Report on the sound level impact of face coverings

Measurements performed: 7/10/2020

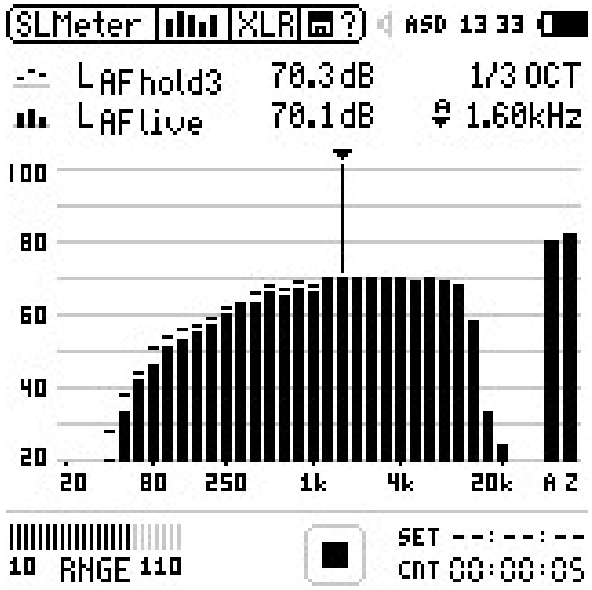
Location: Vistacom | 1902 Vultee St. Allentown Pa. | 610-791-9081 | www.vistacominc.com
Testing engineer and author: Matthew Boyer

Test Environment

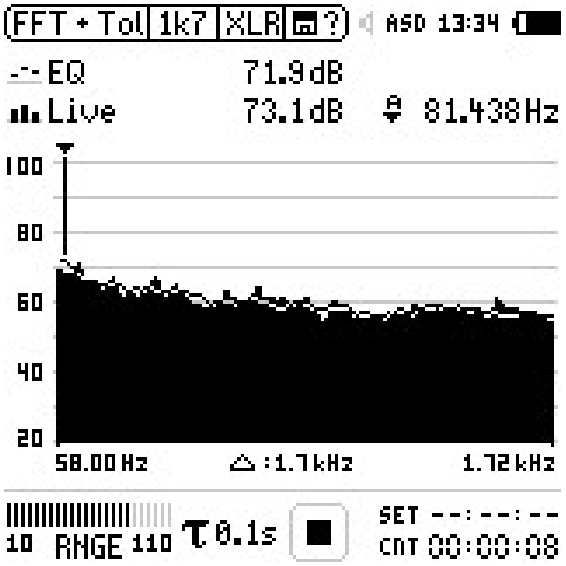
Direct Sound: Reference

SPL Level (A-weighted)

Measurement



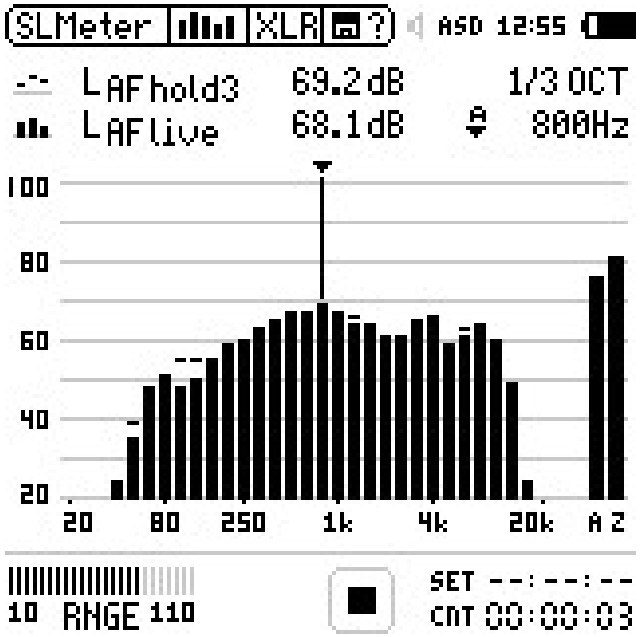
FFT Measurement



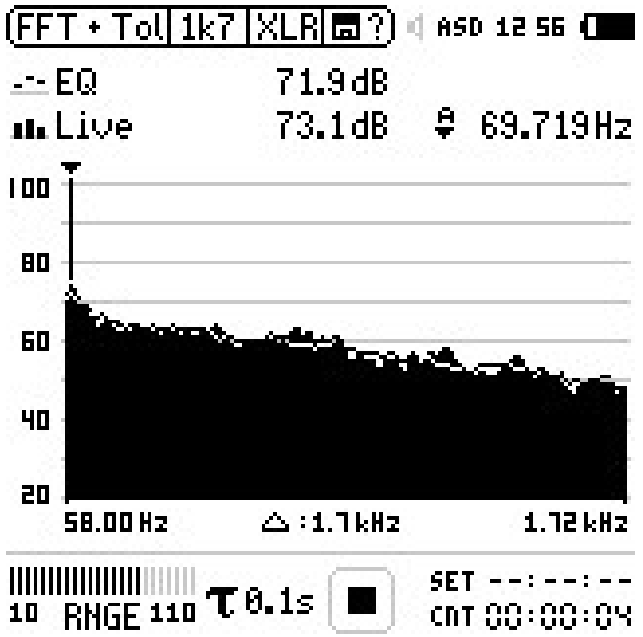
Filtered through N95 mask

SPL Level (A-weighted)

RTA Measurement



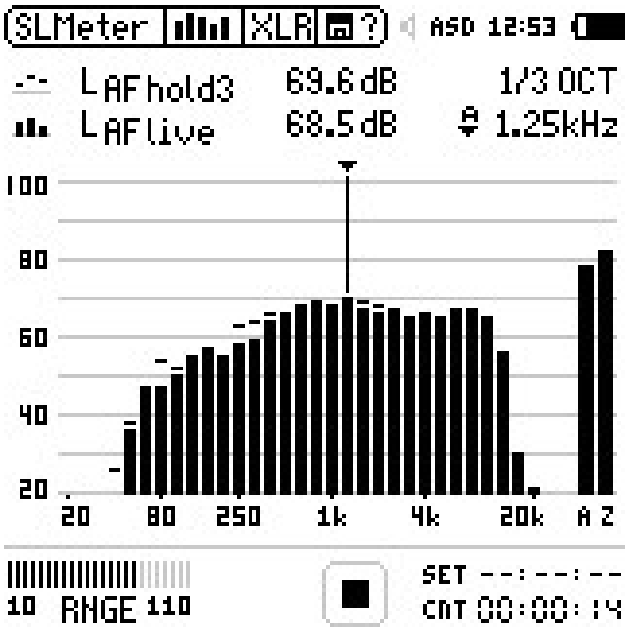
FFT Measurement



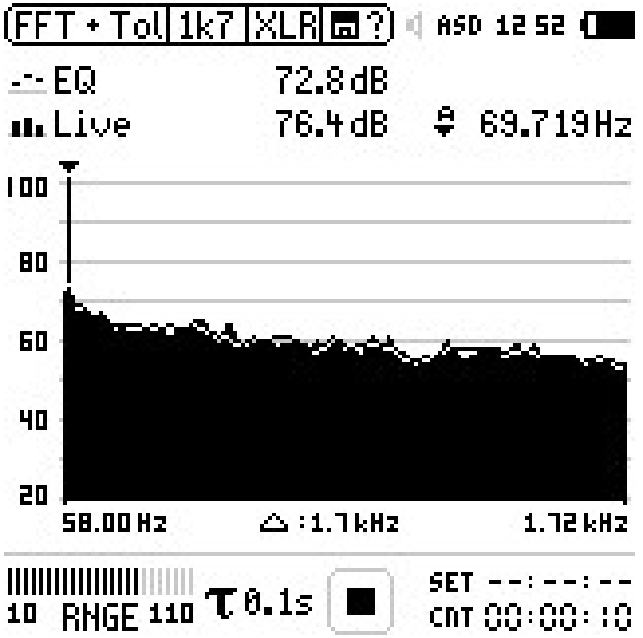
Filtered through double layer cotton mask

SPL Level (A-weighted)

RTA Measurement



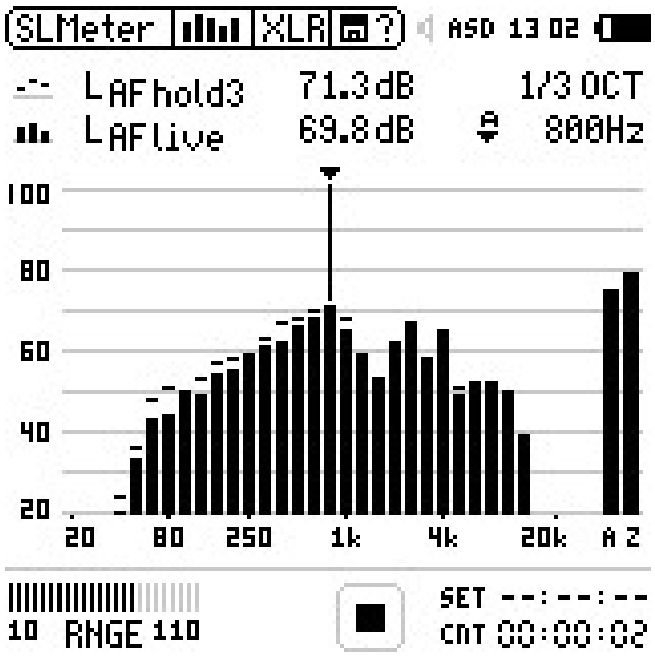
FFT Measurement



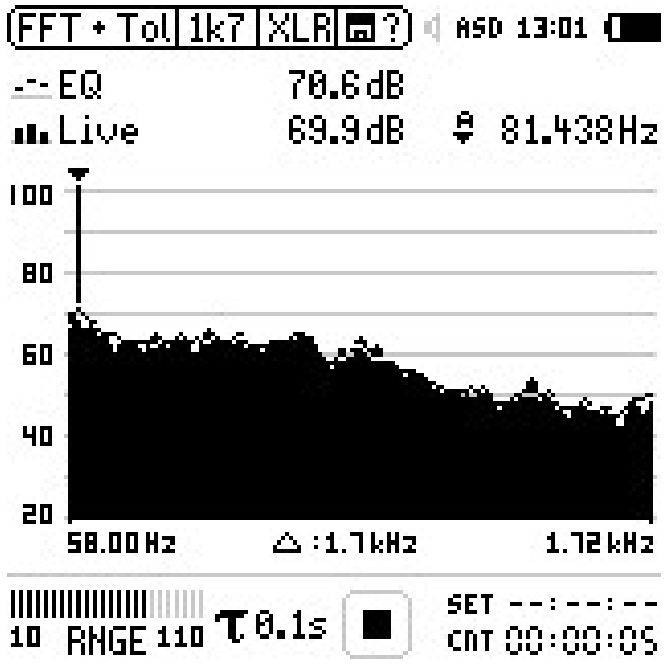
Filtered through plastic face shield

SPL Level (A-weighted)

RTA Measurement



FFT Measurement



Synopsis:

Sound Pressure Level (SPL) is often measured in Decibels using a weighted scale that approximates human hearing response. This is called A-weighting and was used for these tests.

The SPL meter used for measurement was an NTI XL2 calibrated on 2/3/2020.

The sound source used for measurement was an NTI Talkbox calibrated on 6/22/2020.

With regards to SPL, a 6 dB SPL increase is equal to a doubling of intensity whereas a 6 dB SPL decrease is equal to half the sound intensity. That said, people perceive volume changes more subjectively and often a better measurement is the loudness scale. On this scale a 10 dB SPL level change is required to recognize a doubling or halving of sound level.

The tests indicate a measurable decrease in sound pressure level when the mask was placed in front of the sound source. There were also changes in the frequency spectral response. The masks would attenuate higher frequencies.

The mask with the greatest impact was the plastic face shield. The least impact was from the double layer cloth mask with the N95 mask in the middle.

While the level difference is measurable, if we consider the differences based on the loudness scale even the worst performer —the face shield— does not come close to a 10 dB drop in level which would be considered half as loud.

What we do find is the combination of slight attenuation coupled with a slight change of tonal quality combine to create a subjective decrease in intelligibility. I say subjective because all the masks maintained an Excellent STIPA rating.

These tests indicate that no face covering or at least a face covering that provides some layer of protection will be completely acoustically transparent. That said, with only a slight behavioral change i.e. speaking slightly louder and with more articulation, the negative acoustical impact of the mask can be circumvented.

End of report.