

Notification

- Describe the requirements for audible notification appliances.
- Select notification signals that are code compliant.
- Determine the appropriate sound level and frequency of audible alerts.



Notification Systems

- Provide emergency information both audibly and visually
- Required alerts regardless of the presence of people
- Distinct for all emergencies



Audible Notification

- Zones and building wide
- Public and private modes
- **Silencing**
 - Pre-signal
 - Controlled access
 - Still visible
- 2-way communication
 - Fire Command Center
 - Areas of refuge
 - Firefighters



Audible Appliances

- Rating of audible appliances
 - Sound pressure level (SPL)
 - Measurement in decibels (dB)
 - Can be adjusted to account for the way people here
<http://www.szynalski.com/tone-generator/>
 - G4, A4, F4, F3, C4
 - 20-20,000 Hz
 - Typically high-pitched sounds are heard better than low
 - Low pitches can be better in some situations
 - Audible appliance ratings are stated as a certain (SPL) at a distance of 10 feet



Audible Appliances

- The rating varies depending upon the location conditions
 - Example
 - Concrete block walls and tile floor will probably be louder than the same device installed in a space with wood walls, carpet and acoustical tile ceiling
- Additional factors affecting performance
 - Net (SPL) produced throughout the entire protected area
 - Sound reflection off surfaces (reverberation)
 - Sound pressure levels decrease by approximately 6 dB every time the distance from the source is doubled



Audible Appliances

- Fire alarm audible design goals
 - How loud should it be?
 - Measure ambient noise
 - The average sound pressure level during the time the area is occupied
 - The maximum sound pressure level that last 60 seconds or more
 - Both must measured
- Public mode
 - 5 dB above any ambient noise that lasts 60 seconds or more
 - 15 dB above the average
 - Whichever is greater
- Private mode
 - 5 dB above any ambient noise that lasts 60 seconds or more
 - 10 dB above the average whichever is greater



Audible Appliances

- Residential buildings
 - Require more soundproofing
 - Most challenging scenarios for fire alarm design
 - Audible appliances needed in each sleeping room
 - In offices and schools alarms only in corridors
 - 520 Hz
 - ≥ 75 dB outside sleeping
- Audible requirements
 - Maximum allowable SPL a 110 dB
 - Threshold of pain 130 dB
 - Sound level meter

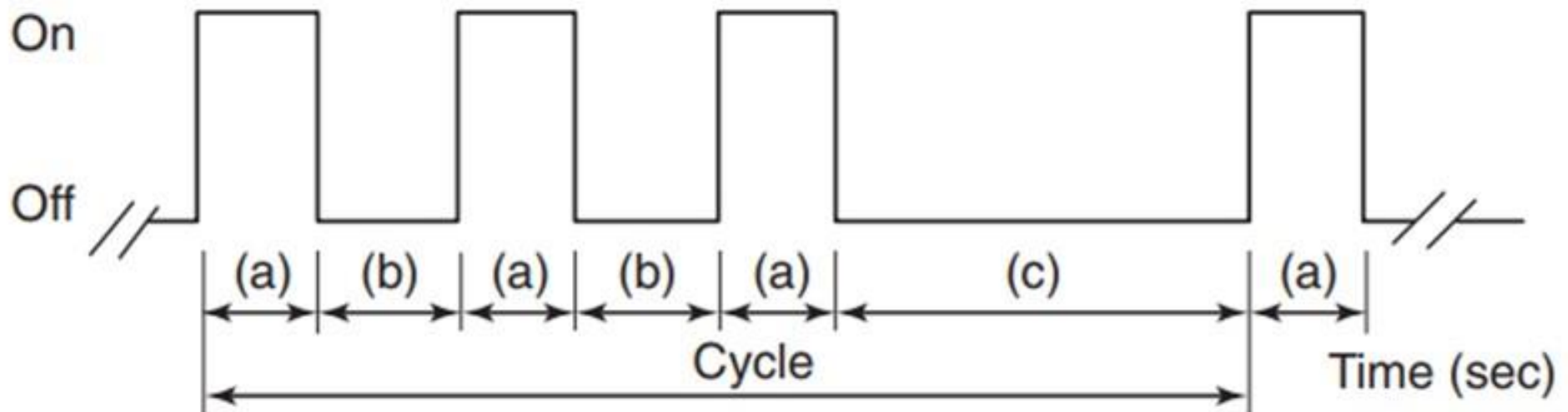


Audible Appliances

- Audible emergency evacuation
 - Common tone is referred to as T-3 signaling
 - Figure 14.3.4 in NFPA handbook
 - Type of signal is not important (i.e. bell, horn, etc.) provided it is not used for any purpose other than a fire alarm system
 - If system instructs relocation of people or to simply inform of a non-fire emergency, a different signal must be used



Three-Pulse Temporal Pattern



Key:

Phase (a) signal is on for 0.5 sec $\pm 10\%$

Phase (b) signal is off for 0.5 sec $\pm 10\%$

Phase (c) signal is off for 1.5 sec $\pm 10\%$ [(c) = (a) + 2(b)]

Total cycle lasts for 4 sec $\pm 10\%$



Ambient Sound Levels

- Typical occupancy values

- Assembly 55 dB
- Business 55 dB
- Educational 45 dB
- Industrial 80 dB
- Institutional 50 dB
- Mercantile 40 dB
- Residential 35 dB
- Storage 30 dB

- Attenuation

- Open door 5 dB
- Hollow core door 10 dB
- Solid core door 20 dB
- Gasket door 24 dB
- Stud wall 41 dB
- 2x distance 6 dB



Audible Appliance Installation

- Location, location, location
 - Specific distance at which alarms will be clearly heard
 - Too far away, can't hear
 - Too close and ambient noise may mask alarm
- Wall mounted
 - ≥ 90 " above floor
 - ≥ 6 " below ceiling
- Can be zoned or building-wide

