

PLASKOLITE

NOISE REDUCTION

Excess noise, whether it's from construction, heavy traffic, aircraft, trains or even noisy neighbors can be disruptive and even harmful to your health and well-being. Depending on the type of noise, its location with respect to the area to be protected and the pathway which the sound is transmitted, various sound protection measures can be deployed to reduce unwanted sounds and noises.

Sound pressure levels and sound reduction indexes are typically expressed in decibel units (abbreviated as dB). The human ear can also detect a difference of 3 dB in noise levels and perceives an increase by 10 dB as a *doubling* of loudness, e.g. car traffic noise at 70 dB seems twice as loud as a busy office environment measuring in at 60 dB. Commonly, there are three components to consider when solving noise problems. These are external noise, the absorption or deflection of noise from the wall or window glazing material and the existing noise in the room.

The goal of any noise reduction design strategy is to decrease the transmission of external noise into an interior space. TUFFAK® solid monolithic and multi-wall sheets can offer a permanent solution by reducing the transmittance of sound in a given area.

COMMON TERMS to NOISE REDUCTION

[SOUND REDUCTION INDEX \(ASTM E90-09\)](#)

The Weighted Sound Reduction Index (Rw) is a number used to rate the effectiveness of a soundproofing system (e.g. wall) or material (e.g. polycarbonate). Sound transmission loss for all materials varies with sound frequency with the loss typically being greater at higher frequencies. The higher the transmission loss (higher Rw), the better the material functions as a barrier to the passage of noise. Increasing the Rw by one unit translates to a reduction in sound of approximately 1 dB of noise level. Thicker materials achieve better noise reduction. TUFFAK® solid and multi-wall sheets achieve sound reduction not from absorption but from a reflection of the sound waves.

[STC \(ASTM E413-10\)](#)

STC stands for Sound Transmission Class. This is the most common rating used in North America for determining airborne sound transmission loss between 125 and 4,000 Hz. This range covers common noise including speech, television, music and similar sounds, but does not evaluate the material's ability to block low frequency noise, such as the bass in music or noise from heavy mechanical equipment. Therefore, the standard is considered by some to be outdated and limited in scope.

[OITC \(ASTM E1332-10a\)](#)

OITC stands for Outside-Indoor Transmission Class and is designed to indicate the sound transmission loss between outdoor and indoor spaces in a structure. The OITC rating represents transmission loss frequencies from 80 to 4,000 Hz. While STC is based on a noise spectrum targeting speech sounds, OITC uses a source noise spectrum that considers frequencies down to 80 Hz (aircraft/rail/truck traffic) and is weighted more towards lower frequencies.

SOUND PRESSURE LEVELS ASSOCIATED with COMMON NOISE SOURCES

Subjective Loudness	Sound Pressure (dB)	Noise Source
Painful	140	Jet aircraft takeoff - immediate vicinity
Intolerable	120	Pneumatic hammer at 1 meter
	110	Night club
Extremely noisy	100	Motorcycle
Very noisy	90	Machine shop
Moderately noisy	80	Busy city Highway
	70	Normal car traffic
Quiet	60	Business office
	50	Normal conversation
Very quiet	30	Whispering
	20	Ticking clock
	0	Threshold of hearing

A SOLUTION for NOISE REDUCTION

The table below shows sound reduction levels, in decibels, for TUFFAK® general purpose polycarbonate sheet. The ratings for TUFFAK GP would apply to other grades of solid TUFFAK polycarbonate as well.

mm (inch)	Rw (dB)	STC (dB)	OITC (dB)
3 (0.118")	24	24	19
4.5 (0.177")	27	27	22
6 (0.236")	29	29	24
9.5 (0.375")	33	33	27
12.7 (0.500")	35	34	30
18 (0.710")	37		

As an example, TUFFAK® 0.500" would have a sound reduction of 35 decibels when used as a sound barrier.

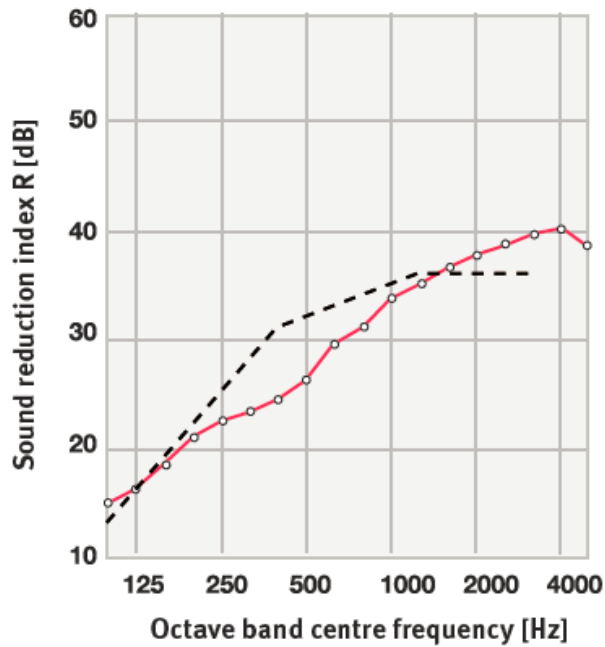
A significant sound reduction can be obtained combining TUFFAK® sheets with an air gap between the sheets.

mm (inch)	mm (inch)	mm (inch)	Rw (dB)	STC (dB)	OITC (dB)
PC 4 (0.158")	50 (1.97")	PC 4 (0.158")	31		
PC 4 (0.158")	150 (5.91")	PC 4 (0.158")	39		
PC 6 (0.236")	30 (1.18")	PC 6 (0.236")	32		
PC 6.35 (0.250")	12.7 (0.50")	PC 6.35 (0.250")		28	23
PC 10 (0.394")	30 (1.18")	PC 10 (0.394")	40		
PC 10 (0.394")	60 (2.36")	PC 10 (0.394")	45		
Glass 6.35 (0.250")	12.7 (0.50")	PC 6.35 (0.250")		31	26
Glass 6.35 (0.250")	12.7 (0.50")	PC 12.7 (0.50")		36	28

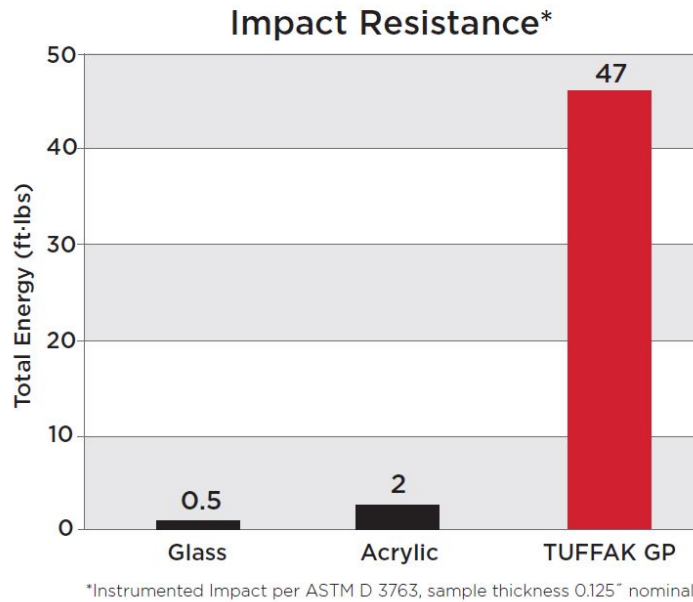
COMPARISON of NOISE REDUCTION CHARACTERISTICS of POLYCARBONATE to OTHER MATERIALS

Subjective Loudness	Sound Pressure (dB)
Acrylic sheet (0.118")	25
Acrylic sheet (0.236")	29
Acrylic sheet (0.472")	33
Glass (0.125")	25
Glass (0.250")	27
Plywood (1")	26
Steel (0.125")	37
Wood stud partition	38

SOUND REDUCTION SOLID POLYCARBONATE SHEET 8 mm (0.315")



TUFFAK® polycarbonate sheet is offered in UV stabilized, clear, tinted and colored. The material is also available with an extended UV and/or abrasion resistant coating. TUFFAK® polycarbonate exhibits high optical clarity and a good flame rating. Since TUFFAK® sheet offers extreme impact strength, it can be used as a transparent or colorful sound barrier to reduce noise levels while increasing safety.



DISCLAIMER:

These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale.