



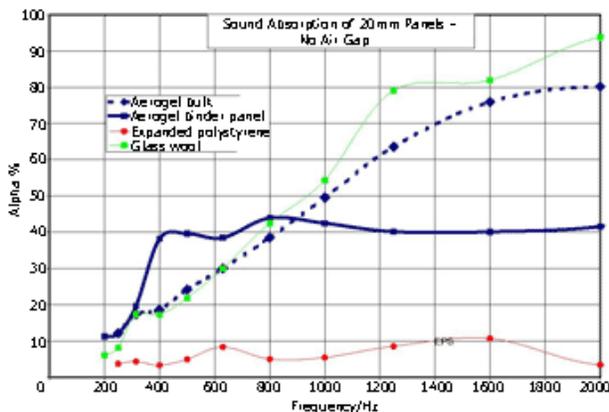
## WHY AEROGEL SOLUTIONS?

# Acoustic Properties

## Acoustic Properties

The key feature of Lumira™ aerogel, formerly Nanogel® aerogel, products in sound control application is the low speed of sound waves (airborne) propagating through the porous medium as well as poor solid vibration transmission - due to the tenuous structure. Speed of sound in a medium is a fundamental material property with important implication in the attenuation of sound waves. To attenuate a sound wave of wavelength  $\lambda$ , it is necessary to use a layer of sound insulation at least  $\lambda/2$  thick. The wavelength of such sound wave is governed by the speed of sound:  $C = \lambda \cdot f$  where  $f$  is the frequency and  $C$  the speed of sound of the medium. Practically, since the wavelength increases as the frequency decreases, the lower the frequency the thicker the layer of sound control material needed.

Lower sound velocity in Lumira aerogel makes the material particularly adapted to low frequency sound control where space is a concern. The spray on form of the product also acts as a dampener, it will significantly modify the resonance frequencies of metal assemblies and act as an impedance matcher between metal layers and air. Figure 1 shows the sound absorption coefficient of several systems for 20 mm thickness (0.79 in). The sound absorption coefficient is the ratio of the total incident energy on a surface minus the energy reflected to the energy incident on the surface.

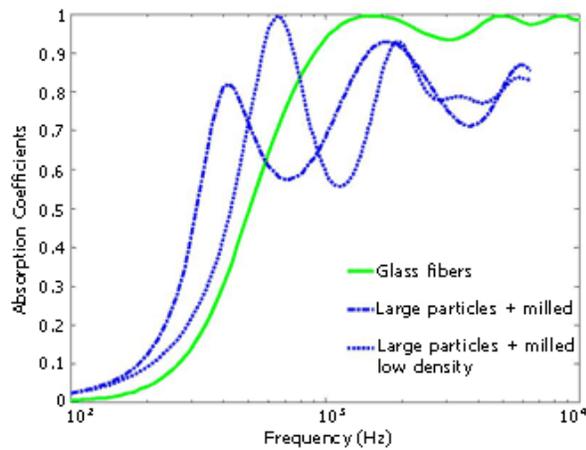


**Figure 1: Sound Absorption coefficient**

The noise reduction coefficient is the average of the absorption at four frequencies (250, 500, 1000, and 2000

Hz). The NRC however does not reflect, material performance at specific frequencies of interest for the application. The sound absorption properties of Lumira granules can be modified to match the needs of a particular application by changing both the mechanical properties of the material as well as the particle size distribution. Figure 2 shows the impact of Lumira aerogel sound absorption composition on the absorption coefficient. Adding low density milled particles to the base product can shift the maximum absorption to higher frequencies.

### Absorption coefficients for aerogel (4 cm)



**Figure 2: Impact of Lumira Composition on Sound Absorption**

Since many of the Lumira properties relevant to acoustic attenuation have a profound impact on the performance of the product in specific application the information above are to be interpreted as generic and non-exhaustive.