CISCA PUBLICATIONS

Acoustical TERMS & DEFINITIONS

CISCA | Ceilings and Interior Systems Construction Association

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Acoustical TERMS & DEFINITIONS

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A–B

Acoustical Analysis
The detailed study of all pertinent sound sources, sound transmission paths, and sound receptors in the context of a particular acoustical problem.

Acoustical Environment
The overall environment, interior or exterior, that affects the acoustic conditions of the space or structure under consideration.

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.

Airborne 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.

Architectural Acoustics
The science and technology of controlling sound in and around buildings.

Articulation Class (AC)
A classification method that rates building systems and subsystems for speech privacy purposes in accordance with ASTM E1110. 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. AC ratings are represented by a numerical value, typically ranging from 100 to 250 or more. The higher the AC rating, the better the partition is at attenuating sound and preventing sound leakage between the spaces it divides.

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 magnitude of a sound signal by separation of a sound source from a receptor, acoustical absorption, enclosure, active cancellation by electronic means, or a combination of these or other means.

Audibility Threshold
The sound pressure at which a typical young, healthy person with normal hearing begins to respond.

A-Weighting
A filter corresponding to the average frequency response of human hearing and is employed to measure approximate loudness. A change of 10 dB represents a doubling or halving of perceived loudness in most circumstances. All noise levels in this report are A-weighted unless noted otherwise. The unit of sound level is often written as dB(A).

Background Sound 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.

B–D

Background Sound Level
The lowest or residual sound level present in a space above which speech, music, or other sounds may be heard.

Barrier
A solid obstacle that blocks the line-of-sight between a sound source and a receiver, thereby providing barrier attenuation (i.e., reducing sound level at the receptor).
Bevel: A sloped or canted surface contiguous with a. vertical or horizontal surface.

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. The CAC rating is represented as a numerical value, typically ranging from 0 to 40 or more, and it indicates the ceiling's ability to block sound transmission between adjacent spaces. The higher the rating, the better the ceiling system can reduce the amount of sound passing through it.

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.

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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.

Coupling
Any means of joining separated elements in any media so that sound energy is transmitted between them.
Decibel (dB): A logarithmic unit used in acoustics to describe the magnitude of a sound with respect to a reference sound level. The term "Sound Level," "Noise Level" and "Sound Pressure Level" (SPL) all imply a standardized reference level near the threshold of human hearing (0 decibels).
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.

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
Distribution of sound such that there is uniform energy density throughout the space. A perfectly diffuse sound field is one in which there is an equal flow of sound power in all directions at any point.
Dispersion: The scattering or distribution of sound in a space.

D–L

Distortion
Any change in the transmitted sound signal such that the sound received is not a faithful replica of the original 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 of sufficient intensity and delay in arrival that will 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.

Field Impact Insulation Class (FIIC)
A single-number rating that quantifies the effectiveness of a floor-ceiling construction to reduce footfall-generated noise as measured in the field. Increasing FIIC values correspond to better impact insulation.

Field Sound Transmission Class (FSTC)
A rating of the field-derived airborne sound transmission loss data for a structure determined in accordance with the procedure of ASTM E336 and E413.

Flanking Paths
Any paths for sound transmission that bypass or circumvent the primary path through the structure under consideration.

Flutter (flutter echo)
A rapid reflection or echo pattern between opposing sound-reflective walls with sufficient time between each reflection to cause a listener to be aware of separate discrete signals.

Focusing
Concentration of reflected acoustic energy within a limited location in a room as the result of reflections from concave surfaces.

Frequency
The number of complete cycles per second of a vibration (or other periodic motion). The unit is hertz (Hz)

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.

Hertz (Hz)
Cycles per second; used to describe frequency (see also Frequency).

Impact Insulation Class (IIC)
A single-number rating that quantifies the performance of a floor-ceiling construction with respect to footfall-generated noise. Increasing IIC values correspond to better impact insulation.

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

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.

L–R

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 obscuring or covering up of one sound by another 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.

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 Criteria Curves (NC, RC, NCB, etc.)
A numerical rating system or family of curves used to specify background sound levels over a specified frequency range.

Noise Insulation Class (NIC)
A rating of the measured room-to-room noise reduction determined in accordance with the procedures of ASTM E336 and E413.

Noise Reduction
The reduction in level of unwanted sound by any of several means (e.g., by distance in outdoor space, by boundary surface absorption, by isolating barriers of enclosures, etc.).

Noise Reduction Coefficient (NRC)
The arithmetic average of the sound absorption coefficients of a sound-absorbing material at the octave bands 250, 500, 1000, and 2000 Hz, rounded to the nearest 0.05.

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. NRC ratings range from 0 to 1. An NRC of 0 means that the material absorbs no sound. An NRC of 1 means that the material absorbs all sound (on average in the range between 250Hz-2000Hz).

Octave Band
A division of the audible frequency range, the center frequency of which is twice that of the preceding band center frequency. The standard acoustical octave bands are centered at 31.5, 63, 125, 250, 500, 1000, 2000, 4000, and 8000 Hz.

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

Reflected Sound
The resultant sound energy returned from a surface that is not absorbed or otherwise dissipated upon contact with the surface.

R–S

Resilient Mounting
Any mounting or attachment system that reduces transmission of vibrational energy from a vibrating body or structure to an adjacent structure.
Resonance: The natural, sympathetic vibration of a material at a particular frequency resulting for excitation by a vibration of that frequency.

Reverberation
The persistence of sound within a space after the sound source has stopped.

Reverberation Time
The time in seconds required for a sound to decay, roughly speaking, to inaudibility after the source ceases. (Strictly, the time in seconds for the sound level at specific frequency to decrease 60 dB in level after the source stops.)

Room Acoustics Speech Transmission Index (RASTI)
A method to assess speech intelligibility, based on the original Speech Transmission Index (STI) developed by Houtgast and Steenekenfor in 1971. The introduction of the RASTI ("Room Acoustics STI") in the mid '80s made the STI broadened the method from one used primarily by speech researchers to a tool for acoustical engineers. RASTI was only intended for pure room acoustics, not electro-acoustics.

Sabin
The measure of sound absorption of a surface equivalent to 1 ft2 of a perfectly absorptive material (named after Wallace Clement Sabine, a pioneer in architectural acoustics) and shown in use as "sabins" (uncapitalized).

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

Signal-to-Noise Ratio
A measure used primarily in audio engineering that compares the level of a desired signal to the level of background noise.

Sound
Vibrations in a medium, usually in the frequency range capable of producing the sensation of hearing.

Sound Absorbing Materials
Materials that dissipate acoustic energy within their structure as heat and/or mechanical energy of vibration.

Sound Absorption
The process by which a material takes in sound energy when sound waves are encountered, as opposed to reflecting the energy. Part of the absorbed energy is transformed into heat and part is transmitted through the absorbing body.

Sound Absorption Average
Arithmetic mean of sound absorption coefficients for the 12 contiguous one-third octave frequency bands with nominal mid-band frequencies of 200 Hz to 2500 Hz, inclusive, rounded to the nearest 0.01.

Sound Absorption Class
A rating system for spectral sound absorption performance in accordance with the international standard EN ISO 11654. Class A materials are the most absorptive and Class E materials are the least absorptive.

Sound Absorption Coefficient
The ratio of sound-absorbing effectiveness (at a specific frequency) of 1 square-foot of actual acoustical absorption to 1 square-foot of a perfectly absorptive material; usually expressed as a decimal value between 1.0 (perfect absorption) and 0 (perfect reflection).
Sound Control: The application of acoustical principles to the design of structures, equipment, and spaces to permit them to function properly and to create the desired environment for the activities intended.

S

Sound Insulation
A fibrous material that absorbs sound and insulates against heat and cold.

Sound Isolation
The ability of materials or constructions to resist transmission of sound or vibration through them.

Sound Leak
Any opening in a structure that permits airborne sound transmission with little or no loss compared with the basic structure.

Sound Level
A measure of sound pressure level as determined by instrumentation with standardized frequency-weighting characteristics (e.g., A-scale sound level in dBA)

Sound Level Meter
A standard electrical instrument for determining sound pressure level.

Sound Power
The rate at which sound energy is radiated, expressed in watts.

Sound Pressure
The change in pressure at a point due to sound energy relative to the static pressure at that point without the sound wave.

Sound Pressure Level
A measure of the magnitude of sound pressure on a logarithmic scale; a value equal to 20 times the logarithm to the base 10 of the ratio of a sound pressure to a reference pressure (the reference pressure is usually taken to be 2 x 10-5 N/m2).

Sound Transmission
The propagation of sound energy through various media.

Sound Transmission Class (STC)
A single number rating of the laboratory-derived airborne sound transmission loss data for a structure determined in accordance with the procedures of ASTM E90 and E413. STC ratings range from 0 to around an upper limit of 100-120. The higher the rating, the greater the sound isolation performance of the assembly.

Sound Velocity
The velocity at which a sound wave propagates through a medium (e.g., in air, the speed of sound is approximately 1100 ft/s).

Sound Wave
A disturbance that is propagated in any medium (gas, liquid, or solid) by energy transfer between adjacent molecules.

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.

S–W

Speech Intelligibility

The degree to which someone is understood when they're speaking. See also: Speech Transmission Index (STI) and Room Acoustics Speech Transmission Index (RASTI)

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.

Speech Transmission Index (STI)

An objective measure for predicting speech intelligibility that uses the modulation transfer function (MTF) to quantify the effects of reverberation and noise on a transmitted signal.

Structure-Borne Sound

Sound energy transmitted through solid elements of a building structure.

Transmission

The propagation of a vibration through various media.

Transmission Loss (TL)

A logarithmic measure of the decrease in sound power during transmission from one point to another (or through a panel, wall, etc.); a value in decibels equal to 10 times the logarithm to the base 10 of the ratio of transmitted-to-incident sound power.

Unwanted Sound

Noise: interfering sound, whatever its source or nature.

Vertical Plane

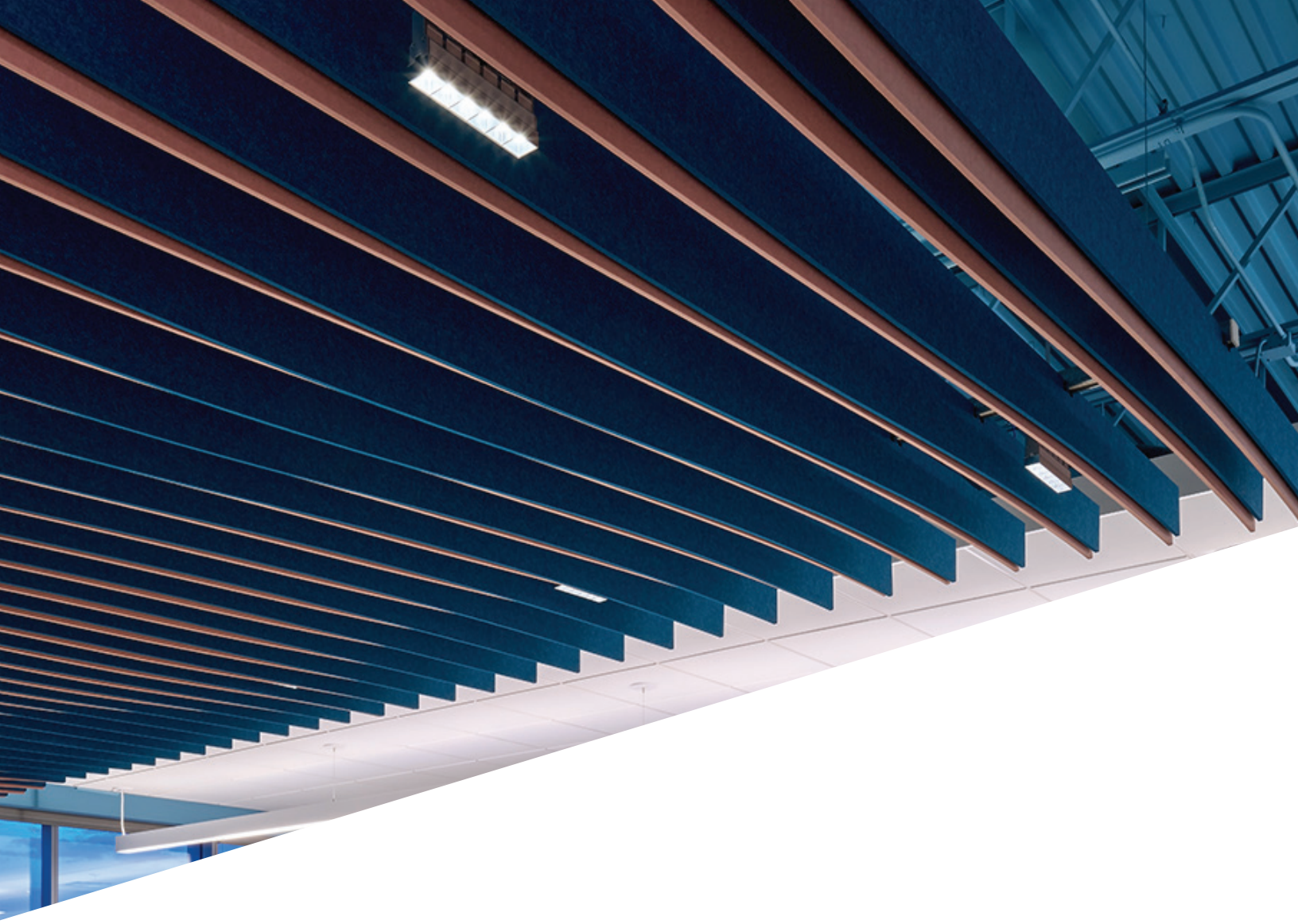
The plane through the centroidal axis of the member perpendicular to the plane of the ceiling.

Vibration Isolation

Any means of minimizing transmission structure-borne sound from a vibrating body to structure in or on which it is mounted.
Wanted Sound: The audible signals which communicate necessary and desirable information or stimuli to the listener.

Wavelength

The distance from one crest to another, or from one trough to another, of a wave. Graphically, the crest is the highest point of the wave whereas the trough is the lowest.



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