ACO TECHNICAL BULLETIN NUMBER 042809-1:
Windscreens for improved low frequency noise (LFN) measurements

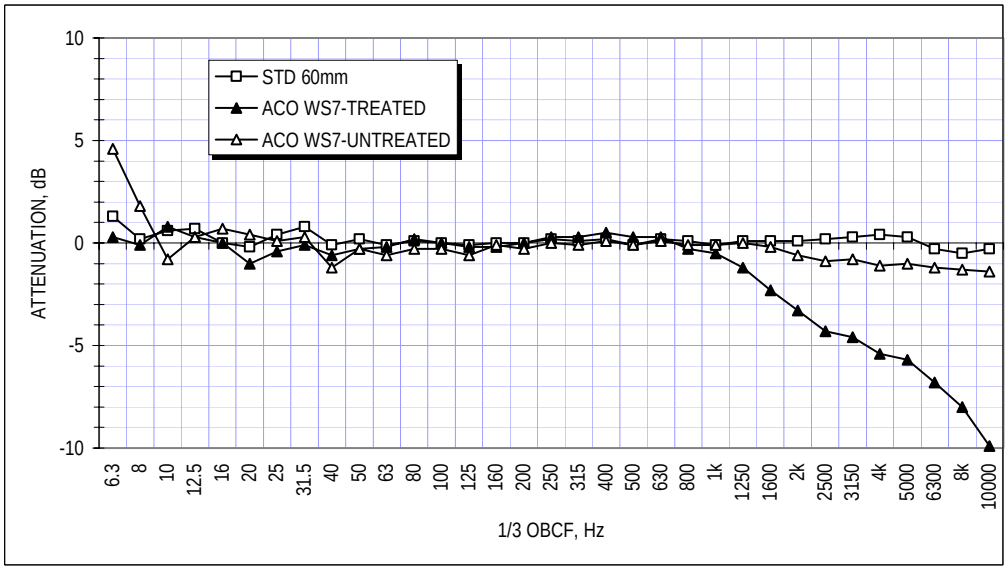
It is well known that larger windscreen diameters reduce turbulence at the microphone face reducing false low frequency readings caused by turbulence. A recent study[1] has quantified the low frequency noise measurement improvements in an aero/acoustic wind tunnel achieved by using ACO Pacific 7 inch diameter products; WS7 and WS7-80T. Model WS7-80T is treated for outdoor weather exposure and has been used for years with good success in harsh environments, whereas Model WS7 is untreated.

Figure 1 below shows the test set up where a baseline untreated, standard diameter windscreen and the ACO Pacific 7 inch screens were tested under stepped quiet airflow only exposure. The attenuation for the windscreens was tested in the duct and in a large anechoic room. Attenuation is defined as the difference in measured level with and without the windscreen in place.

Photos courtesy of Hessler Associates, Inc.

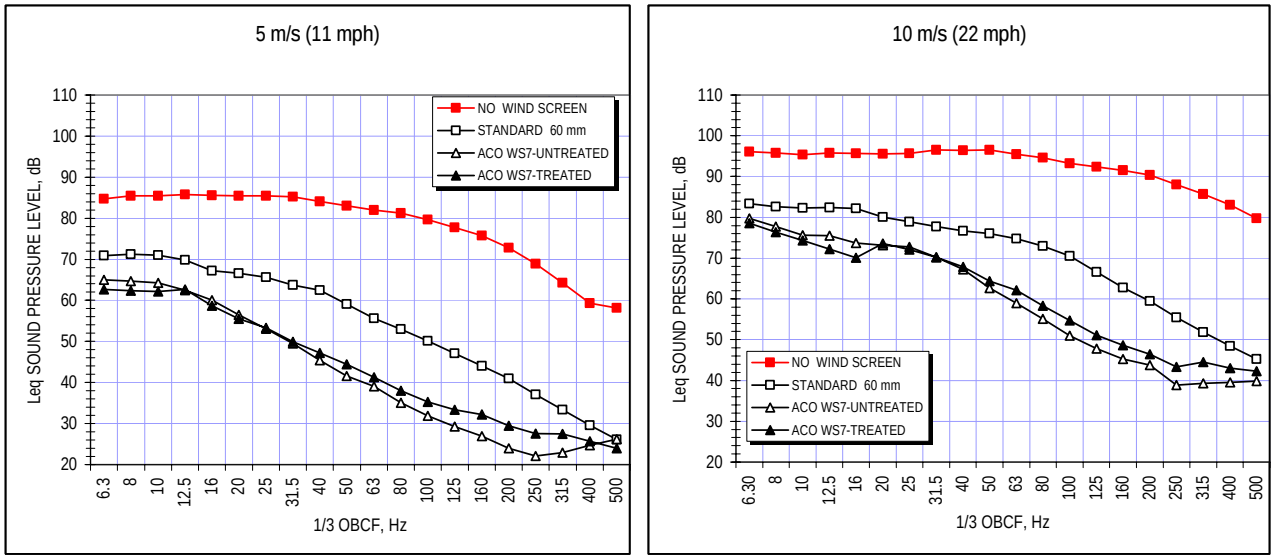
Figure 1: *Test set-up in aero/acoustic wind tunnel showing unprotected microphone and fitted with manufactureres standard 60mm unit and ACO pacific model WS-07*

The measured attenuation is plotted in Figure 2 below that shows substantial high frequency attenuation for the treated 7 inch windscreen. This attenuation may actually be beneficial in leaf-on surveys to reduce insect noise contribution, and may be subtracted from the results to determine the true high frequency levels.



Graphic courtesy of Hessler Associates, Inc.

Figure 2: *Windscreen attenuation fitted with manufactureres standard 60mm unit and ACO pacific model WS7 units*



Graphic courtesy of Hessler Associates, Inc.

Figure 3: *Measured puesdo-wind noise with unprotected and protected microphone with three windscreen models*

The sound pressure level measured in 1/3 octave bands is illustrated on Figure 3 for the 5 and 10 m/s test velocities, important for wind turbine projects. For example, the 7-inch screens offer an 8 to 14 dB improvement at 31.5 Hz at the 5 and 10 m/s flow speed respectively. Reference 1 gives the results for velocities of 2.5, 5, 10, 20 and 30 m/s for evaluating LFN measurements in air-flow streams.

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[1] Hessler, G. F. et al*: "Experimental study to determine wind-induced noise and windscreen attenuation effects on microphone response for environmental wind turbine and other applications"*, Noise Control Engineering Journal, Volume 56, Jul-Aug 2008