelligibility
  - Can require alternate or additional languages
  - It is recommended speakers be distributed around the building rather than high power output of a few speakers.

167

MICROPHONE USE

- All users of systems that are equipped with a microphone for live voice announcements shall be provided with posted instructions

168

EMERGENCY COMMUNICATION SYSTEMS

- Ancillary Functions
  - Emergency Communication Systems may be used for ancillary functions such as:
    - General paging
    - Background music
    - Non-emergency functions
  - Primary function (emergency notification) must take precedence and cannot be compromised

169

EMERGENCY COMMUNICATION SYSTEMS

- Voice evacuation messages shall be preceded and followed by a minimum of two cycles of the emergency evacuation signal specified in section 18.4.2 (T3 pattern).
  - Intent is to get people's attention with the T3 pattern and then move into the voice instructions.

170

VOICE ALARM IN SLEEPING AREAS

- In occupancies where sleeping accommodations are provided, a low-frequency tone shall be provided in the sleeping areas that complies with chapter 18.
- In areas where sleeping accommodations are provided, but message is communicated to those awake (public, common areas, etc.), low frequency is <u>not</u> required.

171

CHAPTER 26-SUPERVISING STATION FA SYSTEMS

172

CHAPTER 26

- Supervising Station Fire Alarm Systems
  - Application
  - General
  - Alarm Systems for Central Station Service
  - Proprietary Supervising Station Systems
  - Remote Supervising Station Systems
  - Communication Methods for Supervising Station Alarm Systems

173

SUPERVISING STATION FIRE ALARM SYSTEMS

- Three options for monitoring a fire alarm system
  - Central Station
  - Proprietary Supervising Station
  - Remote Supervising Station
    - Remote Station represents roughly 85-90% of all monitored fire alarm systems (Source: AFAA)

174

FIRE ALARM SIGNAL (PRE)VERIFICATION

- 2010 Edition-Allowed monitoring companies to verify alarm signals for Remote Station Service only before dispatching when approved by the AHJ
- IAFC introduced proposal to NFPA 72 to require verification on all fire alarm signals.
  - IAFC proposal was modified
  - It was allowed only for remote station when approved by AHJ but verification cannot be more than 90 seconds.

NFSA

175

CONFUSING ?

- NFPA 72
  - Pre-Alarm Signals (Chapter 10)
  - Smoke alarm verification (Chapter 23)
  - Pre-verification of fire alarm signals (Chapter 26)

NFSA

176

COMMUNICATION METHODS

- Requirements found in section 26.6
- Section contains approved methods for transmitting the fire alarm signal from the protected premises to the supervising station

NFSA

177

CHAPTER 26 – CHANGES

Communication Methods: Older editions

- Active Multiplex
- DACTs
- McCulloh
- 2-Way Radio
- 1-Way Radio
- Direct Connect
- Private Microwave
- Other Technologies

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CHAPTER 26 – CHANGES

2019 Communication Methods

- DACTs
- 2-Way Radio
- 1-Way Radio
- Other Technologies

179

MONITORING OPTIONS

- Single Transmission Technologies
  - Cell
  - Internet
  - Radio
- Multiple Transmission Technologies
  - Digital alarm communicator transmitters (DACTs)

180

SUPERVISING STATION FA SYSTEMS

- 2010 Edition
- Where only one communications technology is used, any failure of the communication path shall be annunciated at the supervising station within 5 minutes of the failure.
- The transmission path shall be monitored

181

SUPERVISING STATION FA SYSTEMS

- 2019 Edition
- For single transmission technology, failure of the communications path shall be annunciated at the supervising station and the protected premises at intervals of not more than every 60 minutes.
  - More FA are utilizing IP to monitor system and when IT departments shut down internet for service it was initiating trouble signals at panel.

182

SUPERVISING STATION FA SYSTEMS

- 2010 Edition
- Where two or more transmission methods are used (DACTs), the following requirements shall be met:
  - Both transmission methods shall be monitored.
  - Failure of any of the communications path shall be annunciated at the supervising station and the protected premises at intervals of not more than every 24 hours.

183

SUPERVISING STATION FA SYSTEMS

- 2013 Edition
- Where multiple transmission paths are used (DACTs), the following requirements shall be met:
  - Both transmission methods shall be monitored.
  - Failure of any of the communications path shall be annunciated at the supervising station and the protected premises at intervals of not more than every 6 hours.

184

CHAPTER 26 – CHANGES

- Secondary Power
  - Secondary power supplies for communication methods need to match the requirements for secondary power for the rest of the fire alarm system (24 hours).
  - Caution: Many power supplies for the communication method will not meet this requirement.

185

CHAPTER 26 – MONITORING OPTIONS

- Radio
  - AES Intellinet
  - GSM
  - Alarm Net
- IP Communications
  - Firelite "IP-DACT"
  - Honeywell "IP-DACT"
- Cellular
  - cellular communicator

186

CHAPTER 29

- Single & Multiple Station Alarms and Household Fire Alarm Systems
  - Application
  - Purpose
  - Basic Requirements
  - Assumptions
  - Detection and Notification
  - Power Supplies

187

CHAPTER 29 – LOW FREQUENCY

- Chapter 29 TC took a different approach than Chapter 18 TC on low frequency smoke alarms
- Smoke alarms with low frequency are only required for those with mild to severe hearing loss.
- Must have a square wave frequency of 520 Hz.

188

HOUSEHOLD FIRE WARNING EQUIPMENT

- Smoke alarms must be replaced when they fail an operability test or after ten years, whichever comes first.

189

HOUSEHOLD FIRE WARNING EQUIPMENT

- Smoke alarms shall not be installed within 10 feet of stationary cooking appliances unless listed for close proximity to cooking appliances
- Smoke alarms installed between 10-20 feet must have a silencing button

190

NFPA 13 ACCEPTANCE TESTING

191

REGULATORY INSPECTIONS

IBC-2021
Sections 110 - Inspections, 901 Acceptance
IFC-2021
Sections 106 – Inspections, 901 Acceptance
NFPA-13, 2019
Chapter 25, System Acceptance

- Rough and/or final inspections
- Close-out documents
- Integrated testing
- C of O vs Temp C of O

192

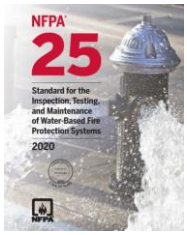
AREA OF COVERAGE

- Hazard classification/Commodity Classification of the Contents
- Type of sprinkler selected
- Ceiling construction
- Minimum allowable distance between sprinklers
- Maximum allowable distances between sprinklers
- Placement of walls and room dividers
- Obstructions to heat flow and discharge
- Heat zones near heat sources

193

KEEP IN MIND…

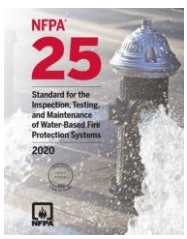
- NFPA 25 assumes the system was installed and approved in accordance with the standard in effect at the time.



194

KEEP IN MIND…

- A.1.1.3.1 The requirement to evaluate the adequacy of the design of the installed system or the capability of the fire protection system to protect the building or its contents is not a part of the periodic inspection, testing, and maintenance requirements of this standard. Examples of items not covered by this standard include the evaluation of unsprinklered areas and the spacing of sprinklers…



195

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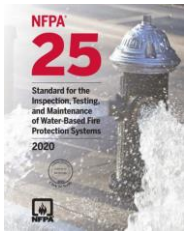

196

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PROTECTION AREAS & MAXIMUM SPACING (SSP & SSU LIGHT HAZARD)

Construction Type	System Type	Maximum Protection Area	Maximum Spacing
Non-Combustible Unobstructed	Hyd. Calc.	225 sf	15 ft
Non-Combustible Obstructed	Hyd. Calc.	200 sf	15 ft
Combustible Unobstructed with no exposed members	Hyd. Calc.	225 sf	15 ft
Combustible Unobstructed with exposed members 3 feet or more on center	Hyd. Calc.	225 sf	15 ft
Combustible Unobstructed with members less than 3 feet on center	All	130 sf	15 ft
Combustible obstructed with exposed members 3 feet or more on center	All	168 sf	15 ft
Combustible obstructed with members less than 3 feet on center	All	130 sf	15 ft
Combustible concealed spaces in accordance with 8.6.4.1.4	All	130 sf	15 ft- parallel to slope 10 ft- perpendicular to slope

197

197

BAR JOIST CONSTRUCTION

198

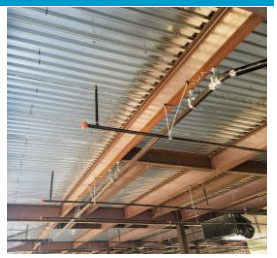
198

BAR JOIST CONSTRUCTION

199

MAXIMUM SPACING OF SPRINKLERS (SSP/SSU/SSS)

- SS U/P light hazard: 15 feet
- SS U/P ordinary hazard: 15 feet
- SS U/P extra hazard: 12 feet
- SS Sidewall light hazard: 14 feet
- SS Sidewall ordinary haz: 10 feet



200

DETERMINATION OF "AREA OF COVERAGE"

Based upon the "S x L rule"

- **AS = S x L**

- **AS** = Area of Coverage
- **S** = Distance along branch line or twice distance to wall.
- **L** = Distance between branch line or twice distance to wall.

Maximum area of coverage of any sprinkler shall not exceed 400 s.f.

201

MAXIMUM DISTANCE FROM WALLS

- Sprinklers cannot be more than one-half the maximum distance between sprinklers.
- Large items against the wall, such as large portraits, furniture, trophy cases, portable closets, the sprinkler is measured to the wall.
- When sprinklers are adjacent to windows, and no additional floor space is created, the distance is measured to the wall line.

202

MINIMUM DISTANCES

From Walls

The distance of sprinklers to walls shall not be less than 4 inches, unless specifically listed to be closer than 4 inches.

Between Sprinklers

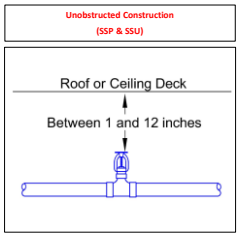
Based upon specific styles, but typically no less than 6 feet, unless provide baffles. *(Cold Soldering & Skipping)*

In-rack sprinklers are exempt from 6 ft. minimum rules.

203

DEFLECTOR POSITIONING BELOW CEILING

- Each type of sprinkler will have specific rules on how far the sprinkler may be down from the ceiling.



204

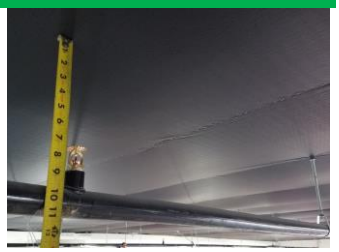
DEFLECTOR POSITIONING BELOW CEILING

Unobstructed Construction
(SSP & SSU)

205

It's OK!

- Deflector Distance?
  - Unobstructed Construction
    - 1-12"?



206

206

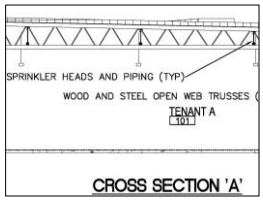
UH OH!

- Deflector Distance?
  - Unobstructed Construction
    - 1-12"?

207

207

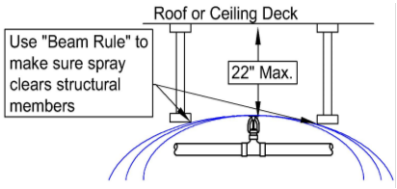
Check The Plans…UH OH!



208

208

EXCEPTION TO OBSTRUCTED CONSTRUCTION RULE



Sprinklers are allowed to be installed with deflectors at or above members where the distances meet section 8.6.5.1.2 (beam rule)

209

209

UH OH!

- Obstructed?
- 3 x Rule?

210

210

FINAL INSPECTION

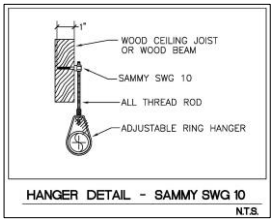
Concealed After the Rough Inspection

- Venting (required in 2016 edition)
  - Required for wet systems utilizing metallic piping
  - Can be manual or automatic
    - Manual – min. ½" valve
    - Automatic air vent
    - Remote inspectors test valve
    - Other approved means
  - Manual should be accessible
  - Located near a high point

211

211

Check The Plans…UH OH!



212

212

UH OH!

- Allowed Hanger?

213

213

UH OH!

- Approved?

214

UH OH!

- Approved?

215

UH OH!

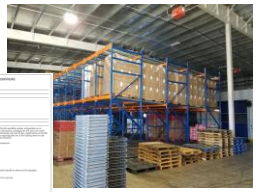
- Allowed Hanger?

216

FINAL WALKTHROUGH

Occupancy Hazard / Commodities

- Does the installation correlate with the Owner's Certificate and stated use?
- Storage application?
  - IFC (2018) Approved storage layout
  - Rack layout, top of storage, commodities, pallet types, etc



217

217

FINAL WALKTHROUGH

Obstructions

- Not present during the rough inspection

Ducts and other building systems

Building features that weren't built yet

218

218

FINAL WALKTHROUGH

Escutcheons / Trim

- Escutcheons on
- Caps/straps removed?
- Painted sprinklers?

219

219

UH OH!

- What Happened?
  - Write it down for correction

220

220

UH OH!

- What Happened?
  - Write it down for correction

221

221

UH OH!

- What Happened?
  - Write it down for correction

222

222

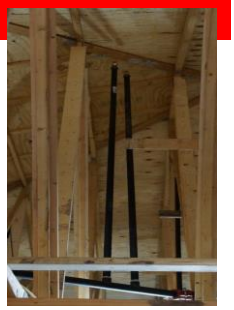
UH OH!

- What's wrong?
  - FDC to be located between system control valve and dry-pipe valve on single dry system – NFPA 13 8.17.2.4.2. Here there is a shut-off valve above the FDC

223

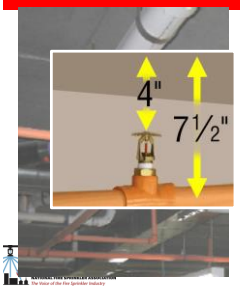
UH OH!

- Sprigs 4 feet or longer need restraint against lateral movement



224

UH OH!



- Per the listing for CPVC
- 4" maximum from ceiling to deflector and 7.5" from ceiling to CPVC

225

UH OH!

- Bends are too tight

226

UH OH!

- Sidewall sprinklers cannot be installed back-to-back without a lintel or soffit.
  - Section 8.7.3.1.4

227

UH OH!

- Ball drip installed at wrong location

228

UH OH!

- Paddle-type flow switches not permitted on dry systems

229

229

UH OH!

230

230

FINAL WALKTHROUGH

Heat Sources

- Radiant heaters
  - Located where indicated on plans?
- Fireplaces
- Diffusers

- Appropriate temperature rating for sprinklers?
- Intermediate temperature can be used throughout ordinary and light hazard

231

231

FINAL WALKTHROUGH

Heat Sources

- Radiant heaters
  - Located where indicated on plans?
- Fireplaces
- Diffusers

- Appropriate temperature rating for sprinklers?
- Intermediate temperature can be used throughout ordinary and light hazard

232

232

FINAL WALKTHROUGH

Signage

- Control valves

- Drain valves

- Venting and test connection valves

- Permanently marked metal or rigid plastic signs.
  - Secured with corrosion resistant means

233

233

FINAL WALKTHROUGH

Signage

- Control Valve
  - Identifies portion of the building served
  - Multiple valves

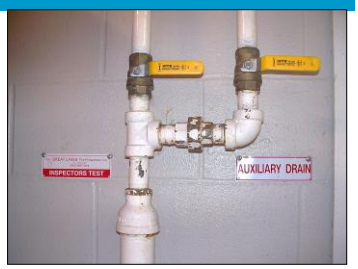
234

234

FINAL WALKTHROUGH

Signage

- Test connections
- Drains



235

235

FINAL WALKTHROUGH

Signage

- Test & Drain

236

236

FINAL WALKTHROUGH

Signage

- Hydraulic Nameplate
  - Installed by contractor
  - Install near or on valve:
    - Alarm valve / Wet system
    - Dry
    - Preaction
    - Deluge

237

237

FINAL WALKTHROUGH

Signage

- General Information Sign
  - Installed by contractor
  - System control riser, antifreeze loop and auxiliary control valves.
  - Required by NFPA 25 also

238

FINAL WALKTHROUGH

Signage

- Antifreeze systems
  - Placard on antifreeze system near main valve:
    - Manufacturer, type & brand
    - Concentration by volume
    - Volume used
- Remote antifreeze systems require placard on system riser
- Number of remote antifreeze systems
- Locations of remote antifreeze systems

239

FINAL WALKTHROUGH

Approved Storage Layout

- New to the 2018 IFC
  - Required when building use falls under provisions of Chapter 32 High Piled Combustible Storage
  - All of the storage-related design info posted on the wall
    - Commodities
    - Top of storage
    - Aisles / array, etc
    - More

240

FINAL WALKTHROUGH

Stock of Spare Sprinklers

- Minimum number of spare sprinklers
  - Under 300 sprinklers in premises: Min 6
  - 300-1000 sprinklers in premises: Min 12
- Sprinklers shall correspond to types and temperatures of installed sprinklers
- Kept in cabinet in conditioned space
- One wrench for each type
- List provided in cabinet
  - Head legend from drawing has the info

241

241

UH OH!

- What Happened?
  - Write it down for correction

242

242

ACCEPTANCE TESTING

NFPA 4

- Integrated Testing:
  - Do the individual building active and passive protection systems interact appropriately together as a single unit?
  - 2018 IBC/IFC:
    - Where two or more systems are interconnected, the intended response is verified

243

243

ACCEPTANCE TESTING

Hydrostatic Testing

- When systems are modified they are required to be tested for two hours
  - Modifications that affect more 20+ sprinklers that can be isolated must be hydrostatically tested to 200 psi or 50 psi over normal system pressure (whichever is greater)
  - Modifications to FDC tested at 150 psi
  - All other modifications must be hydrostatically tested to system pressure

244

244

ACCEPTANCE TESTING

Operational Tests

- Water flow alarm
- Trip test
- Deluge and preaction Systems
- Main drain
- Pressure reducing valves
- Backflow preventers

245

ACCEPTANCE TESTING

Inspector's Test Connection

- Wet system: after flow switch
- Dry system: most remote branch line

246

246

ACCEPTANCE TESTING

Waterflow Alarm

- Audible alarm must sound within 5 minutes of flow
- If the switch is also an initiating device for an alarm system, alarm must sound within 90 seconds of flow (NFPA72)

Exterior Alarm Bell

Fire Alarm System

247

247

ACCEPTANCE TESTING

Waterflow Alarm - Video

- In this test, a Test & Drain valve is used
  Allowing the Main Drain Test as well

248

248

ACCEPTANCE TESTING

Trip Test

- Dry pipe systems only
- Water must reach the inspector's test connection within an acceptable amount of time
- Three recognized testing options:
  - Single inspector's test connection
  - Multiple inspector's test connections
  - Computer program

249

249

ACCEPTANCE TESTING

Trip Test

- Water delivery time for single outlet ITC

Occupancy/QOD	System Volume	Water Delivery Time
Dwelling Unit	All	15 seconds
Not a dwelling unit	Under 500 gallons	No required delivery time
Not a dwelling unit with a QOD	Between 500 and 750 gallons	No required delivery time
Not a dwelling unit, no QOD	Between 500 and 750 gallons	60 seconds
Not a dwelling unit	Over 750 gallons	60 seconds (probably will need QOD to get it)

250

250

ACCEPTANCE TESTING

Aboveground Material and Test Certificate

- Applies to 13 & 13R
- Completed after acceptance testing and system is in service
- A blank certificate can be used as a checklist to perform final inspections

251

ACCEPTANCE TESTING

Witnessing

V. Signatures

1. Name of sprinkler contractor: _____
2. Tests witnessed by:
   For property owner (Signed): _____
   Title: _____ Date: _____
   For sprinkler contractor (Signed): _____
   Title: _____ Date:

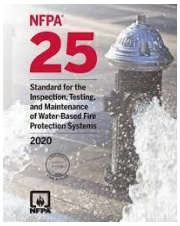
252

252

ACCEPTANCE TESTING

Instructions for the Owner

- The owner must be instructed as to how to maintain the system
- The owner must be given a copy of NFPA 25
- The owner must be given a copy of any instructions from the manufacturers of products installed in the system



253

THANK YOU!!

Any questions??

John Swanson, CFPS
Codes & Standards Specialist, NFSA
Swanson@nfsa.org

CONTACT INFORMATION

Swanson@nfsa.org
443-863-4406

E-mail is preferred option so I can attach code sections, if necessary

Goal is to get back to you in less than 24 hours.

255