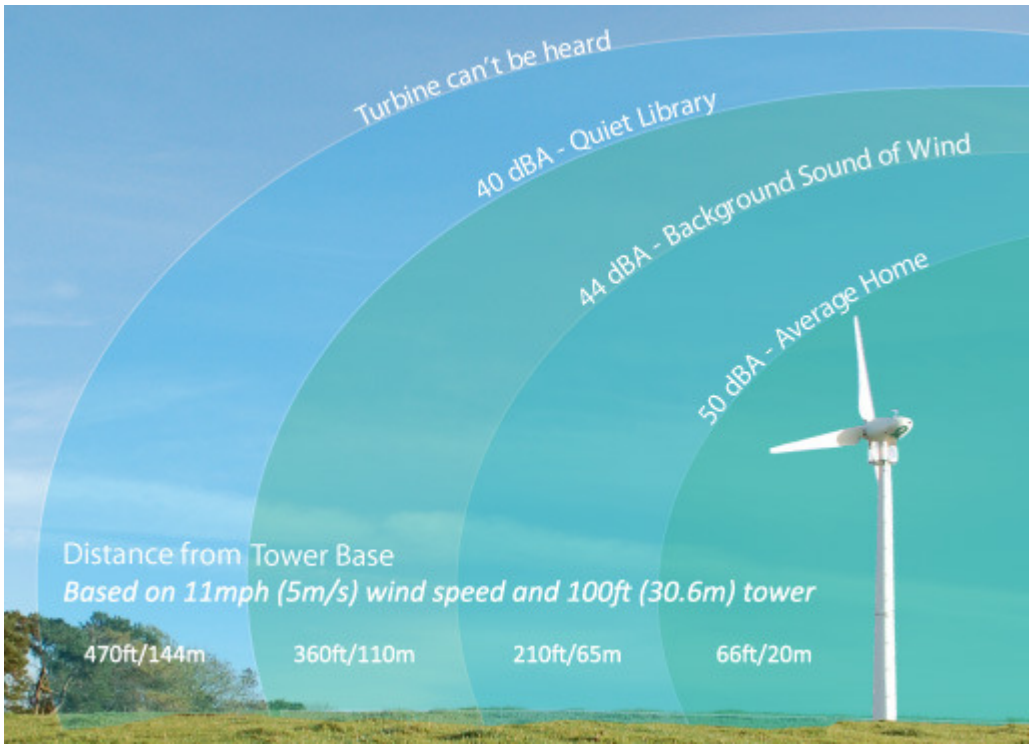
ACOUSTIC PROFILE OF THE E-3120

THE ACOUSTIC PROFILE OF THE ENDURANCE E-3120 50 kW WIND TURBINE



How Quiet is the Endurance E-3120?
The numbers show that the E-3120 is extremely quiet, but the experiences and testimonials of neighbors and owners are even more impressive. Quiet operation was the essential characteristic that Montana State University required for their wind turbine to maintain the learning environment on their campus. Prior to installation, they were assured by two other turbine owners- a farmer in Cornwall, England and the Sault College of Applied Arts and Technology- that the E-3120 was a "very quiet" wind turbine. "Very quiet" were the same words used to describe the E-3120 by Montana State University's neighbors after it was installed.

Sound Measurement and Perception
Sound levels are measured above on the decibel scale, with an "A" weighting to account for how the ear perceives sound (dBA). A one decibel difference is perceptible, and a 10 decibel increase is usually perceived as twice as loud.

Measuring Wind Turbine Acoustics
Acoustic data has been collected and analyzed per IEC standard 61400-11: Wind turbine generator systems – acoustic noise measurement techniques. All data is based on the E-3120-1 three-phase wind turbine at a 100ft (30.6m) hub height. The E-3120-2 single phase turbine has a different acoustic profile. All wind speeds are at turbine hub height.
The turbine sound does not have irritating tones, and is not considered tonal per IEC 61400-11.

AWEA Sound Rating – 48.1 dBA
The American Wind Energy Association (AWEA) sound rating is 48.1 dBA – which is the sound level that is not exceeded 95% of the time in a 5 m/s average annual wind, 173ft (52.6m) from the tower base. This is per the conditions defined in the AWEA *Small Wind Turbine Performance and Safety Standard.*

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- **Explanation of Sound Levels**

E-3120 Sound Level Chart

Distance from tower base		Sound level (dBA)	
ft	m	11 mph wind (5 m/s)	22 mph wind (10 m/s)
33	10	51.0	53.7
66	20	49.9	52.6
98	30	48.5	51.2
131	40	47.1	49.8
164	50	45.8	48.5
197	60	44.5	47.3
230	70	43.5	46.2
262	80	42.5	45.2
295	90	41.6	44.3
328	100	40.7	43.4
394	120	39.3	42.0
459	140	38.0	Inaudible
525	160	Inaudible	Inaudible

Key Sound Data

	11 mph wind (5 m/s)	22 mph wind (10m/s)
Background wind noise level	43.8 dBA	47.0 dBA
Distance at which turbine matches background noise	220 ft (67m)	200 ft (62 m)
Distance at which the turbine is inaudible	470 ft (144m)	440 ft (135m)
35 dBA distance	660 ft (200 m)	900 ft (273 m)
Acoustic power level at turbine	92.1 dBA	94.8 dBA

Common Sound Levels

Sound	Approximate Sound Level
Busy road, 16ft (5m) away	80 dBA
Vacuum cleaner at 3ft (1m)	70 dBA
Normal conversation	60 dBA
Average home	50 dBA
Quiet library	40 dBA
Quiet bedroom at night	30 dBA