



How Ceilings Affect Room Sound Levels



ENGINEERING CORNER

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Area Source



- When a room has a full ceiling stretching from wall to wall, the ceiling isolates the room from the area above the ceiling.
- Frequently that space above the ceiling is used for the return air path to the air handler.
 - Used to mount mechanical equipment, plumbing, electric supplies and lighting.
 - Open space is a separate space from the occupied area below.
- sound that is generated in this return plenum spreads throughout the plenum
 - Produces an **area sound source** that emanates across the entire ceiling into the space below.
- AHRI Standard 885
 - Describes how the sound from the mechanical equipment is affected as it enters the occupied space.
- Sound readings in the occupied space will be nearly constant across the entire floor area in the room.



Point Source



- When a ceiling is not present, sound enters the space in a different manner
 - The room volume increases since there is now only one overall space
- The sound source becomes a **point source** and is mostly affected by distance between the source and the receiver
 - Also reflected from various equipment in the upper part of the room and directed toward one or more areas in the occupied space
- AHRI Standard 885 has a procedure for predicting sound levels in the occupied space for this condition
 - Proven to be very optimistic
 - Measured attenuation values in each octave band vary greatly from the predictions made with and without the ceiling
- Efforts to achieve acceptable NC values in the occupied space without a ceiling usually will cause the mechanical equipment to be oversized to reduce the noise generated
 - Equipment sound levels tend to migrate toward higher octave bands making the equipment noise additive to the diffuser noise
 - Sound readings in the occupied space will vary greatly across the entire floor area in the room, generally dissipating with increasing distance from the equipment

Cloud or Floating Ceilings

- **Cloud or floating ceilings** are partially suspended ceilings in the room
 - Do not extend from wall to wall
- Used to hide the mechanical equipment in the upper part of the room
- Expands the height of the room near the perimeter glass
 - Provides a larger view through the perimeter glass and simulates a higher and more open room
- In the very best conditions, the room NC levels will be no better than what they would be with no ceiling
- Some areas have greater noise levels where the noise from above the ceiling is focused on a particular spot or area in the occupied space



****Use great care when attempting to predict room noise levels with partial or no ceilings. The values will be very different from that of a space with a full ceiling.****

Contact the Local Experts



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