Office Acoustics - Speech Privacy and Security in Closed Rooms

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Speech privacy is an essential component of a successful boardroom or meeting room. It goes without saying that many office discussions are best conducted behind closed doors. But, how easy is it for potential eavesdropper to listen in to your discussions? ASTM International Standard E2638-10 lists five categories (Levels 1 through 5) of speech privacy/security from enclosed meeting rooms and offices. These are described in the table below.

For minimal or standard speech privacy (Level 1 & 2), we aim to control the intelligibility of speech. Under this condition, you could potentially hear speech sounds, but would have some difficulty understanding the conversation. For speech security (Levels 3 to 5), we aim to control both the intelligibility and audibility of speech.

Level	Category	Description
1	Minimal Speech Privacy	One or two words will be intelligible every few minutes, and speech sounds will frequently be audible.
2	Standard Speech Privacy	One or two words will be occasionally intelligible and frequently audible.
3	Standard Speech Security	One or two words will very rarely be intelligible and occasionally audible
4	High Speech Security	Speech essentially unintelligible and very rarely audible
5	Very High Speech Security	Speech not intelligible and very rarely audible

The intelligibility and audibility of speech from a closed room depends on two key factors: the sound attenuation provided by separating partition(s) and the background noise level at a potential listing point outside of the closed room. Sound attenuation refers to the degree by which sound is reduced from within a source room (i.e. meeting room, boardroom, executive office, interrogation room)

to listening positions outside the source room. Background noise, such as that provided by an HVAC system, can reduce the intelligibility/audibility of speech through *sound masking*. Masking sounds (i.e. HVAC, computer fans) can affect the perception (i.e. intelligibility/audibility) of other sounds (i.e. speech). If you have ever tried to carry on a conversation next to a busy street you may have experienced the masking effect that road traffic noise can have on speech communication.

Both of these factors (sound attenuation, background noise) must be carefully considered in the control of speech between adjacent office spaces. As an example, let's consider a boardroom that is separated from an adjacent cellular office by a typical single stud cavity wall (filled with batt insulation) with one layer of gypsum wallboard on either side. To minimize costs, this hypothetical wall has been installed up to a suspended T-Bar ceiling. The background noise environment within the office is controlled by the HVAC system. The noise level in the office is 35dBA (a quiet office). Under these conditions, a minimal level of speech privacy should be expected (Level 1).

We have two ways in which to increase the speech privacy between these hypothetical spaces to speech privacy Level 2. The first is to continue the wall to the underside of the ceiling (assuming there are no other sound attenuation weaknesses). The second is to increase the level of noise in the office space by using a sound masking system.

Many open offices employ a sound masking system for the purpose of artificially increasing background noise levels within the office to increase speech privacy between work stations. The output of such systems must be carefully configured. Too low in volume, and the masking system may fail to provide sufficient masking. Too high, and there is risk of increasing worker annoyance and lowering productivity. Generally speaking, background noise levels in an open office should not exceed 45dBA. In a cellular office, a 40dBA background noise level is more suitable.

To achieve a standard level of speech security (Level 3) in the above example, both the introduction of a sound masking system and building the wall from slab to slab would likely be required. Significant changes in wall construction would be required to achieve the higher speech security levels 4 and 5.

This example is a simplified case. In reality, there are many ways in which the sound attenuation of speech from an office to the potential listening positions outside the room can be compromised. These include, but are not limited to, window/wall junctions, penetrations through walls, interconnecting doors and shared HVAC ducts between adjacent spaces. We call sound transmission via these indirect paths flanking transmission. If noise control were easy, we acoustic consultants would be out of work.

The best time to address noise control is at the design stage of the office when we can review the client's privacy/security requirements. We can then work with the architect to develop partition assemblies and design junction details to control flanking transmission