M 86 MARKETING BULLETIN

Glossary of Acoustical Terms

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• **Acoustical Treatment:** The use of acoustical absorbents, acoustical isolation or any changes or additions to the structure to correct acoustical faults or improve the acoustical environment.

• **Acoustics:** The science of sound, including its production, transmission and effects.

• **Air-Borne Sound:** Sound transmitted through air as a medium rather than through solids or the structure of a building.

• **Ambient or Background Noise:** Total of all noise in a system or situation, independent of the presence of the desired signal. Ambient noise may come from the building's mechanical equipment, outside traffic, activities in adjacent room or other sources not directly related to the desired signal.

• **Articulation Class (AC):** A single number rating system used for comparing building system: and sub-systems for speech privacy purposes. The rating is designed to correlate with transmitted speech intelligence between office spaces.

• **ASTM International:** ASTM International is one of the largest voluntary standards development organizations in the world-a trusted source for technical standards for materials, products, systems, and services. Known for their high technical quality and market relevancy, ASTM International standards have an important role in the information infrastructure that guides design, manufacturing and trade in the global economy.

• **Attenuation:** Reducing the intensity of a sound signal, the lowering of sound level. The efficiency of a material to resist the transmission of airborne sound measured in decibels.

• **Background Level:** The normal sound level present in the space above which speech, music or similar specific wanted sound must be presented.

• **Background Noise Criteria:** NC- levels usually refer to steady, continual background levels within a space or neighborhood, as opposed to specific noises or intermittent activities occurring there. The level of a performing orchestra or hand, for example, normally is not expressed in this way, hut in a dBa or Sound Pressure Levels in various frequency hands. All numbers listed may vary as much as +5 points in specific areas.

• **Bevel:** A sloped or canted surface contiguous with a. vertical or horizontal surface.

• **Bow:** The maximum component of deviation in the vertical plane or a main runner, cross runner or wall molding where the centroidal axis of these structural components has been permanently deformed from end to end into the shape of a simple regular curve during the manufacturing process.

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• **Camber:** The amount of upward bow rolled into a suspension member to offset deflection under the load of lights, acoustical panels, air diffuser, etc.

• **Ceiling Attenuation Class (CAC):** A measure of reduction in sound transmission via plenum path between two rooms determined in accordance with ASTM EI414 and plotted decibel reduction (transmission loss) obtained at 16 frequencies against a stand reflectance curve, in accordance with ASTM E413.

• **Ceiling Suspension System:** Entire network or grid of structural components that provides support for acoustical ceiling tile, acoustical ceiling panels, lighting fixtures and air diffusers.

• **CISCA:** Ceilings and Interior Construction Association

• **Coffer:** A recessed panel or dome in the ceiling.

• **Cycle:** The entire sequence of movement of a particle (during periodic motion) from rest to one extreme of displacement, back through rest position to the opposite extreme of displacement and back to rest position.

• **Decibel:** Unit for measuring sound intensity. A division of a uniform scale based upon ten (10) times the common logarithm of the ratio of two like quantities proportioned to power or energy. Zero on the decibel scale corresponds to a standardized reference sound power of 10 - 12 watts.

• The chart below demonstrates how sound pressure levels compare with intensity expressed in units:

100,000,000,000,000	140
10,000,000,000,000	130
1,000,000,000,000	120
100,000,000,000	110
10,000,000,000	100
1,000,000,000	90
100,000,000	80
10,000,000	70
1,000,000	60
100,000	50
10,000	40
1,000	30
100	20
10	10
0	0

• **Deflection:** The sag or bowing down of a member simply supported caused by superimposed loads (i.e., lights, acoustical tile). Deflection is limited to L/360 of the span, per ASTM C-635.

• **Design Loads:** Engineering criteria used to establish or meet safety factors as set forth by building codes.

• **Diffraction:** Roughly, the ability of a sound wave to "flow" around an obstruction or through openings with little loss of energy.

• **Diffuser:** A circular, square, rectangular or slot outlet located in the ceiling of a room through which supply air is normally discharged on a plane approximately parallel to the ceiling.

• **Diffusion:** Dispersion of sound within a space so that there is uniform energy density throughout the space.

• **Dispersion:** The scattering or distribution of sound in a space.

• **Distortion:** Any change in the transmitted sound which alters the character of the energy-frequency distribution within the signal so that the sound being received is not a faithful replica of the source sound.

• **Distribution:** The pattern of sound intensity levels within a space; also, the patterns of sound dispersion as the sound travels within the space.

• **Echo:** Any reflected sound which is loud enough and received late enough to be heard as distinct from the source.

• **Exposed Grid:** A suspension system which, after installation of all elements of the ceiling, leaves the main and cross runners exposed when viewed from below.

• **Fire Rating:** Those ratings of a tested assembly which are exposed in hours and applied to floors, roofs, beams, columns and walls.

• **Flutter:** A multiple echo set-up between parallel, reflecting surfaces.

• **Frequency:** The number of times per second that the sound pressure alternates above and below the ambient atmospheric pressure. Each complete alternation is called a cycle and frequency is expressed in Hertz (Hz) or cycles per second (CPS).

• **Grid Members:** Main and cross runners which interlock to support the acoustical, lighting, air diffusers, etc., of the ceiling system, with the secondary function of having aesthetic acceptance when viewed from below. These members may be made from steel or aluminum in various configurations.

• **Heating Degree Days:** Heating degree days are an index of "cold" useful in energy consumption calculations. The number of heating degree days is calculated for each day by subtracting the day's mean temperature from a base temperature (usually, 65F). The daily totals are accumulated for each month and the monthly totals are accumulated for the "heating year" from July through June. The amount of energy consumed for heating is closely correlated to these heating degree days.

• **Horizontal Plane:** The plane through the centroidal axis of the member parallel to the plane of the ceiling.

• **Hz (Hertz):** The unit designation for frequency of a sound wave, formerly cycles per second (CPS) - one cycle per second.

• **Intensity:** The rate of sound energy transmitted in a specific direction through a unit area.

• **L/360:** A standard used to determine the maximum vertical deflection allowed the horizontal member (supported) for acceptance. "L" is the distance between hanger (support) points in inches. The "360" is a pure number without quantity. Therefore, the distances in inches divided by 360 gives a result in inches of maximum allowable vertical deflection.

• **Light Reflectance (LR):** The number designation indicating the percentage of light reflected from a ceiling's surface, in accordance with ASTM E1477.

• **Linear Air Diffusers:** They are in integral part of the ceiling system incorporating the air diffuser element with the orifice face at the ceiling line, mechanically locked into the grid system.

• **Loudness:** The effect on the hearing apparatus of varying sound pressures and intensities.

• **Loudness Level:** The sound pressure level in decibels (relative to 0.0002 microbar) of a simple tone of 1,000 c.p.s. frequency.

• **Masking:** The increase in threshold of audibility of a sound necessary to permit its being heard in the presence of another sound.

• **Mass:** The quality of matter which permits it to resist acceleration; the quality of matter which produces the effect of inertia.

• **Maximum Allowable Load:** The weight placed on the suspension system which if exceeded will cause a greater deflection, in the main or cross runner, than is allowable for safety and to meet ASTM specifications. This is frequently defined as L/360.

• **Moment of Inertia:** Stated in inches, an engineering computation of effectiveness of a grid member to resist deflection of that member.

• **Mounting, Resilient:** Any mounting, attachment system or apparatus which permits room surfaces or machinery to vibrate normally without transmitting all of the energy of vibration to the structure.

• **Noise:** Unwanted sound.

• **Noise Criterion Curves (NC Curves):** Series of criterion curves that portray sound pressure levels for background noises which generally should not be exceeded, or should be maintained, in various human environments.

• **Noise Reduction:** The reduction level of unwanted sounds by any of several means.

• **NRC (Noise Reduction Coefficient):** A measure of sound absorbed by a material. The single number designation representing the average of the sound absorption coefficients of a material at 250 Hz, 1000 Hz and 2000 Hz rounded to the nearest 0.05 when tested in accordance with ASTM C-423.

• **Octave Bands:** An octave is the interval between two sounds having basic frequency ratio of two.

• **Pitch:** The physical response to frequency. The subjective response of the hearing mechanism to changing frequency.

• **Resonance:** The natural, sympathetic vibration of a material at a particular frequency resulting for excitation by a vibration of that frequency.

• **Reverberation:** The prolongation of sound within a space after the source has stopped.

• **Sabin:** One square foot of a surface having perfect absorption, an absorption coefficient of 1.00.

• **Sabin Formula:** Relates room volume and total acoustical absorption to reverberation time:

T = .05V/A

T = Reverberation Time in Seconds
V = Room Volume in Cubic Feet
A = Total Absorption in Sabin

• **Self-Drilling Fastener:** A fastener which combines the functions of drilling and tapping.

• **Self-Tapping Fastener:** A fastener which taps its own threads in a pre-drilled hole.

• **Sound:** A vibration in a medium; usually in the frequency range capable of producing the sensation of hearing.

• **Sound Absorption Coefficient:** Fraction of incident sound energy absorbed or otherwise not reflected by a surface.

• **Sound Leaks:** Any opening which permits airborne sound transmission.

• **Sound Pressure:** The average deviation in atmospheric pressure above or below the static value due to a sound wave (analogous to alternating voltage).

• **Sound Transmission Classification (STC):** A single number value describing the ability of a system of materials to isolate one enclosed space from another acoustically. A rating method (per ASTM designation E413) based on the requirement that the value of transmission loss at any of the 16 measuring frequencies does not fall below the specified limits of the TL frequency contour.

• **Sound Wave:** A disturbance which is propagated in a medium in such a manner that at any point in the medium the displacement is a function of the time.

• **Span:** The distance between two supporting members.

• **Spectrum:** Description of the resolution of a sound wave into components, each of different frequency and (usually) different amplitude and phase.

• **Specular Reflection Loss:** The attenuation of sound in db, as it is reflected from a ceiling, wall, etc. at a specific angle.

• **Speed of Sound:** 344 meters per second or 1,128 feet per second at 25 degrees C or 77 degrees F. The speed of sound is an important consideration in large room acoustics where the relative timing of sound fronts (direct and reflected) has a strong bearing on sound quality.

• **Structure-Borne Sound:** Sound energy transmitted through the solid media of the building structure.

• **Transmission:** The propagation of a vibration through various media.

• **Transmission Loss:** A measure of the decrease is sound level as it passes through a structure. Variable with the frequency of the sound.

• **Unwanted Sound:** Noise: interfering sound, whatever its source or nature.

• **Vertical Plane:** The plane through the centroidal axis of the member perpendicular to the plane of the ceiling.

• **Wanted Sound:** The audible signals which communicate necessary and desirable information or stimuli to the listener.

• **Wave Length:** The distance a sound wave travels during each complete vibration or cycle.