



**BURGLAR** ESTABLISHED 1981  
**& FIRE ALARM**  
ASSOCIATION OF **MICHIGAN**

APPRENTICESHIP PROGRAM

**Period 2**  
**Related Training Instruction (RTI)**  
**Module 3 – NFPA 72 Notification Appliances**

**Reading material associated with this module:**  
**Chapter 18**  
**NFPA 72, National Fire Alarm Code, 2022 Edition**

**NFPA 72**  
**National Fire Alarm Code**  
**2022 Edition**  
**Notification Appliances**

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.1 Application / 18.2 Purpose:
  - Chapter 18 applies to :
    - The performance, location and mounting of notification appliances used to initiate or direct evacuation or relocation of occupants or for providing information to occupants or staff.
    - The performance, location and mounting of annunciators, displays, and printers used to display or record information for use by occupants, staff, responding emergency personnel, or supervising station personnel.
  - Notification appliances shall provide stimuli for initiating emergency action and provide information to users, emergency response personnel, and occupants.

18.1.3, 18.1.4, 18.2

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.3 General:
  - All notification appliances shall be listed for the purpose for which they are used.
  - Appliances intended for use in special environments, such as outdoor verses indoor, high and low temperature, high humidity, dusty conditions, and hazardous locations, or where subject to tampering, shall be listed for the intended use.
  - Notification appliances used for signaling other than fire shall not have the word FIRE, or any fire symbol, in any form (i.e., stamped, imprinted, etc.) on the appliance visible to the public.
  - Notification appliances with multiple visible elements used for signaling other than fire shall be permitted to have fire markings only on those visible elements used for fire signaling.

18.3.1, 18.3.3.1, 18.3.3.2, 18.3.3.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.3 General:
  - Appliances subject to mechanical damage shall be suitably protected.
  - If guards, covers or lenses are employed, they shall be listed for use with the appliance.
  - The effect of guards, covers, or lenses on the performance of the appliance shall be in accordance with the listing requirements.
  - Appliances shall be supported independently of their attachment to the circuit conductors.
  - Appliances shall be mounted in accordance with the manufacturer's published instructions.
  - Terminals, leads, or addressable communication, that provide for monitoring the integrity of the notification appliance connections shall be provided.

18.3.4, 18.3.5, 18.3.6

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### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - An average ambient sound level greater than 105dBA shall require the use of a visible notification appliance(s).
  - The total sound pressure level produced by combining the ambient sound pressure level with all notification appliances operating shall not exceed 110dBA at the minimum hearing distance.
  - *3.3.176 Minimum Hearing Distance: The closest distance that an occupant's ear can be to an audible appliance.*
  - Sound from normal or permanent sources, having a duration of at least 60 seconds, shall be included when measuring maximum ambient sound level.

18.4.1.1, 18.4.1.2, 3.3.176, 18.4.1.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Audible alert and evacuation signal tones, including those that precede or follow voice messages shall meet the requirements for public mode, private mode, sleeping area, or narrow band signaling.
  - Where required, voice communications systems shall be capable of providing messages that meet voice intelligibility requirements.
  - Voice messages shall not be required to meet the audibility (volume) requirements for public mode, private mode, sleeping area, or narrow band signaling.
  - Audible notification appliances used for exit marking shall not be required to meet the audibility (volume) requirements for public mode, private mode, sleeping area, or narrow band signaling.

18.4.1.5, 18.4.1.6, 18.4.1.7

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - The audible alarm signal pattern used to notify building occupants of the need to evacuate (i.e., leave the building) or relocate (i.e., from one area to another) shall be the standard alarm evacuation signal consisting of a three-pulse temporal pattern in accordance with ANSI/ASA S3.41 (temporal Code 3 signal).
  - *It is not the intent to prohibit the continued use of an existing consistent evacuation signaling scheme, subject to the approval of the AHJ. It is also not the intent that the distinct pattern be applied to visible appliances.*
  - The signal shall be repeated until the fire alarm system is manually silenced or reset by authorized or emergency personnel.
  - The standard evacuation signal shall be synchronized within a notification zone.

18.4.2.1, A18.4.2.1, 18.4.2.2, 18.4.2.5

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### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Where a carbon monoxide detector or alarm is required, and where an audible signal is required, a distinctive pattern shall be required that is different from a fire evacuation signal.
  - Where an audible signal is required, the carbon monoxide signal shall be a four-pulse temporal pattern and be synchronized within a notification zone of a protected premises.

18.4.3.1, 18.4.3.2, 18.4.3.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - The public mode audibility requirement is 15 dBA over the average ambient sound level or 5 dBA above the maximum sound level lasting more than 60 seconds, whichever is greater.
  - Where approved by the AHJ or other governing codes or standards, the requirements for audible signaling shall be permitted to be reduced or eliminated when visible signaling is provided.
  - Speakers installed in elevator cars are permitted to use the audibility criteria for private mode signaling instead of public mode.
  - If approved by the AHJ, audible notification appliances installed in restrooms shall be permitted to use the audibility criteria for private mode signaling instead of public mode.

18.4.4.1, 18.4.4.2, 18.4.4.3, 18.4.4.4

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - The fire alarm system may be arranged to shut down sources of ambient noise to reduce the ambient sound level in compliance with the following:
    - If the system reduces the ambient sound level, it shall operate at 15 dBA over the reduced ambient sound level or 5 dBA above the maximum sound level lasting more than 60 seconds after reduction of the ambient noise level, whichever is greater.
    - Visible notification appliances shall be installed in the affected area.
    - Relays, circuits, or interfaces necessary to stop or reduce ambient noise shall meet the requirements of chapters 10, 12, 21, and 23.

18.4.4.5, 18.4.4.5.1, 18.4.4.5.2, 18.4.4.5.3

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### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - The private mode audibility requirement is 10 dBA over the average ambient sound level or 5 dBA above the maximum sound level lasting more than 60 seconds, whichever is greater.
  - Where approved by the AHJ or other governing codes or standards, the requirements for audible signaling shall be permitted to be reduced or eliminated when visible signaling is provided.

18.4.5.1, 18.4.5.2

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - The fire alarm system may be arranged to shut down sources of ambient noise to reduce the ambient sound level in compliance with the following:
    - If the system reduces the ambient sound level, it shall operate at 10 dBA over the reduced ambient sound level or 5 dBA above the maximum sound level lasting more than 60 seconds after reduction of the ambient noise level, whichever is greater.
    - Visible notification appliances shall be installed in the affected area.
    - Relays, circuits, or interfaces necessary to stop or reduce ambient noise shall meet the requirements of chapters 10, 12, 21, and 23.

18.4.5.3, 18.4.5.3.1, 18.4.5.3.2, 18.4.5.3.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - The sleeping area audibility requirement is 15 dBA over the average ambient sound level or 5 dBA above the maximum sound level lasting more than 60 seconds, or a sound level of at least 75dBA, whichever is greater, measured at the pillow level.
  - 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 in place.
  - Audible appliances provided for the sleeping areas to awaken occupants shall produce a low frequency alarm signal that complies with the following:
    - The waveform shall have a fundamental frequency of 520Hz  $\pm$ 10%.
    - The notification equipment shall be listed for producing the low frequency waveform (i.e., the equipment producing a 520Hz tone through a speaker, such as an EVACS tone generator, amplifier, NAC card, etc.).

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### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - The intent of the previous section covering sleeping areas is to require the use of low frequency signals in areas intended for sleeping and in areas that might reasonably be used for sleeping. An apartment would require a low frequency audible in the bedroom as well as the living room, as it is reasonable to assume the living room could have a sleeping occupant. However, it would not be reasonable to assume a sleeping occupant in a hallway, lobby or other normally unoccupied area.
  - This chapter does not address dwelling unit protection such as smoke alarms and their audible signal characteristics. Requirements for single- and multiple-station alarms and household fire alarm systems can be found in chapter 29.

A18.4.6.3

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### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Narrow band tone signaling for exceeding masked thresholds:
    - Audible tone signaling shall be permitted to comply with the masked threshold requirements of narrow band signaling as an alternative to the A-weighted public or private mode signaling requirements.
    - This alternative method is useful for large facilities with high ambient noise levels, as the A-weighted public or private mode requirement is a simplified method that can result in required dBA levels far in excess of what is needed for occupant notification.
    - Narrow band signaling is more design intensive and involves analyzing the frequencies of the ambient sound level and selecting signals at frequencies that will be heard over the ambient sound level.

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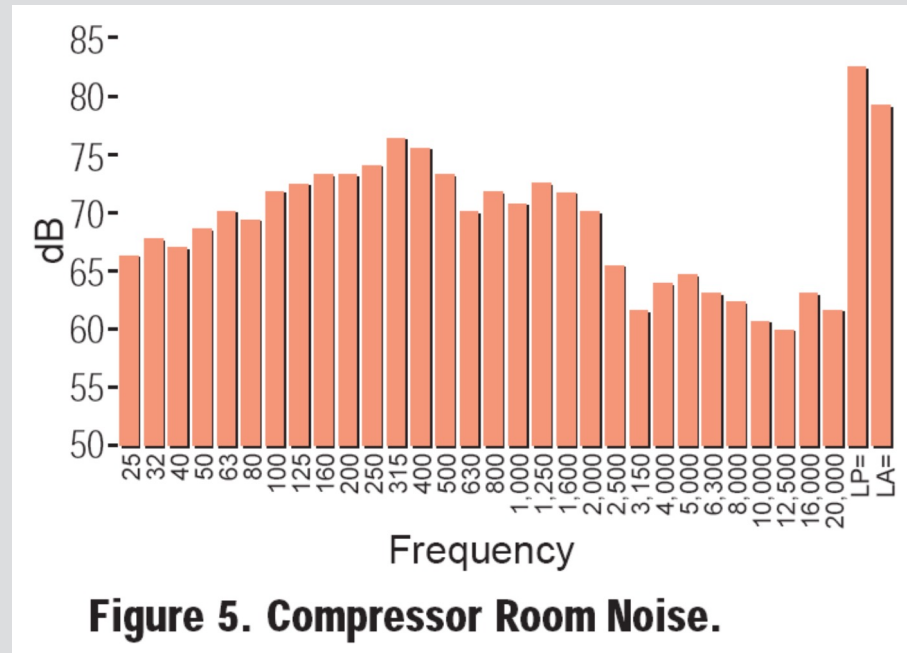
### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Narrow band tone signaling for exceeding masked thresholds:
    - The noise data for calculating the effective masked threshold shall be the peak value of noise lasting 60 seconds or more for each octave or one-third octave band.
    - The sound pressure level for masked threshold signaling shall meet the following, but does not apply to reproduction of prerecorded, synthesized, or live messages:
      - 10dBA over ambient in one or more octave bands.
      - 13dBA over ambient in one or more 1/3 octave bands.
    - Real world benefits include optimized notification and substantial reductions in speaker volume and amplification requirements.

18.4.7.3, 18.4.7.5, 18.4.7.5.1, 18.4.7.5.2

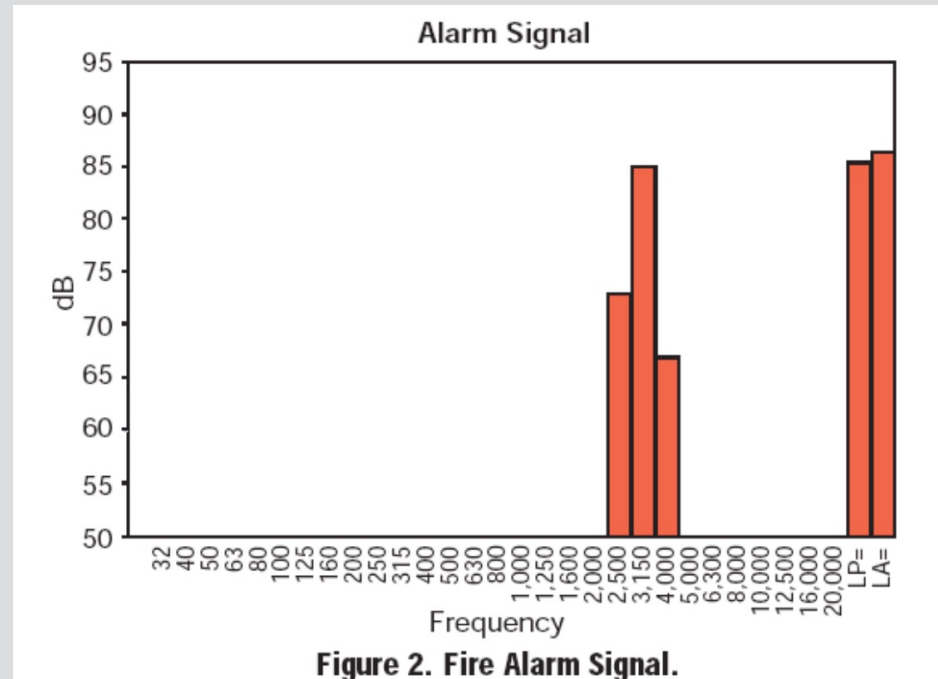
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### Chapter 18 – Notification Appliances:



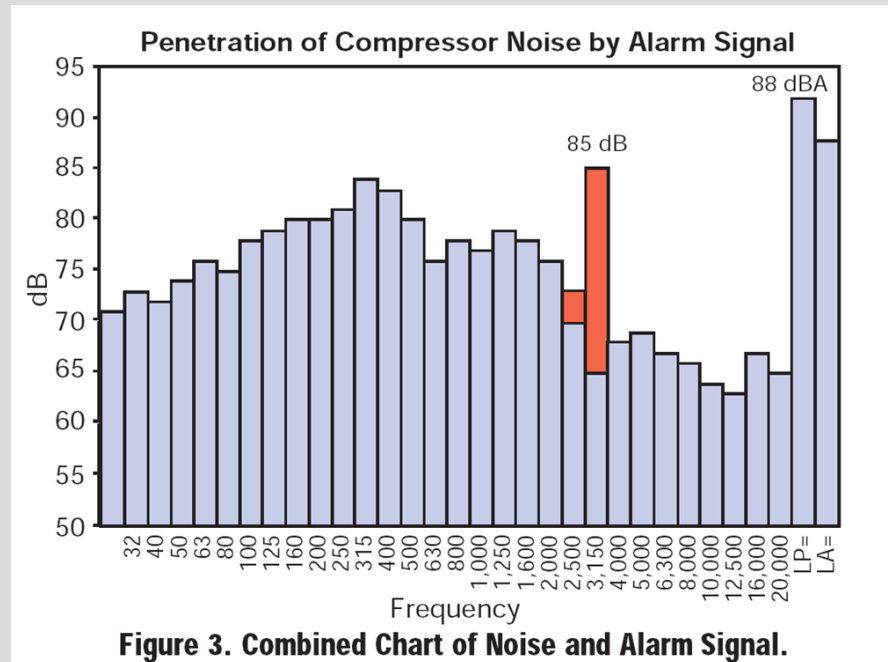
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### Chapter 18 – Notification Appliances:



## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:



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### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Analysis and design documentation for narrow band signaling shall be submitted to the AHJ and contain the following:
    - Frequency data for ambient noise, including date, time, and location of measurements for existing environments, or projected data for environments not yet constructed.
    - Frequency data of the audible notification appliance.
    - Calculations of the effective masked threshold for each set of noise data.
    - A statement of the sound pressure level that would have been required for public or private mode signaling if masked threshold signaling had not been done.

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### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Exit marking audible notification appliances shall meet or exceed the frequency and sound level settings and guidelines specified in the manufacturer’s published instructions.
  - As a minimum, to ensure that exit marking audible notification appliance signals are clearly heard and produce the desired directional effects for 50’ within an unobstructed egress path, they shall meet the audibility requirements of narrow band signaling in at least one 1/3 octave band or one octave band.
  - The exit marking audible notification appliance shall penetrate both the ambient noise and fire alarm signal.

18.4.8.1, 18.4.8.2, 18.4.8.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Where required by the AHJ, governing laws, codes, or standards; or other parts of this code, exit marking audible notification shall be located at the entrance to all building exits and areas of refuge.
  - Where exit marking audible notification appliances are utilized to mark areas of refuge, they shall provide an audible signal distinct from that used for other exits that do not have areas of refuge.

18.4.8.5, 18.4.8.6

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Audible notification appliance locations:
    - Ceiling mount.
    - Wall mounted with the top of the appliance at least 90” above the finished floor.
    - Wall mounted with the top not less than 6” below the finished ceiling.
    - Recessed mounting is acceptable.
  - Combination audible/visual notification appliances shall be installed based on the requirements for visible notification appliances.
  - Notification appliances that are part of a smoke detector or alarm, or carbon monoxide detector or alarm, or other initiating device shall be located in accordance with the requirements for that device.

18.4.9.1, 18.4.9.2, 18.4.9.3, 18.4.9.4

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Alternate mounting heights shall be permitted provided the sound pressure level requirements for public mode, private mode, or sleeping areas based on the application are met.
  - Audible notification appliances for wide-area signaling (for mass notification systems) shall be installed in accordance with the requirements of the AHJ, approved design documents, and the manufacturer’s installation instructions.

18.4.9.5, 18.4.10

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - Within the acoustically distinguishable spaces (ADS) where voice intelligibility is required, voice communications systems shall reproduce prerecorded, synthesized, or live messages with voice intelligibility.
  - ADSs shall be determined by the system designer during the planning and design of the emergency communications system.
  - Each ADS shall be identified as requiring or not requiring voice intelligibility.
  - Unless specifically required by other governing laws, codes, or standards, or by other parts of this code, intelligibility shall not be required in all ADSs.
  - Where required, ADS assignments shall be submitted for review and approval.

18.4.11, 18.4.11.1, 18.4.11.2, 18.4.11.3, 18.4.11.4

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.4 Audible Characteristics:
  - *Examples of locations where voice intelligibility might not be required:*
    - *Private bathrooms, shower rooms, saunas, and similar rooms/ areas.*
    - *Mechanical, electrical, elevator equipment rooms, and similar rooms/ areas.*
    - *Elevator cars.*
    - *Individual offices.*
    - *Kitchens.*
    - *Storage rooms.*
    - *Closets.*
    - *Rooms/areas where intelligibility cannot be reasonably be predicted.*

A18.4.11.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - The required coverage area for visual notification shall be as required by other governing laws, codes, or standards. The designer of the visual notification system shall document the rooms and spaces that will have visual notification and those that will not. Coverage shall only be provided in occupiable areas.
  - Flash rate shall be a minimum of 1 flash per second (1 Hz) and a maximum of 2 flashes per second (2 Hz) throughout the listed voltage range of the appliance.
  - Visual notification appliances used for fire alarm signaling only or to signal the intent for complete evacuation shall be clear or nominal white and shall not exceed 1000cd.
  - Visual notification appliances to signal occupants to seek information or instructions shall be clear, nominal white, or other color as required by the emergency plan and the AHJ for the area or building.

18.5.1.2, 18.5.1.3, 18.5.2.1, 18.5.3.1, 18.5.3.5, 18.5.3.6

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - The visual synchronization requirements contained in this chapter shall not apply where the visual notification appliances located inside the building are viewed from outside the building.
  - *Synchronization would be required if an atrium visually connected multiple floors.*
  - Wall-mounted appliances shall be mounted so that the entire lens is not less than 80” and not greater than 96” above the finished floor or at a mounting height specified using a performance-based alternative.
  - Where low ceiling heights do not permit wall mounting at the minimum of 80”, the appliance can be mounted at 6” below the ceiling and reduce the room spacing by 2x the difference between the minimum mounting height of 80” and the actual lower mounting height.

18.5.3.7, 18.5.5.1, 18.5.5.2, 18.5.5.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - Visible notification appliances listed for mounting parallel to the floor shall be permitted to be located on the ceiling or suspended below the ceiling.
  - The minimum mounting height of a visual notification appliance listed for ceiling mounting shall be 80” above the finished floor or the actual ceiling height, whichever is less.
  - Ceiling mount visual notification appliances shall be mounted such that the effect of the appliance is not blocked by obstructions.
  - The effect of obstructions on distribution of light from wall-mounted appliances shall be considered when determining the location of appliances.
  - The effect of obstructions on the direct viewing of corridor appliances shall be considered when determining the location of appliances.

18.5.5.4, 18.5.5.5, 18.5.5.6.1, 18.5.5.6.2, 18.5.5.6.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - Obstructions to consider include, but are not limited to:
    - Light fixtures.
    - Ductwork.
    - Structural elements.
    - Video monitors.
  - In corridors, it is the viewing of the appliance that is the concern, while in rooms it is the pattern of light produced on walls and floors that might be of concern.
  - Spacing shall be in accordance with either Table 18.5.5.7.1(a) and Figure 18.5.5.7.1 for wall mounted or Table 18.5.5.7.1(b) for ceiling mounted visible notification appliances.

A18.5.5.6, 18.5.5.7.1

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - Visible notification appliances shall be installed per Table 18.5.5.7.1(a) for wall mounted devices or Table 18.5.5.7.1(b) for ceiling mounted devices using one of the following:
    - A single visual notification appliance.
    - Two groups of visual notification appliances, where visual notification appliances of each group are synchronized, in the same room or adjacent space within the field of view. This shall include synchronization of visual appliances operated by separate systems.
    - More than two visual notification appliances or groups of synchronized appliances in the same room or adjacent space within the field of view that flash in synchronization .

18.5.5.7.2

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - Strobes are not required to be synchronized when there are only two in a field of view. This permits groups of strobes from different systems to be installed in the same field of view, as long as each group is synchronized within the group, and there are not more than two groups in a field of view.

A18.5.5.7.2(2)

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### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - Room spacing in accordance with Table 18.5.5.7.1(a) and Figure 18.5.5.7.1 for wall mounted appliances shall be based on mounting the appliance at the halfway distance of the wall.
  - In square rooms with appliances not centered, or in non-square rooms, the cd is calculated by a room size measured by the distance to the far wall, or double the distance to the far adjacent wall, whichever is greater.
  - Table 18.5.5.7.1(b) shall be used if the ceiling mounted visual notification appliance is at the center of the room. If the appliance is not located at the center of the room, the cd is calculated by a room size measured by doubling the distance from the appliance to the far wall to obtain the maximum room size.

18.5.5.7.3, 18.5.5.7.4, 18.5.5.7.7, 18.5.5.7.8

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### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - If ceiling heights exceed 30', ceiling mounted visual notification appliances shall be suspended at or below 30', or at the mounting height determined using the performance-based alternative, or wall mounted visual notification appliances shall be used.

18.5.5.7.6

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### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - The installation of visual notification appliances in corridors 20’ or less in width:
    - Room spacing tables **or** the corridor spacing requirements of this section may be used.
    - The visual notification appliances shall be rated not less than 15cd.
    - Corridors greater than 20’ in width shall comply with the spacing requirements for rooms.
    - Visual notification appliances shall be located not more than 15’ from the end of a corridor with a separation not greater than 100’ between appliances.

18.5.5.8.1, 18.5.5.8.3, 18.5.5.8.4

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - The installation of visual notification appliances in corridors 20’ or less in width:
    - If there is an interruption of the viewing path (fire door, change in direction) the area shall be treated as a separate corridor.
    - Where more than two visual notification appliances are in any field of view, they shall flash in synchronization.
    - Visual notification appliances in corridors shall be permitted to be mounted on the ceiling, end wall, or side wall of the corridor.

18.5.5.8.6, 18.5.5.8.7, 18.5.5.8.8

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - Performance-based spacing/mounting alternative:
    - Any design that provides at least .0375 lumens per square foot of illumination at any point within a covered area at all angles specified by the polar dispersion planes for wall- or ceiling-mounted public mode visual notification appliances in UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories*, or equivalent, as calculated for the maximum distance from the nearest visual notification appliance, shall be permitted in lieu of 18.5.5, excluding sleeping areas.
    - *Strobe manufacturers typically provide the necessary software for these calculations.*

18.5.5.9.1

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

Calculations Report for CEILING mounted strobes  
 Room Size: 68 Ceiling Height: 40. Rated Candela: 177

UL Angle (on axis = 0)	UL Angle (radians)	UL Wall% Vertical/ Horizontal	Lumens/sqft Horizontal/ Vertical
0	0.000	100	0.111
5	0.087	90	0.099
10	0.175	90	0.097
15	0.262	90	0.093
20	0.349	90	0.088
25	0.436	90	0.082
30	0.524	75	0.062
35	0.611	75	0.056
40	0.698	75	0.049
45	0.785	75	0.057
50	0.873	55	0.049
55	0.960	45	0.046
60	1.047	40	0.046
65	1.134	35	0.044
70	1.222	35	0.047
75	1.309	30	0.043
80	1.396	30	0.045
85	1.484	25	0.038
90	1.571	25	0.038

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.5 Visual Characteristics – Public Mode:
  - Sleeping areas:
    - Visual notification appliances installed less than 24" from the ceiling shall be 177cd.
    - Visual notification appliances installed 24" or more from ceiling shall be 110cd.
    - For rooms with a linear dimension greater than 16', the visual notification appliances shall be located within 16' of the pillow.

Table 18.5.5.10.3, 18.5.5.10.4

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.8 Textual Audible Appliances:
  - Speakers shall comply with the audible notification appliance requirements. The sound pressure level of the tone produced by a speaker shall comply with all the requirements of public, private, or sleeping areas or shall comply with the requirements for narrow band signaling.
  - Telephone appliances (two-way, in-building wired emergency services communications devices, i.e. fire fighter phones and jacks) shall comply with section 24.8.
    - Fire fighter phones or jacks shall be installed not less than 36” and not more than 66” above floor level with clear access to the appliance that is at least 30” wide.
    - If accessible to the general public, mounting height shall not be more than 48” above floor level.

18.8.1.1, 18.8.1.2, 18.8.2

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.9 Textual and Graphical Visual Appliances:
  - Textual and graphical visual appliances shall be permitted to be used to signal information about fire and other emergency conditions, or to direct intended responses to those conditions.
  - Textual and graphical visual information should be of a size and visual quality that is easily read.
  - Textual visual appliance messages shall be permitted to be static, flashing, or scrolling.

A18.9, 18.9.1.1, 18.9.1.3

## NFPA 72, 2022 Edition

### Chapter 18 – Notification Appliances:

- 18.10 Tactile Appliances:
  - Tactile appliances (pillow shaker, etc.) shall be permitted if used in addition to audible and/or visual notification appliances.
  - Tactile appliances shall meet the performance requirements of UL 1971, *Signaling Devices for the Hearing Impaired*, or equivalent.

18.10.1, 18.10.2

END OF PERIOD 2 – MODULE 3