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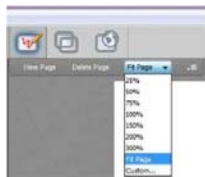
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Accessible Fire Alarm Systems

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Presenters



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Scoping

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Where Required (§215.1 & §F215.1)

New construction:

“Where fire alarm systems provide audible alarm coverage, alarms shall comply with §215.”

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Where Required (§215.1 & §F215.1)

Existing Facilities:

“EXCEPTION: In existing facilities, visible alarms shall not be required except where an existing fire alarm system is upgraded or replaced, or a new fire alarm system is installed.”

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Where Required (§215.2 & §F215.2)

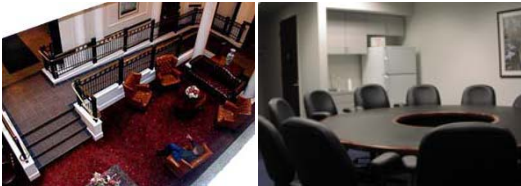
Public and Common Use Areas:

Areas of a facility open to the general public and employee areas not used solely for work must meet the standard if protected by a fire alarm system.

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Where Required (§215.2 & §F215.2)

Public and Common Use Areas:



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Where Required (§215.3 & §F215.3)

Employee Work Areas:

“Where employee work areas have audible alarm coverage, the wiring system shall be designed so that visible alarms complying with §702 can be integrated into the alarm system.”

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Where Required (§215.3 & §F215.3)

Employee Work Areas:



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Where Required (§215.4 & §F215.4)

Transient Lodging Facilities:

“Guest rooms required to comply with §224.4 or §F224.4 shall provide alarms complying with §702.”

§224.4 & §F224.4 covers Transient lodging room requiring accessible communication features.

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Where Required (§215.4 & §F215.4)

Transient Lodging Facilities:



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Where Required (§215.5 & §F215.5)

Residential Facilities:

“Where provided in residential dwelling units required to comply with §809.5, alarms shall comply with §702.”

§809.5 covers residential dwelling units with communication features.

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Technical Requirements

Fire Alarms §702

“Fire alarm systems shall have permanently installed audible and visible alarms complying with NFPA 72 (1999 or 2002 edition)”

Fire Alarms §702



Audible and Visual Combination Appliance

Fire Alarms §702



Audible Horn Speaker

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Fire Alarms §702



Visible Alarm Appliance

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Medical Facilities §702.1

“EXCEPTION: Fire alarm systems in medical care facilities shall be permitted to be provided in accordance with industry practice.”

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Transient Lodging Facilities §806.3

“Where emergency warning systems are provided, alarms complying with §702 shall be provided.”

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Residential Facilities §809.5.1

“Where a building fire alarm system is provided, the system wiring shall be extended to a point within the residential dwelling unit in the vicinity of the residential dwelling unit smoke detection system.”

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Residential Facilities §809.5.1

“Where alarm appliances are provided within a residential dwelling unit as part of the building fire alarm system, they shall comply with §702.”

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Residential Facilities §809.5.2

“Residential dwelling unit smoke detection systems shall comply with NFPA 72.”

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Residential Facilities §809.5.2

“All visible alarm appliances provided within the residential dwelling unit for smoke detection notification shall be activated upon smoke detection.”

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Smoke Alarms §809.5.2.1



Hardwired Smoke Alarm with Visible Strobe

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Fire Alarm Pulls §205, §F205, & §309



- Operable with one hand
- Not require tight grasping, pinching, or twisting of the wrist
- Maximum force required of 5 pounds to activate

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NFPA 72

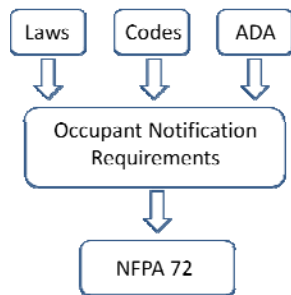
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NFPA 72 National Fire Alarm Code

Requirements for Notification
Appliances
(2002 Edition)

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Codes and Standards



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Codes and Standards

- NFPA Codes
 - NFPA 101 *Life Safety Code* www.nfpa.org/101
 - NFPA 5000 *Building Construction and Safety Code* www.nfpa.org/5000
 - NFPA 1 *Fire Code* www.nfpa.org/1
- NFPA "Installation Standards"
 - NFPA 13, *Standard for the Installation of Sprinkler Systems* www.nfpa.org/13
 - NFPA 72, *National Fire Alarm and Signaling Code* www.nfpa.org/72

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Codes and Standards

- What edition of the installation standard should be used?
 - The edition being enforced
 - By reference from law, code or ADA
- The ADA and ABA Accessibility Guidelines for Buildings and Facilities
 - The 2002 edition of NFPA 72

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Occupant Notification

- What is needed?
 - From laws, codes and ADA
 - Usually depends on occupancy
- Possibilities
 - Audible (tone, voice)
 - Visible (strobe, textual)
 - Often both audible and visible signaling is required
- Off site forces notification
 - May be required

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Audible Notification Appliances

- Types of audible notification
 - Operating modes
 - Public mode – see 3.3.122.2
 - Private mode – see 3.3.122.1
 - Audible signals (tones) – chimes, bells, horns or speakers
 - Audibility (sound pressure level)
 - Voice communications – speakers
 - Intelligibility (not audibility)

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Audible Notification Appliances

- Audibility – 7.4.1 (general requirements)
 - Average ambient sound levels greater than 105 dBA require visible signaling
 - Average ambient sound level – see 3.3.18
 - Total sound pressure level (ambient + alarm) can not exceed 120 dBA - changed later to 110 dBA
 - Sound pressure level is measured using the A-weighted scale (dBA)

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Audible Notification Appliances

- Audibility – 7.4.2 (public mode)
 - General areas – the greater of:
 - 15 dB above average ambient sound level
 - 5 dB above the maximum sound pressure level having a duration of at least 60 minutes
 - Measure 5 feet above the floor
 - Continued, next slide

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Audible Notification Appliances

- Audibility – 7.4.2 (public mode)
 - Allowances to reduce or eliminate audible signal
 - Must be approved and must use visible signaling
 - Allowances to use private mode
 - Elevators and bathrooms
 - Allowance to stop or reduce ambient noise
 - Must be approved and must use visible signaling

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Audible Notification Appliances

- Audibility – 7.4.3 (private mode)
 - General areas – the greater of:
 - 10 dB above average ambient sound level
 - 5 dB above the maximum sound pressure level having a duration of at least 60 minutes
 - Measure 5 feet above the floor
 - Allowances to reduce or eliminate audible signal
 - Must be approved and must use visible signaling
 - Allowance to stop or reduce ambient noise
 - Must be approved and must use visible signaling

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Audible Notification Appliances

- Audibility – 7.4.4 (sleeping areas)
 - Sleeping areas – the greater of:
 - 15 dB above average ambient sound level
 - 5 dB above the maximum sound pressure level having a duration of at least 60 minutes
 - 75 dBA minimum
 - Measure at pillow level
 - Measure with doors closed or barriers in place

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Audible Notification Appliances

- Audibility – 7.4.6 (location of appliances)
 - Listed wall-mounted
 - Tops at least 90 inches above finished floor
 - Tops at least 6 inches below the ceiling
 - Combination horn/strobe must follow mounting requirements for visible signaling in 7.5.4
 - Listed ceiling-mounted permitted
 - Location/spacing
 - Any location/spacing that results in the required audibility (public mode, private mode, sleeping area) in the occupiable area

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Audible Notification Appliances

- Narrow Band Tone Signaling – 7.4.5
 - Can be used instead of public mode or private mode audibility requirements
 - Use for troublesome situations
 - high ambient levels such as machinery areas
 - Requires narrow band analysis

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Audible Notification Appliances

- Voice communications – 7.4.1.4
 - Voice Intelligibility
 - Free from distortion, capable of being understood
 - Guidance in A.7.4.1.4
 - Not the same as audibility
 - Requirements and guidance completely updated in the 2010 & 2013 editions – see later slides

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Visible Notification Appliances

- Types of visible notification
 - Operating modes
 - Public mode (strobes)
 - Private mode (control unit displays, etc)
 - Public mode visible signaling – strobes
 - Indirect viewing – spacing in rooms
 - Direct viewing – spacing in corridors
 - Textual and graphical displays

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Visible Notification Appliances

- Basic requirements for strobes – 7.5.2, 7.5.3
 - Flash rate must be between 1 and 2 flashes per second
 - Color must be clear or white
 - Must be listed to ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired*
 - Strobe ratings are given as Effective Intensity (cd)

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Visible Notification Appliances

- Wall-mounted strobes
 - Mounting – 7.5.4
 - Bottom of lens at least 80 inches above floor
 - Top of lens not more than 96 inches above floor
 - Indirect viewing – room spacing – 7.5.4.1
 - Use wall-mounted spacing table
 - See next set of slides

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Visible Notification Appliances

Table 7.5.4.1.1(a) Room Spacing for Wall-Mounted Visible Appliances

Maximum Room Size		Minimum Required Light Output (Effective Intensity, cd)		
		One Light per Room	Two Lights per Room (Located on Opposite Walls)	Four Lights per Room (One Light per Wall)
m	ft			
6.10 × 6.10	20 × 20	15	NA	NA
8.53 × 8.53	28 × 28	30	Unknown	Unknown
9.14 × 9.14	30 × 30	34	15	NA
12.2 × 12.2	40 × 40	60	30	15
13.7 × 13.7	45 × 45	75	Unknown	Unknown
15.2 × 15.2	50 × 50	94	60	30
16.5 × 16.5	54 × 54	110	Unknown	Unknown
18.3 × 18.3	60 × 60	135	95	30
21.3 × 21.3	70 × 70	184	95	60
24.4 × 24.4	80 × 80	240	135	60
27.4 × 27.4	90 × 90	304	185	95
30.5 × 30.5	100 × 100	375	240	95
33.5 × 33.5	110 × 110	455	240	135
36.6 × 36.6	120 × 120	540	300	135
39.6 × 39.6	130 × 130	635	375	185

NA = Not allowable.

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Visible Notification Appliances

ft	One Light per Room
20 × 20	15
28 × 28	30
30 × 30	34
40 × 40	60
45 × 45	75
50 × 50	94
54 × 54	110
60 × 60	135
70 × 70	184
80 × 80	240
90 × 90	304
100 × 100	375
110 × 110	455
120 × 120	540
130 × 130	635

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Visible Notification Appliances

- Square rooms – 7.5.4.1.3
 - The maximum room size for wall-mounted strobes assumes the appliance is mounted at the halfway distance on the wall
 - See next slide for square room configuration

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Visible Notification Appliances

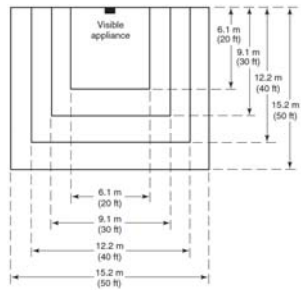


FIGURE 7.5.4.1.1 Room Spacing for Wall-Mounted Visible Appliances.

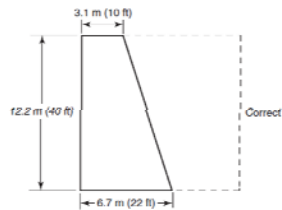
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Visible Notification Appliances

- Non-square or large rooms – 7.5.4.1.5
 - If the room is not square or is very large, subdivide the room into squares that will work
 - See next two slides

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Visible Notification Appliances



Note: Broken lines represent imaginary walls.

FIGURE A.7.5.4.1(a) Irregular Area Spacing.

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Visible Notification Appliances

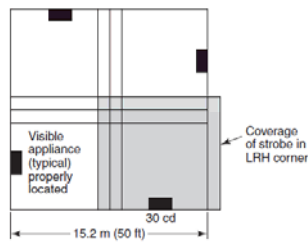


FIGURE A.7.5.4.1(c) Room Spacing Allocation — Correct.

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Visible Notification Appliances

- Ceiling-mounted strobes – 7.5.4.1.6
 - Mounting
 - Mount on the ceiling
 - Suspend below the ceiling
 - Indirect viewing – room spacing
 - Use ceiling-mounted spacing table
 - 30 feet maximum height above floor
 - See next slide

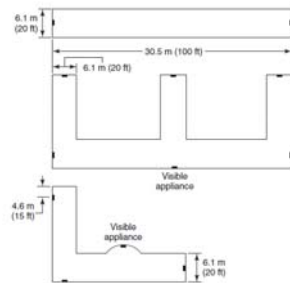
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Visible Notification Appliances

- Direct viewing – spacing in corridors – 7.5.4.2
 - Corridors 20 ft wide or less
 - Strobe rating 15 cd minimum
 - Strobe spacing 100 ft maximum
 - Strobe within 15 ft from the end of the corridor
 - Interruption in viewing path treated as new corridor
 - See next slide

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Visible Notification Appliances



| FIGURE A.7.5.4.2 Corridor Spacing for Visible Appliances.

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Visible Notification Appliances

- Synchronization
 - More than two strobes in the same room or space within the field of view require synchronization
 - Two or less **do not** require synchronization

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Visible Notification Appliances

- Sleeping areas – 7.5.4.4
 - Special rules apply
 - Wall-mounted appliances must still comply with 7.5.4 for mounting height
 - Appliances must be located within 16 ft of the pillow
 - High intensity strobes must be used
 - 177 cd if within 24 inches of ceiling
 - 110 cd if greater than 24 inches of ceiling

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Updated Requirements

- Strobe synchronization
 - 2007 and later editions of NFPA 72
 - Groups of synchronized strobes
 - Where appliances in each group are synchronized, two groups can be used without the need to synchronize the two groups
 - Must include groups from any system

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Updated Requirements

- Low frequency audible signals - commercial
 - 2010 and later editions of NFPA 72 – 18.4.5.3
 - Audible appliances for sleeping areas
 - Audible appliances of commercial systems
 - Effective January 1, 2014
 - 520 Hz \pm 10% fundamental frequency
 - Square wave or equivalent awakening ability

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Updated Requirements

- Low frequency audible signals - household
 - 2010 and later editions of NFPA 72 – 29.3.8
 - For those with mild to severe hearing loss
 - Where required by governing laws, codes or standards or where installed voluntarily
 - Effective with code adoption
 - 520 Hz \pm 10% fundamental frequency
 - Square wave or equivalent awakening ability
 - Those with moderately severe to profound hearing loss
 - Use strobes and tactile appliances

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Updated Requirements

- New requirements for voice intelligibility
 - 2010 and later editions of NFPA 72 – 18.4.10
 - Acoustically Distinguishable Space (ADS)
 - New defined term – see Chapter 3
 - Not all spaces must have voice intelligibility
 - ADS assignments must be determined and documented by system designer
 - New Annex D Speech Intelligibility
 - Provides design and testing guidance

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Updated Requirements

- New design requirements
 - 2013 edition of NFPA 72
 - Audible appliances – 18.4.1.4
 - Designer must identify areas that need appliances
 - For covered areas the designer must document
 - expected ambient sound levels
 - design sound levels of audible appliances
 - Visible appliances – 18.5.2
 - Designer must document areas that need appliances
 - Designer must provide cd ratings for AHJ review, if requested

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Updated Requirements

- Textual and Graphical Visible Appliances
 - 2010 and later editions of NFPA 72
 - Types of displays
 - Location of displays
 - Display height
- Character & symbol requirements
 - Size versus viewing distance
 - Style & spacing

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Questions?

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