Advanced acoustical material tuned for low frequency noise reduction: a case study

Kathleen Kondylas\textsuperscript{a}, Natalia Levit\textsuperscript{b}, Joseph King\textsuperscript{b} and Chris Fuller\textsuperscript{c}

\textsuperscript{a}NEVA Associates Noise Control, 15 Beck Street, Newburyport, MA 01950, USA
\textsuperscript{b}DuPont, 5401 Jefferson Davis Highway, Richmond, VA 23234, USA
\textsuperscript{c}Virginia Tech, 131 Durham Hall, Blacksburg, VA 24061, USA

Low frequency noise is a significant annoyance at very low amplitudes, particularly when outdoor community noise from mechanical equipment penetrates commercial and residential building structures. Mid and high frequencies are selectively attenuated by the exterior walls. However, mitigation of the low frequency noise has been very challenging due to the longer wavelength and higher energy. This work presents case studies of an advanced acoustical material in typical metal panels to mitigate community noise from outdoor mechanical equipment. These advanced materials were developed with a unique combination of patented acoustical and vibration absorbing technology, based on distributed absorbers, layered with standard acoustic materials. The materials provide enhanced low frequency noise (below 300 Hz) over state of the art 10 cm metal panels filled with the fiberglass absorber. The case studies demonstrate superior acoustic performance in low frequency without substantial increase in weight.