

1. Establishing Long-Term Background Noise Level

- a. Instrumentation: ANSI or IEC Type 1 Precision Integrating Sound Level Meter plus meteorological instruments to measure wind velocity, temperature and humidity near the sound measuring microphone. Measurement procedures must meet ANSI S12.9, Part 3.
- b. Measurement location(s): Nearest property line(s) from proposed wind turbines representative of all non-participating residential property within 2.0 miles.
- c. Time of measurements and prevailing weather: The atmosphere must be classified as stable with no vertical heat flow to cause air mixing. Stable conditions occur in the evening and middle of the night with a clear sky and very little wind near the surface. Sound measurements are only valid when the measured wind speed at the microphone does not exceed 2 m/s (4.5 mph).
- d. Long-Term Background sound measurements: All data recording shall be a series of contiguous ten (10) minute measurements. The measurement objective is to determine the quietest ten minute period at each location of interest. Nighttime test periods are preferred unless daytime conditions are quieter. The following data shall be recorded simultaneously for each ten (10) minute measurement period: dBA data includes L_{A90} , L_{A10} , L_{Aeq} and dBC data includes L_{C90} , L_{C10} , L_{Ceq} , plus maximum wind speed at the microphone during the ten minutes and a single measurement of temperature and humidity at the microphone for each new location or each hour whichever is oftener. A ten minute measurement contains valid data provided: Both L_{A10} minus L_{A90} and L_{C10} minus L_{C90} are not greater than 10 dB and the maximum wind speed at the microphone did not exceed 2 m/s during the same ten minute period as the acoustic data.

2. Wind Turbine Sound Immission Limits

No wind turbine or group of turbines shall be located so as to cause wind turbine sound immission at any location on non-participating property containing a residence in excess of the limits in the following table:

Table of Property Line Noise Immission Limits ¹			
Criteria		dBA	dBC
A	Immission above pre-construction background:	$L_{Aeq} = L_{A90} + 5$	$L_{Ceq} = L_{C90} + 5$
B	Maximum immission:	$35 L_{Aeq}$	55 L_{Ceq} for quiet ² rural environment 60 L_{Ceq} for rural-suburban environment
C	Immission spectra imbalance	L_{Ceq} (immission) minus $L_{A90} + 5$ (background) ≤ 20 dB	
D	Prominent tone penalty:	5 dB	5 dB
Notes			
1	Each Test is independent and exceedance of any test establishes non-compliance. Sound "immission" is the wind turbine noise emission as received at a property.		
2	A "Quiet rural environment" is a location 2 miles from a state road or other major transportation artery without high traffic volume during otherwise quiet periods of the day or night.		
3	Prominent tone as defined in IEC 61400-11. This Standard is not to be used for any other purpose.		
¹ Procedures provided in Section 7. Measurement Procedures (Appendix to Ordinance) of the most recent version of "The How To Guide To Siting Wind Turbines To Prevent Health Risks From Sound" by Kamperman and James apply to this table.			

3. Wind Farm Noise Compliance Testing

All of the measurements outlined above in 1. Establishing Long-Term Background Noise Level must be repeated to determine compliance with 2. Wind Turbine Sound Immission Limits. The compliance test location is to be the pre-turbine background noise measurement location nearest to the home of the complainant in line with the wind farm and nearer to the wind farm. The time of day for the testing and the wind farm operating conditions plus wind speed and direction must replicate the conditions that generated the complaint. Procedures of ANSI S12.9- Part 3 apply. The effect of instrumentation limits for wind and other factors must be recognized and followed.

Recommendations in this report reflect our present understanding of wind turbine sound emissions, land-use compatibility, and the effects of sound on health. Anyone choosing to follow these recommendations must assume all risks. Please obtain the most recent version of the criteria from the authors and seek professional assistance in applying these recommendations to any specific community or Wind Energy Conversion System (WECS) development.