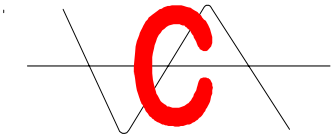


CONABEARE ACOUSTICS

Noise Control Glossary of Terms

A, B, C Scales: Sound level meter weighting networks which provide different response characteristics to sound pressure levels as a function of frequency.

The A Scale, for instance, is approximately representative of the frequency response of the human ear, which is less sensitive to low frequency than to high frequency sound. It is the basis for many of the criteria outlined in the following. A Scale decibel levels are expressed as "dBA."

Absorption Coefficient: The absorption coefficient of a material or sound absorbing device is the ratio of the sound absorbed to the sound incident on the material or device.

Absorptive Attenuator: A device inserted into an air duct or opening to reduce noise transmitted through the duct or opening. Noise reduction is accomplished through the use of internal sound absorbing materials.

Acoustical Material: A material used to alter a sound field. The material may be used to absorb, damp or block acoustical energy.

Airborne Noise: A condition when sound waves are being carried by the atmosphere.

Ambient Noise: All the sounds from many sources associated with a given environment.

Anechoic Room: A test chamber which has a lining of absorbent acoustical material to eliminate all sound reflections. It is most often used to determine the sound radiation characteristics of equipment.

Damping: The process of dissipating mechanical vibratory energy into heat. In noise control, a damping material is usually applied to a vibrating surface to reduce the noise radiating from that surface.

Directivity Index (DI): The difference between sound pressure level in any given direction in the acoustic far field and the average sound pressure level in that field.

Far Field: That part of the sound field in which sound pressure decreases inversely with distance from the source. This corresponds to a reduction of approximately 6 dB in level for each doubling of distance.

Flanking Transmission: Noise that reaches an observer by paths around or over an acoustical barrier.

Frequency Spectrum: A graph or plot of the sound pressure level in each band from a set of octave or 1/3 octave bands.

I**nsertion Loss:** The reduction of sound power level attained by inserting a silencer or attenuator in an acoustic transmission system.

Inverse Square Law: Under far field/free field conditions, sound intensity varies inversely with the square of the distance from the source.

The difference in sound pressure level between two far field locations is expressed as follows:

$$L_{P2} = L_{P1} - 20 \log\left(\frac{R_2}{R_1}\right)$$

where: L_{P1} = Sound pressure level in decibels at location 1.
L_{P2} = Sound pressure level in decibels at location 2.
R_1 = Distance from noise source to point 1.
R_2 = Distance from noise source to point 2. (R_1 and R_2 must have the same units.)

Loudness: Loudness is the subjective human definition of the intensity of a sound. Human reaction to sound is highly dependent on the sound pressure and frequency.

Mass Law: A rule for estimating the transmission loss of a barrier in its mass controlled region. The rule states that transmission loss increases/decreases 6 dB for each doubling/halving of either frequency or barrier surface density.

Noise: Any undesired sound.

NR (ISO) Noise Rating Curves: Developed by the International Standards Organisation in 1971 to rate noisiness with the 1000 Hz octave band as reference point - at NR 70, for instance, the curve has a level of 70 dB at 1000 Hz. Compared to NC curves, the NR curves permit higher levels at lower frequencies and dictate lower levels at higher frequencies.

Noise Reduction (NR): The reduction in sound pressure level caused by making some alteration to a sound field.

Noise Reduction Coefficient (NRC): A single number rating which is the average of the sound absorption coefficients in the octave bands centred at 250, 500, 1000 and 2000 Hz expressed to the nearest integral multiple of 0.05.

Octave Band (O.B.): A range of frequencies where the highest frequency of the band is double the lowest frequency of the band. The band is usually specified by the centre frequency, i.e., 31.5, 63, 125, 250, 500 Hz, etc.

Radiation: The process whereby structure-borne vibration is converted into airborne sound.

Reverberation: Reverberation is the echoing of previously generated sound caused by reflection of acoustic waves from the surface of enclosed spaces.

Reverberation Room: A test chamber so designed that the reverberant sound field within the room has an intensity that is approximately the same in all directions and at every point. It is commonly used to measure sound absorption and transmission loss.

Sabin: The unit of measure of sound absorption. The number of square metres of sound absorbing material multiplied by the material absorption coefficient.

Sound: Pressure waves that are travelling in the air or other elastic materials.

Sound Absorption: The acoustical process whereby sound energy is dissipated as heat rather than reflected back to the environment.

Sound Level Meter: An instrument used to measure sound pressure level. Sound level meters are commonly either Type 1, precision instruments, or Type 2, general purpose instruments. Both types can have weighting and filter networks to provide dB readings by octave band in the A, B, or C scales.

Sound Power Level (Lw): A measure of the total airborne acoustic power generated by a noise source, expressed on a decibel scale referenced to some standard (usually 10-12 watts).

Sound Pressure Level (Lp): A measure of the air pressure change caused by a sound wave, expressed on a decibel scale referenced to 20µPa.

Sound Transmission Class (STC): A single number rating derived from measured values of transmission loss in accordance with ASTM 413. The rating provides an estimate of the performance of a barrier in certain common noise attenuation applications.

Speed of Sound in Air:

$$C = 49.03\sqrt{460 + T}$$ in feet per second (A-4)

or

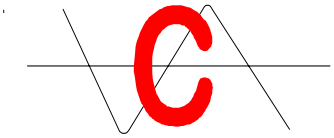
$$C_m = 20.05\sqrt{273 + T_c}$$ in meters per second (A-5)

where:

C = Speed of sound in feet per second
T = Temperature in degrees Fahrenheit
C_m = Speed of sound in meters per second
T_c = Temperature in degrees Celsius

Structure-borne Noise: Mechanical vibration in a structure which can ultimately become audible sound. Until such time as radiation occurs, these vibrations are inaudible and of little concern.

Transmission Loss (TL): The reduction in sound power that is caused by placing a wall or barrier between the source and receiver. Transmission loss is expressed in decibels.



CONABEARE ACOUSTICS

Sound Power Level of Typical Sources

Source	**Sound Power watts**	**L_W, dB re 10^{-12} Watts**
Saturn rocket	100,000,000	200
Afterburning jet engine	100,000	170
Large centrifugal fan at 500,000 cfm (849,500 m^3/hr	100	140
75 piece orchestra vane axial fan at 100,000 cfm (169,900 m^3/hr)	10	130
Large chipping hammer	1	120
Blaring radio	0.1	110
Centrifugal fan at 13000 cfm (22087 m^3/hr)	0.1	110
Auto on highway	0.01	100
Food blenders - upper range	0.001	90
Dishwashers - upper range	0.0001	80
Voice - conversational level	0.00001	70
Attenuator self-noise at + 1000 fpm (5.1 m/s)	0.00000001	40
Voice - very soft whisper	0.000000001	30
Quietest audible sound for persons with excellent hearing	0.000000000001	0

Typical Noise Source dBA Levels

Noise Source	dBA
Noise at ear level from rustling leaves	20
Room in a quiet dwelling at midnight	32
Soft whisper at five feet (1.52m)	34
Large department store	50 to 65
Room with window air conditioner	55
Conversational speech	60 to 75
Self-service grocery store	60
Busy restaurant or canteen	65
Within typing pool (9 typewriters in use)	65
Passenger car at 50 ft (15.2 m)	69
Vacuum cleaner in private home at 10 ft (3.05 m)	69
Ringing alarm clock at two feet (0.61 m)	80
Loudly reproduced orchestral music in large room	82
Buses, trucks, motorcycles at 50 ft (15.2 m)	82 to 85
Pneaumatic tools at 50 ft (15.2 m)	85
8-hour OSHA criteria – hearing conservation programs	85
Medium size automatic printing press plant	86
Bulldozer at 50 ft (15.2 m)	87
Jackhammer at 50 ft (15.2 m)	88
8-hour OSHA criteria – engineering and administrative noise controls	90
Heavy city traffic	90
Heavy diesel propelled vehicle at 25 ft (7.6 m)	92
Grinders	93 to 95
Small air compressor	94
Hammermill	96
Plastic chipper	96
Cut-off saw	97
Home lawn mower	98
Multiple spot welder	98
Turbine condenser	98
Drive gear	103
Banging of steel plate	104
Hi-pressure gas leak	106
Magnetic drill press	106
Air chisel	106
Positive displacement blower	107
Large air compressor	108
Jet aircraft at 500 ft (152 m) overhead	115
Human pain threshold	120
Inside jet engine test cell	150