

BFAAM Apprenticeship Program

Period 2

Related Training Instruction (RTI)

Module 3 – NFPA 72 – Notification Appliances

Reading material associated with this
module: Chapter 18 of NFPA 72, *National Fire
Alarm Code*, 2013 edition

Notification Appliances

General

- Chapter 18 covers:
 - Performance, location and monitoring of notification appliances
 - Performance, location and monitoring of annunciators, displays and printers
- Purpose is to initiate emergency action and provide information

18.1.3, 18.1.4

Notification Appliances

General

- Appliances shall be listed for the purpose for which they are used, and for the environment in which they are located
- Notification appliances used for signaling other than fire shall not have the word FIRE displayed in any form on the appliance

18.3.1, 18.3.3.1, 18.3.3.2

Notification Appliances

General

- Appliances subject to physical damage shall be protected 18.3.4.1
- If guards, covers or lenses are employed, they shall be listed with the appliance 18.3.4.2
- The effect of guards, etc. on the performance of the device shall be addressed as specified in the listing of the guard, etc. 18.3.4.3

Notification Appliances

General

- Appliances shall be supported independently of their circuit conductors 18.3.5.1
- Shall be mounted in accordance with the manufacturers instructions 18.3.5.2
- Shall be provided with terminals or leads to provide for the monitoring integrity of the wiring connections 18.3.6

Notification Appliances

Audible

- Average ambient sound level greater than 105 dBA - use visual signals instead 18.4.1.1
- Total sound pressure level of ambient and audible notification levels shall not exceed 110 dBA 18.4.1.2
- Sounds lasting more than 60 seconds shall be included in the ambient sound level, unless they are temporary in nature 18.4.1.3

Notification Appliances

Audible

- Where required, voice communications systems shall be capable of providing messages with voice intelligibility 18.4.1.5
- Voice messages are not required to meet the audibility (volume) requirements for public mode, private mode, or narrow band signaling 18.4.1.5

Notification Appliances

Audible

- Exit marking appliances are not required to meet the audibility (volume) requirements for public mode, private mode, or narrow band signaling

18.4.1.6

Notification Appliances

Audible

- Audible evacuation signal shall comply with ANSI S3.41 (Code 3 temporal) standard
- Exception: Where approved by the AHJ, use of an existing consistent evacuation signal scheme shall be permitted

18.4.2.1

Notification Appliances Audible

- 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 18.4.3.1

Notification Appliances Audible

- With the approval of the AHJ, audible signaling requirements may be reduced or eliminated when visible signaling is provided
18.4.3.2
- With the approval of the AHJ, appliances installed in restrooms can use the private mode requirements instead of the public mode
18.4.3.4

Notification Appliances

Audible

- Speakers installed in elevator cars are permitted to use the private mode requirements instead of the public mode

18.4.3.3

- The fire alarm system may shut down sources of ambient noise to reduce the ambient sound level

18.4.3.5

Notification Appliances Audible

- If the system reduces the ambient sound level, it shall operate at 15 dBA above the reduced ambient sound level 18.4.3.5.1
- If the system reduces the ambient sound level, strobes shall be provided in the affected area 18.4.3.5.2

Notification Appliances Audible

- Private mode audibility requirement is 10 dBA over average ambient sound level or 5 dBA above the maximum sound level of at least 60 seconds. The louder of the two measurements shall be selected 18.4.4.1

Notification Appliances Audible

- Private mode signaling has the same options as public mode signaling, such as:
 - Reduction or elimination of audibles when strobes are used
 - Reduction of ambient sound levels by shutting down sources of ambient noise

18.4.4.3

Notification Appliances

Audible

- Sleeping areas require public mode audibility levels, with a sound level of at least 75 dBA measured at the pillow level

18.4.5.1

- Sleeping areas require 520 Hz square wave alarm signals

18.4.5.3

Notification Appliances Audible Narrow Band Signaling

- NBS is an alternative to the Public Mode audibility requirement of 15 dBA over ambient
- Useful for large facilities with high ambient noise levels, as the Public Mode requirement is a simplified method that can result in required dBA levels far in excess of what is needed for occupant notification

18.4.6

Notification Appliances Audible Narrow Band Signaling

- NBS 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
- Requirement is 10 dB over ambient in one octave band, or 13 dB over ambient in a 1/3 octave band

18.4.6.5.1, .2

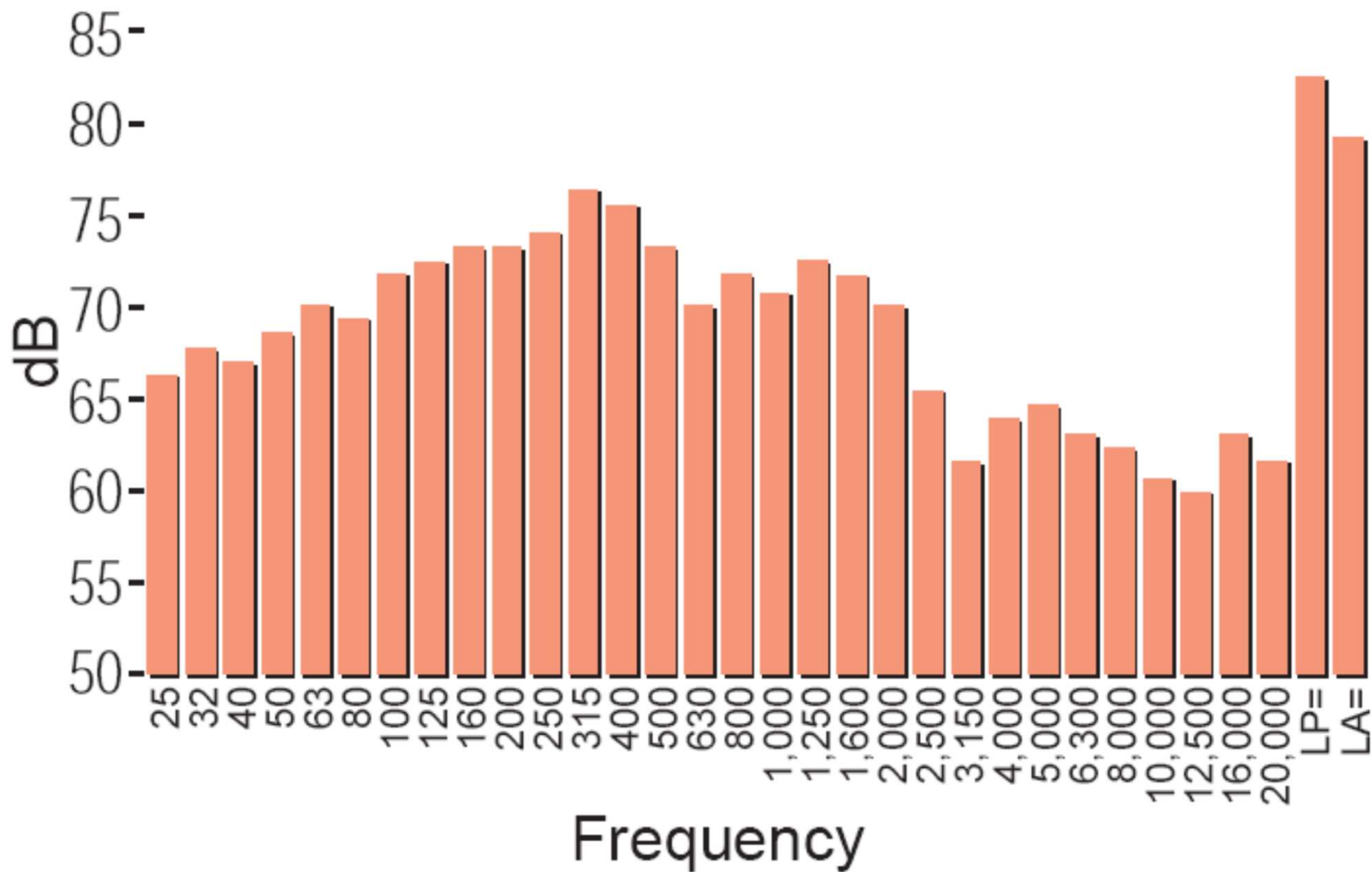


Figure 5. Compressor Room Noise.

Alarm Signal

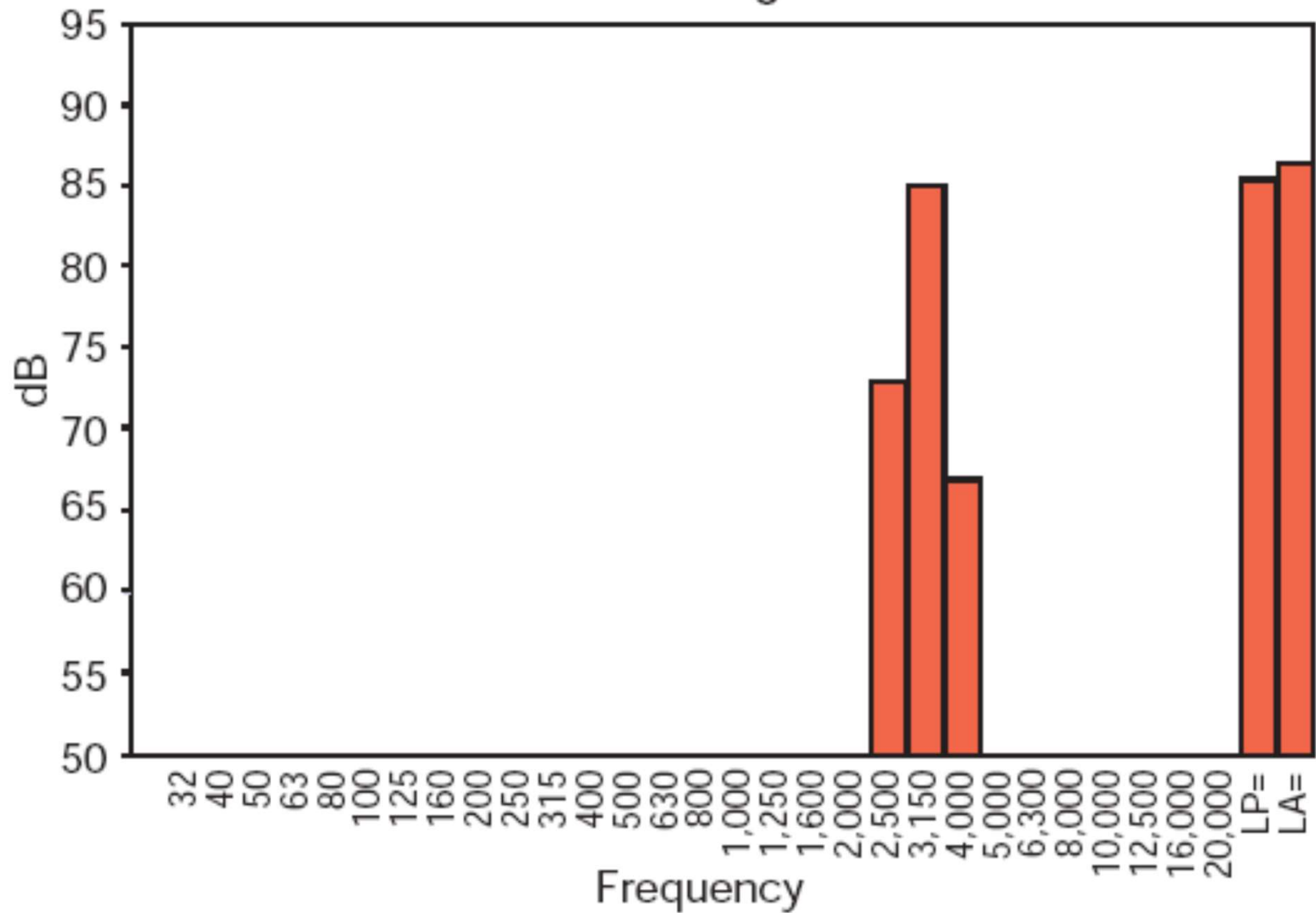


Figure 2. Fire Alarm Signal.

Penetration of Compressor Noise by Alarm Signal

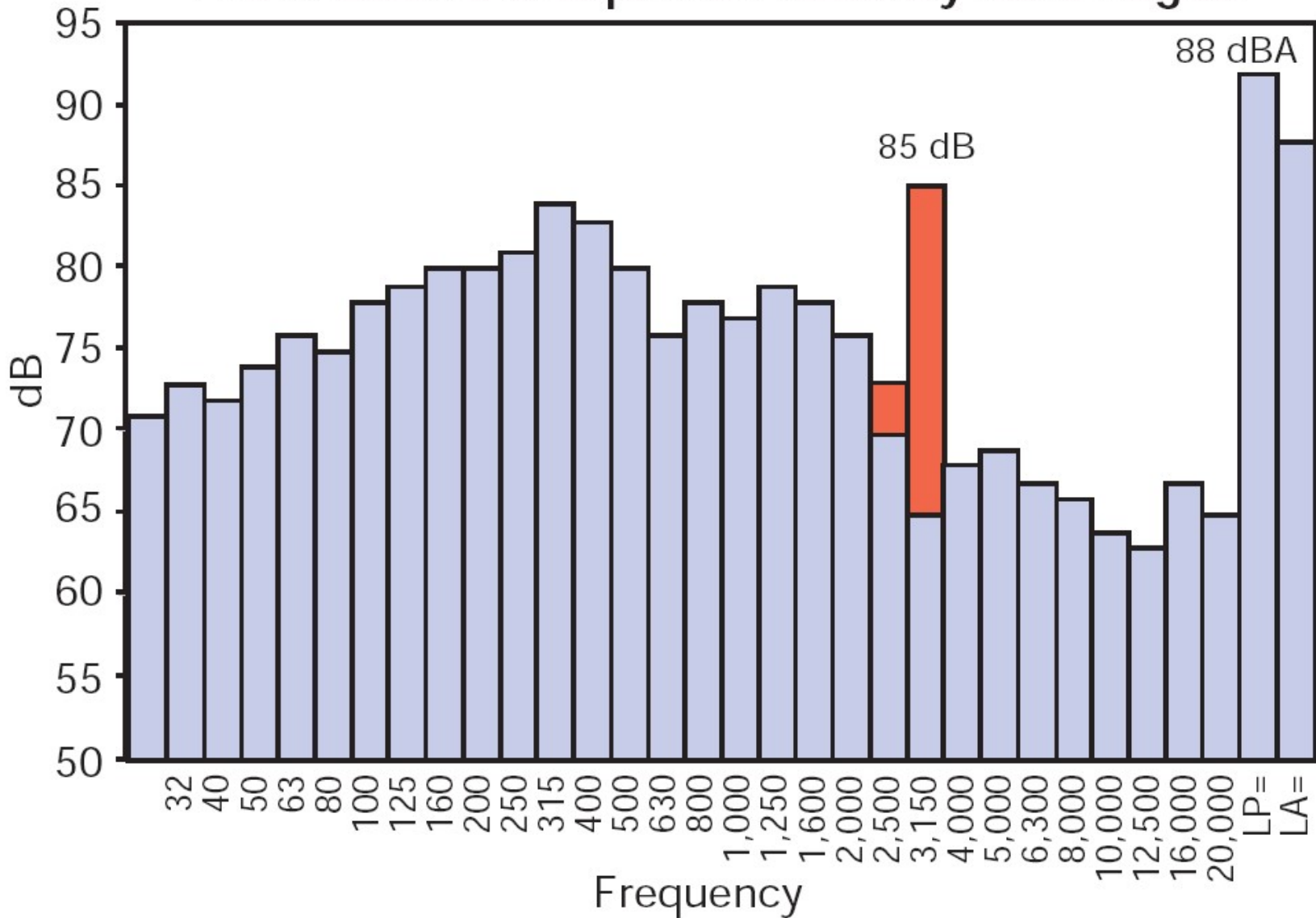


Figure 3. Combined Chart of Noise and Alarm Signal.

Notification Appliances Audible Narrow Band Signaling

■ Documentation:

- Frequency data for ambient noise, including date, time, and location of measurements for existing environments, or projected data for future environments
- Frequency data for notification appliance
- Calculations documenting compliance with Chapter 7 requirements
- Statement of what Public Mode requirements would have been

18.4.6.4

Notification Appliances Audible Narrow Band Signaling

- Sound pressure level requirements apply only to the tone portion of the signal, not to the reproduction of pre-recorded, synthesized, or live voice messages 18.4.6.5
- Real world benefits include optimized notification and substantial reductions in speaker volume and amplification requirements

Notification Appliances Audible Exit Marking Appliances

- Shall meet or exceed frequency and sound level settings specified in the manufacturers instructions 18.4.7.1
- Shall comply with Narrow Band Signaling requirements, and shall penetrate both the ambient noise and the fire alarm notification appliance sound 18.4.7.2

Notification Appliances Audible Exit Marking Appliances

- Shall be located at all exits and areas of refuge 17.4.7.4
- Areas of refuge appliances shall have a sound distinctive from exits 18.4.7.5

Notification Appliances

Audible

- Location of audible appliances:
 - Ceiling mount
 - Wall mounted with top of appliance at least 90" from floor
 - Wall mounted with top of appliance at least 6" below ceiling
 - Recess mounting acceptable 18.4.8
- Combination audible/visible appliances play by visible appliance rules 18.4.8.3

Notification Appliances

Audible

- Alternate mounting heights shall be permitted provided the sound pressure level requirements are met 18.4.8.5
- Wide area signaling appliances (for Mass Notification Systems) shall be installed per the approved design documents and manufacturers installation instructions 18.4.9

Notification Appliances

Speaker Intelligibility

- Within acoustically distinguishable spaces (ADS) where voice intelligibility is required, systems shall reproduce pre-recorded, synthesized, or live intelligible messages 18.4.10
- ADS's shall be determined by the system designer during the design of all emergency communications systems 18.4.10.1

Notification Appliances

Speaker Intelligibility

- Each ADS shall be identified as requiring or not requiring voice intelligibility 18.4.10.2
- Unless specifically required by other laws, codes or standards, intelligibility shall not be required in all ADS's 18.4.10.2.1
- Where required, ADS assignments shall be submitted for review and approval 18.4.10.3

Notification Appliances Visible

- Flash rate shall be a minimum of 1 flash per second (1 Hz) and a maximum of 2 flashes per second (2 Hz) 18.5.3.1
- Strobe lens for fire alarm use shall be clear or white, with a maximum candela of 1000 cd 18.5.3.4
- Strobe lens for other use are permitted to be clear, white or other color 18.5.3.5

Notification Appliances Visible

- Mounting height is based on the lens, which must be between 80" and 96" above the floor 18.5.5.1
- Performance based method permitted to determine other mounting height 18.5.5.1
- For low ceilings, mount at 6" below ceiling and reduce room spacing by 2x the difference between actual and required mounting height 18.5.5.2

Notification Appliances Visible

- Spacing in rooms shall be per either ceiling mount or wall mount table, and be:
 - A single appliance
 - Two appliances located on opposite walls
 - Two groups of appliances where each group is synchronized
 - More than two appliances or groups that are synchronized together

18.5.5.4.2

Notification Appliances Visible

- 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.

A-18.5.5.4.2(2)

Notification Appliances Visible

- Strobe synchronization is only intended for viewing inside the building. Synchronization between floors of a building shall not be required when multiple floors of a building can only be viewed from outside the building. Synch would be required if an atrium visually connected multiple floors

18.5.3.6

Notification Appliances Visible

- Room spacing tables for wall mount appliances are based on mounting the appliance at the halfway distance of the wall
- If appliances are not centered on the wall, 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

18.5.5.4.4

Notification Appliances Visible

- Room spacing tables for ceiling mount appliances are based on mounting the appliance in the center of the room
- If the appliance is not centered in the room, the cd is calculated by a room size measured by doubling the distance from the appliance to the far wall

18.5.5.4.7

Notification Appliances Visible

- If ceiling heights exceed 30', ceiling mount strobes shall be suspended at 30' (or a performance based alternative may be used)

18.5.5.4.6

Notification Appliances Visible

- Spacing strobes in corridors up to 20' wide:
 - Room spacing tables may be used, or
 - Strobes must be at least 15 cd
 - A strobe shall be installed within 15' of the end of a corridor
 - Separation between strobes shall not exceed 100'

18.5.5.5

Notification Appliances Visible

- Spacing strobes in corridors up to 20' wide:
 - Any obstruction in the corridor or change in direction shall be treated as a separate corridor
 - Where more than 2 strobes are in any field of view, they shall be synchronized
 - Strobes can be mounted on either the end wall or side wall of corridors
 - Corridors over 20' are treated as rooms for strobe spacing

18.5.5.5

Notification Appliances Visible

- Performance based spacing/mounting alternative:
 - Design must provide at least .0375 lumens per square foot of illumination, at all angles in the polar dispersion planes referenced by UL 1971
 - Strobe manufacturers typically provide software for this calculation

18.5.5.6

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

Notification Appliances Visible

- Sleeping areas:

- Appliances installed within 24" of the ceiling shall be 177 cd
- Appliances installed 24" or more from ceiling shall be 110 cd
- Appliances shall be installed within 16' of the pillow

18.5.5.7

Notification Appliances

Textual Audible

- Speakers shall comply with the audible notification appliance requirements 18.8.8.1
- Firefighter phones or jacks shall be installed between 36" and 66" above the floor with 30" of clear access. Where accessible to the general public, mounting height shall not exceed 48" 18.8.2

Notification Appliances

Textual Visible

- Textual visible appliances are permitted, and shall produce legible information
- Tactile appliances are permitted, and shall comply with UL 1971

18.9

BFAAM Apprenticeship Program

Period 2

Reading Assignment for
Module 4 – NFPA 72 – Protected Premises

Reading material associated with this
module: Chapters 21, 23 and 24 of NFPA 72,
National Fire Alarm Code, 2013 edition