Insulation Insights
Volume 1, Edition 2

Sound Attenuation – Diesel Powered Equipment

Diesel-powered equipment, with its many advantages, does have the drawback of being somewhat noisy. When placed in a room / enclosure with poor sound-absorption characteristics, this noise can be deafening and quite disturbing to those who find themselves in its environs.

As a manufacturer of removable insulation blankets, we are often called upon to provide sound attenuation as well. While standard removable insulation blankets do offer some sound attenuation properties, the correct solution is often a combination of removable blankets, composite foam barrier materials, insulation boards, and barrier curtains. The right choice depends on a number of factors particular to each situation.

Background: What is Sound?

Sound is a change in atmospheric pressure that is interpreted by the ear. The sound pressure level heard by a person in a room is determined both by the sound power radiated by the source of the sound and the acoustic characteristics of the room.

The most common way of measuring sound is in Decibels [dB] which measure both sound power and sound pressure levels and are expressed in logarithmic terms. **Tolerable noise is accepted as 85dBs.** (OSHA standard 29 CFR 1910.95).
To identify the root cause of a noise problem, sound has to be further analyzed into frequency levels [Hz Hertz], which for convenience are separated into 8 or 9 octaves on a frequency scale.

In order to engineer sound attenuation solutions, ideally, both the dB ratings and Octave band Frequency Analysis report are needed. This enables an Acoustics Engineer to address the complete situation within the practical limitations of the available materials and constraints of the individual case.

Sound Attenuation Solutions – Materials

Insulation solutions are based on using combinations of materials to absorb sound, to offer barriers to sound, and to close up places where there is sound leakage.

1. Some materials, such as Fiberglass and Mineral wool, are particularly good in absorbing higher frequency sound in the 1000 to 4000 Hz ranges.
2. Low frequency sounds are difficult to absorb because of their long wavelengths. In general, the absorption of low frequency sound increases with the thickness of the absorber or barrier.

3. Sound will leak through openings where no sound insulation is in place.

In order to give some perspective to the effect of Sound barrier materials and their effectiveness over a full full Octave band we show data for some typical materials used.

Comparitive Charts of three typical absorber materials showing Sound Absorption and NRC [Noise Reduction Coefficients]

Frequency [Hz]							
	125	250	500	1000	2000	4000	NRC
Material							
Fibrous Glass 4lb/cu.ft	***Sound Absorption Coefficients***						
1″ thick	.07	.23	.48	.83	.88	.80	.60
2″ thick	.2	.55	.89	.97	.83	.79	.81
Fibrous Glass 11lb/cu.ft							
1″ thick		.29	.86	.95	.92	.95	.75
Polyurethane Foam [Open Cell]							
1″ thick	.14	.30	.63	.91	.98	.91	.70
2″ thick	.35	.51	.82	.98	.97	.95	.82

Chart showing Transmission Loss and STC [Standard Transmission Loss Coefficient] for a Composite Absorber/Barrier used for lining Engine Rooms and Containers

Frequency [Hz]								
	80	125	250	500	1000	2000	4000	STC
Material	***Transmission Loss [dB]***							
BTMM14C	22	22	22	32	44	50	56	34