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Rx for health care speech privacy: A balanced acoustical design.

Understanding the new HIPAA regulation on oral privacy.

Armstrong®

Architects and designers as well as owners and managers of hospitals, nursing homes, pharmacies, physicians' offices and a myriad of other organizations that handle healthcare information are currently in search of a cure for a common ailment: the lack of speech privacy in their facilities.

A "cure" is needed because of the provision in the Health Insurance Portability and Accountability Act (HIPAA) that mandates that all individually identifiable health information communicated orally be kept private. This provision joins other HIPAA privacy requirements that deal with both electronic and paper-based information.

Fortunately, there is an easy-to-take prescription to help remedy the problem of inadequate speech privacy: a balanced acoustical design that can help facilities comply with HIPAA regulations relatively easily.

"Reasonable Safeguards" Must Be Taken

HIPAA regulations were originally signed into law in August, 1996. Then, in response to growing concerns about privacy in healthcare environments, the Department of Health and Human Services (DHHS) completed revisions to the Act in 2002, all of which became effective in April, 2003.

The current law consists of two parts: portability of health insurance and accountability for privacy. The accountability portion of the act describes three areas of privacy: electronic, which requires the protection of healthcare information via secure computer systems; written, which requires protection of paper-based information; and oral, which requires protection that conversations about or with a patient are not overheard.

Soon after the law went into effect, questions arose concerning the requirements for oral privacy. In response, DHHS noted that "incidental uses or disclosures that arise out of authorized activity, that are limited in nature and cannot be reasonably prevented, do not violate the privacy rule provided that the entity employs reasonable privacy safeguards."

Unfortunately, DHHS has not yet clearly said what constitutes "reasonable privacy safeguards," other than the fact that the Office of Civil Rights, which enforces HIPAA regulations, will take into account all the circumstances, including the potential effect on patient care and the financial and administrative burden of those safeguards.

Speech Privacy Can Be Measured

Speech privacy can be measured and monitored, particularly with the help of an acoustical consultant. That's because objective speech intelligibility and speech privacy test methods are already available from national standards writing bodies, including the American National Standards Institute (ANSI) and the American Society for Testing and Materials (ASTM International).

For example, ASTM E 1130 describes a means of measuring speech privacy between spaces, while ASTM E 1374 describes the acoustical principles and interactions that affect the acoustical environment and speech privacy in an open space. Similarly, ANSI Standard S3.5 discusses a method of measuring the intelligibility of speech.

Subjective testing, which measures human response to acoustical environments, is also available. However, the hearing ability, attention span and sound level interpretation of the listener introduce a greater level of uncertainty than do the objective measurements obtained through the use of sound measurement equipment.

What Is Sound Masking?

Sound masking is a precise application of electronic background sound that blends into the environment to cover up or "mask" unwanted noise. It is important because speech privacy is dependent on the ratio of the intruding speech from a nearby conversation to the level of background noise, which in many cases comes from the air delivery (HVAC) system. To

The ABCs™ of Speech Privacy

As a result of the new oral privacy provisions of the HIPAA regulations, more attention must now be given to the creation of speech privacy. That's because telephone conversations must be conducted in a secure environment; patients must be able to confer in confidence with their physicians; and they must be able to register for procedures discreetly and confer on payment matters without being unduly overheard.

A balanced acoustical design is one of the most effective methods to achieve speech privacy. It consists of three key techniques, which are often collectively referred to as the ABCs of balanced acoustical design:

A Absorb sound within a space by the use of high performance acoustical ceilings that prevent unwanted sound from building up due to reflections.

B Block sound transmission between spaces with a combination of high performance ceilings and effective wall and furniture design and layout.

C Cover the remaining intruding sound within a space by the use of an evenly distributed, comfortable sound masking system that can be adjusted to meet the desired privacy level.

attain speech privacy, the level of background noise must be higher than the level of the intruding speech.

The proper choice of an acoustical ceiling will help lower the level of the intruding sound. In the past, the background noise contributed by HVAC equipment was generally sufficient to assure speech privacy. With the advent of quieter HVAC equipment, particularly variable air volume (VAV) systems and underfloor air delivery systems, this is no longer the case.

Consequently, a different source of controlled background sound is needed to override the intruding speech and to preserve the privacy of a conversation without itself being obtrusive. That sound is called masking sound.

When this electronically generated sound is used correctly, unwanted sound, such as an intruding conversation, generally goes unnoticed. To be most effective, the masking sound should cover the space uniformly, making nearby conversations less intelligible throughout the space. Music is not a good source of masking sound because it is dynamically variable

Acoustical Performance Indicators

A balanced acoustical design solution can be a valuable component of the "reasonable privacy safeguards" mandated by the new regulations. To better understand the elements of that design, it's important first to be familiar with the main indicators, as generally accepted by the industry, of acoustical performance. They are:

• **Noise Reduction Coefficient (NRC)** – Indicates the ability of a surface, such as a ceiling, to absorb sound from all angles. It is expressed as a number between 0.00 and 1.00, and indicates the average percentage of sound that a ceiling absorbs. For example, an NRC of 0.60 means a ceiling absorbs 60% of the sound that strikes it. The higher the number, the better the surface acts as a sound absorber. A surface material with an NRC less than 0.50 is considered a poor absorber, while one with an NRC greater than 0.80 is considered a very good absorber.

• Articulation Class (AC) – Indicates the ability of a ceiling to absorb sound that is reflected off the ceiling between two adjacent open spaces divided by partial-height furniture panels, such as office cubicles. The higher the number, the better the ceiling performs with respect to speech privacy between adjacent open plan spaces. A ceiling system with an AC less than 150 is considered low performance, while one with an AC equal to or greater than 200 is considered high performance.

• Ceiling Attenuation Class (CAC) – Indicates the ability of a ceiling to block sound in one room from passing up into the plenum and transmitting back down into an adjacent room that shares the same plenum. The higher the number, the better the ceiling acts as a barrier to sound intrusion between closed spaces. A ceiling system with a CAC less than 25 is considered low performance, while one with a CAC greater than 35 is considered high performance. A ceiling with a high CAC may often have a low NRC.

• **Sound Transmission Class (STC)** – Indicates the ability of a wall or furniture panel to block the transmission of sound through it and into an adjacent space. The higher the number, the better the construction acts as a barrier to sound transmission. A wall system with an STC less than 35 is considered low performance, while one with an STC equal to or greater than 55 is considered high performance.

• **Privacy Index (PI)** – Indicates the degree of speech privacy attained in open or closed spaces. It is expressed as a percentage, and takes into account the combined acoustical performance of everything in the space, including ceiling, walls, floor covering and furniture. The higher the percentage, the better the speech privacy.

Speech privacy refers to how well a private conversation can be overheard by an unintended listener. The commonly recognized levels of speech privacy are:

■ **Confidential** – Represents a PI rating of 95% to 100%. Means conversations conducted within a space may be partially overheard, but definitely not understood beyond the confines of the space. This is the recommended level for examination rooms, treatment rooms, consultation rooms and doctor's offices.

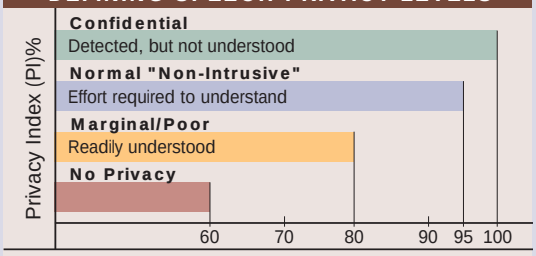
■ **Normal or Non-Intrusive** – Represents a PI rating between 80% and 95%. Means nearby conversations can be overheard, but are only partially intelligible to unintended listeners.

"Normal" speech privacy is the goal for most commercial office environments, especially where distractions and productivity are key issues. However, due to HIPAA's oral privacy requirements, and the requirement to provide "reasonable safeguards" in many key patient areas in healthcare facilities, "confidential" privacy levels are more often indicated than are "normal" levels to adequately protect patients' privacy.

■ **Marginal or Poor** – Represents a PI rating of 60% to 80%. Means that most nearby conversations will be overheard and will most likely be fully intelligible to unintended listeners.

■ **No Privacy** – Represents a PI rating of 60% or less. Means that all conversations can be entirely heard and clearly understood.

DEFINING SPEECH PRIVACY LEVELS



- Confidential Privacy: Expected for most private offices. PI: 95%-100%
- Normal Privacy: Allows people to think and concentrate without overhearing complete sentences in adjoining spaces and is expected for most open plan spaces. PI: 80%-95%
- Marginal or No Privacy: Clear sentence intelligibility is typical; common in many office environments. PI: Below 80%

in both loudness and frequency content over time.

Sound masking effectively raises the background sound level at the listener's ear, thus reducing speech intelligibility. It also produces a more reliable and predictable level of speech privacy because it can, in part, compensate for some of the less controllable influences, such as the quality of construction, sound leaks or value engineering.

As a result, sound masking should be considered a vital component in the design of all open plan spaces because it has the potential to cover up the residual speech not controlled by other architectural sound control elements. Achieving the full privacy potential of closed plan spaces also requires that sound masking often be provided in order to elevate background noise or to offset less than adequate architectural design.

Different Masking Systems Available

Sound masking is generally provided in either of two ways: the traditional method of installing the masking speakers in the ceiling plenum or a new, innovative method of installing the masking speakers in the ceiling plane.

Traditional sound masking speakers are hung in the ceiling plenum by chains or wires from the deck above. In a typical system, the electronic masking sound is directed upward in an attempt to create a reverberant sound field within the plenum. The masking sound then transmits down through the ceiling plane at reduced levels as it passes through the ceiling tile on its way into the occupied space.

In a traditional system, the type of masking signal, as well as the speaker spacing, location and orientation, must be adjusted for plenum depth, plenum obstructions and the acoustical performance of the ceiling panels because all of these affect the performance of the system. Plenum obstructions, for example, can create acoustical "shadow zones" that result in lower-than-normal masking levels in occupied areas below.

In addition, because the ceiling panels block the passage of a substantial portion of the masking signal, any openings in the ceiling plane, such as those around lighting fixtures, unducted air return grills or "cloud ceilings," can result in "hot spots" where the plenum masking sound flows unimpeded into the occupied space below, creating higher-than-normal masking levels.

As a result of new speaker technology, new systems are now available that can provide sound masking as well as paging and/or background music from speakers installed directly in the ceiling plane. The speakers are flat panels that look like 2' x 2' acoustical ceiling panels and simply lay in the grid like normal ceiling panels. This allows for greater flexibility in space layout and re-configuration.

The flat, in-ceiling speakers deliver masking sound differently than traditional in-plenum speakers because they radiate the sound downward from the ceiling plane directly into the space below in a controlled pattern. This design provides broader, more effective and more uniform sound masking because it is not sensitive to plenum obstructions and penetrations or the variability of the ceiling panel.

The speaker panels are also faster and easier to tune to the prescribed masking sound because they are not dependent on ceiling panel performance. And, because they can also deliver paging and/or music, they eliminate the need for extra systems for these applications.

Proper Choice of Ceiling Is Key

The attainment of speech privacy is dependent on good acoustical design and the proper selection of interior systems and materials used in the healthcare facility. In that regard, the proper choice of a ceiling can serve to both limit the sound intrusion between spaces and affect the quality of sound within a space. The ceiling is thus a key element in creating an acoustical environment that can maintain speech privacy.

When selecting ceilings for a healthcare facility, the use of the same acoustical ceiling throughout the entire space is not always the best choice. That's because in terms of speech privacy, there is a significant difference in the acoustical requirements of ceilings used in closed spaces, such as treatment rooms and doctors' offices, and those used in open spaces, such as reception areas and open office plans with cubicles. As a result, different areas require different ceilings and different applications of the ABCs of balanced acoustical design.

Open Spaces

Open plan spaces are usually spacious areas that house a large number of people. Examples of open plan spaces in healthcare facilities include reception areas, waiting rooms, recovery wards, open plan offices with cubicles and call centers in which private health information is discussed.

Lack of speech privacy can be a salient problem in many of these spaces. That's because overheard conversations can lead to unintentional breaches in confidentiality. Fortunately, achieving speech privacy in open areas is not difficult as long as the ABCs of balanced acoustical design are followed:

A Absorb noise with a high performance acoustical ceiling – In open spaces, the main function of the ceiling is to absorb sound that would normally bounce off the ceiling into a nearby space or cubicle. For speech privacy, a fiberglass acoustical ceiling with an AC rating of 180 or higher and an NRC of 0.80 or higher is the best choice.

Always base your product selection on ceilings with UL-classified acoustical performance. This will ensure that the ceiling meets or exceeds published values. Also, the ceilings should be at least 9' high to meet the published AC rating.

B Block noise with effective furniture systems and layout – In open plan offices with cubicles, furniture panels should be 60" or higher with an STC rating of 24. Use four-sided cubicles – anything less compromises privacy in some direction – and prevent direct "line-of-sight" sound paths by staggering the location of the entrances to the cubicles.

C Cover intruding noise with sound masking – For best results, the sound masking should cover the key speech frequency range at a minimum sound level, which means it must be adjustable in 1/3 octave bands as prescribed in the ASTM E 1130 test method for measuring speech privacy.

Closed Spaces

Closed spaces are typically smaller areas consisting of four walls and a door and housing one or more people. Examples of such spaces within a healthcare facility include examination rooms, consultation rooms, treatment rooms, patient rooms, meeting rooms, conference rooms and physicians' private offices.

The audibility of speech between adjacent closed spaces is not a problem until it becomes intelligible. As a result, the main function of the ceiling in closed spaces is to limit the transmission of sound between adjacent rooms, especially when these spaces share a common ceiling plenum.

The Privacy Index is an especially important acoustical performance indicator in closed spaces. Unfortunately, PI ratings for many closed rooms often indicate less than confidential speech privacy, even with doors closed. In addition, the rooms are generally not designed for dealing with raised voice levels, which is often the situation when speaking with elderly patients.

One reason for the lack of speech privacy is that the walls in most closed spaces stop at the ceiling plane. They do not go all the way up to the deck above. Complicating the situation is that ceiling and wall

components are usually tested separately in an acoustical laboratory, and not as a complete installed system. As a result, the tests do not factor in the "as built" details in ceilings, walls and floors that can result in sound leaks, thus compromising the laboratory rated performance.

Examples of typical sound leaks include unducted plenum return air grills, back-to-back electrical boxes, non-gasketed partitions at ceiling/floor intersections, ineffective door seals and air leaks around light fixtures and at the ceiling tile/grid interface.

"System" Approach Achieves Privacy

Tests that include all the components usually installed in a room have now been conducted. They were performed at the Armstrong Ceilings acoustical laboratory and involved construction of two adjoining 10' x 10' closed spaces.

The test results showed that confidential speech privacy in closed spaces can be achieved, even at raised voice levels, by once again using the ABCs of balanced acoustical design:

A Absorb noise with an acoustical ceiling. Use mineral fiber acoustical ceilings that are installed continuously across the ceiling plane and that combine moderate sound absorption (NRC of 0.60 to 0.70) with good ceiling attenuation (minimum CAC 35, with CAC 40 preferred). It may be necessary to supplement the ceiling

system by providing closure/seal components to stop sound leaks around ceiling penetrations. It is especially important to control sound leaks through air return openings.

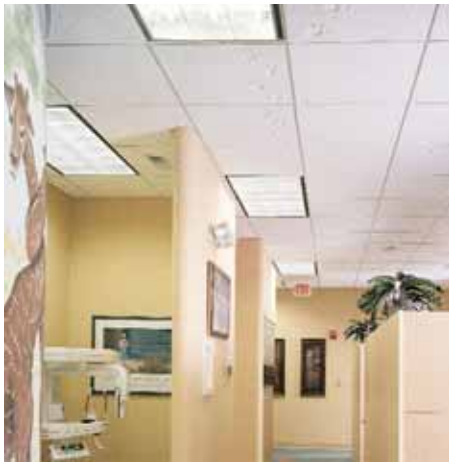
B Block noise with an effective combination of wall construction and ceiling. If space relocation is not an issue, use a floor-to-slab fixed stud wall construction (drywall and fiberglass insulation) with a minimum STC 40 rating. If space relocation is an issue, use either fixed stud walls or relocatable walls of floor-to-ceiling height with an STC 40 rating and a ceiling with a minimum CAC 35, CAC 40 being preferred.

All components of the wall system, including doors and glazings, should be pre-engineered for STC performance and for the removal of problematic sound leaks from doors, wall system joints and seals at the ceiling and floor interface.

Sound, like water, will always follow the path of least resistance. As a result, construction of the wall is critical since any crack in it or in the wall joints will allow sound to intrude into the adjoining space. As an example, consider the fact that a crack representing only 0.1% of the total wall area can reduce the performance of an STC 50 wall (two layers of 1/2" gypsum board with R11 insulation in the cavity) from STC 50 to STC 30. As a result, the noise intruding into the adjacent space will be nearly four times louder than the noise intruding through the same wall with no sound leaks.

In addition to effective wall designs, movable furniture panels, glass partitions and special curtains can also help block horizontal sound transmission.

C Cover intruding noise from adjoining spaces with electronic sound masking. Coordinated performance between the sound masking and ceiling/wall system is essential in achieving speech privacy. Each component must be engineered to make certain the design of the sound masking system complements the architectural performance over the key speech frequency range. The result will provide the appropriate level of



speech privacy with the minimum level of masking sound.

Acoustics Plus Aesthetics

Regardless of whether it is an open or closed area, aesthetics do not have to be compromised when using a high performance acoustical ceiling. In fact, many of the highest performing acoustical ceiling panels not only feature the smooth, fine textured surface visual that is popular today, but also other beneficial attributes such as high light reflectance, humidity resistance,

New Ceiling Is Perfect Prescription for Privacy

case study

Oyster Point Family Health Center is a large medical practice located in south central Pennsylvania. Like other healthcare organizations, it has recently taken steps to comply with HIPAA regulations. One such step was a ceiling upgrade in the facility's centrally-located nurses station.

Pat Dehoff, Oyster Point's front desk manager, explains that the station is an open area surrounded by exam rooms and offices. "The nurses station is always a very busy area because of all that goes on there," she says. "As a result, it is also an extremely noisy area in terms of conversations, many of which could be heard in nearby treatment areas. Compliance with oral privacy and patient confidentiality was not easy here."

To help remedy the situation, Oyster Point worked in conjunction with Armstrong and installed a new ceiling and a sound masking system. The existing ceiling consisted of traditional 2' x 4' fissured panels with an NRC of 0.55 and CAC of 33. It was replaced with 2' x 2' Armstrong Optima Open Plan panels, a high performance acoustical ceiling that features a smooth, fine textured surface, an NRC of 0.85 and an AC of 180.

Sound masking is attained through the use of an Armstrong i-ceilings® Sound System designed specifically for small installations. Called Tri-Pak, the system can provide music, paging and sound masking, although Oyster Point is using it only for masking. In addition, the speaker looks just like an Optima panel, so it blends in with the overall ceiling, making the space more aesthetically pleasing.

According to Dehoff, the combination of a high performance ceiling and sound masking has had quite an effect. "Now, as you pass the station, you can still hear voices, but you can't understand what's being said," she says. "The amount of sound carrying into nearby exam rooms is also greatly reduced."

The facility's supervisor of nursing agrees. She notes that prior to the new ceiling, she could hear telephone conversations emanating from the nurses station when she was in an exam room located across the hall. Today, that condition no longer exists.

"The new ceiling has definitely made us more compliant," Dehoff adds.

washability and a paint that inhibits the growth of mold and mildew on the ceiling surface.

Additional aesthetic options include large, custom-size panels that provide the opportunity to use panels that are more in scale with the size of a space, and panels with a unique edge detail that produces a 1/4" reveal that minimizes the visible grid, creating a ceiling that is more monolithic in appearance than ordinary suspended ceilings.

Panels are also available with a Tegular or reveal edge to create a shadow line that helps camouflage the suspension system. In addition to their aesthetic appeal, Tegular ceiling panels provide better acoustical performance than square lay-in panels because there is less leakage at the interface between the panel and the grid.

The Cost of Acoustical Design

Speech privacy can often be achieved without expensive soundproofing of existing walls, without new major construction and without imposing a large financial burden on the healthcare provider. In other words, hospitals, doctors' offices, pharmacies and other healthcare facilities that fall under HIPAA regulations do not have to be rebuilt in order to be in compliance.

In fact, a balanced acoustical design is relatively low cost in terms of both initial installation and long term costs, especially when compared to the cost of adding a wall. For example, using average costs (actual costs will depend upon location), a confidential Privacy Index of 95% - 100% using the ABCs of balanced acoustical design could be attained for approximately $9.50 per square foot. This includes an STC 40 wall installed to the underside of the ceiling, a high performance acoustical ceiling and sound masking.

The cost of adding an STC 40 wall, on the other hand, and running it to the deck above, sealing all of its penetrations and installing gasket doors could cost approximately $12.25 per square foot. And, the Privacy Index would only be 80% - 95%. In addition, running the wall to the deck greatly decreases the reconfiguration flexibility of the space compared to that possible with a wall installed to the underside of the ceiling plane.

An Enhanced Feeling of Confidentiality

A balanced acoustical design consisting of high performance acoustical ceilings to absorb sound; effective wall, ceiling and furniture design to block sound; and a ceiling-based sound masking system to cover sound is an easy and economical way to help meet the "reasonable safeguard" provisions of the new HIPAA oral privacy requirements. The successful use of this design solution will also help provide both physicians and their patients with the level of speech privacy necessary for them to feel more comfortable in their healthcare environment.

This information on HIPAA and speech privacy in health care environments has been provided by Armstrong Ceiling Systems. There are additional resources available for all of your speech privacy design needs that include:

- HIPAA CEU course through your Armstrong Ceilings sales representative at 1-877-ARMSTRONG or armstrong.com/ceu
- Additional HIPAA information at armstrong.com/hipaa
- Speech privacy predictor tool through your Armstrong representative
- Answers to all of your technical questions through TechLine™ at 1-877-ARMSTRONG
- Additional information at hipaa.org

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