

Technical Appendix 10.5: Candidate turbine manufacturer's noise emission data

Data Sheet

ENERCON Wind Energy Converter E-136 EP5 / 4650 kW with TES (Trailing Edge Serrations)

Operating Mode 0 s



Data Sheet
Operating Modes E-136 EP5 / 4650 kW with TES

2 Sound power level

Allocation of the sound power levels to the standardised wind speed (v_s) at a height of 10 m is valid only if based on a logarithmic wind shear law with a roughness length of 0.05 m. Allocation of the sound power levels to the wind speed at hub height (v_H) is valid for all hub heights (HH). During measurements, the wind speed is determined based on the power output and the power curve.

The maximum tonal noise KTN across the entire power range is 1 dB (applies to close range acc. to TR 1:2008 of the Federation of German Windpower and DIN 45681:2005) or $\Delta L_{a,k} < 2$ dB (applies to close range acc. to IEC 61400-11:2012).

The impulse noise KIN across the entire power range is 0 dB (applies to close range acc. to TR 1:2008 and DIN 45645-1:1996).

Due to uncertainty in acoustic measurements (σ_R) and serial product variation (σ_P), the sound power level values indicated in this document are subject to an uncertainty of $\sigma_R = 0.5$ dB(A) und $\sigma_P = 1.2$ dB(A). Standards are TR 1:2008 and IEC 61400-11:2012. If, during measurement, the difference between total noise and extraneous noise is less than 6 dB(A), a greater uncertainty should be assumed.

This data sheet does not constitute a project-specific and/or site-specific warranty of compliance with sound power levels.

2.1 Octave band level

The specified octave band levels of the loudest condition of the tower have been simulated from the one-third octave band level values defined in the frequency bands of DIN EN ISO 266:1997. An octave band level L_O is calculated from 3 one-third octave band levels L_{T1} , L_{T2} und L_{T3} according to the following formula:

$$L_o = 10 \times \log\left(10^{\frac{L_{T1}}{10}} + 10^{\frac{L_{T2}}{10}} + 10^{\frac{L_{T3}}{10}}\right)$$

The individual octave band level values cannot be guaranteed. Only the cumulative level of all octave band levels for each wind speed, which corresponds to the sound power level at that particular wind speed, is a guaranteed quantity.

3.2 Calculated sound power levels – operating mode 0 s

In operating mode 0 s the wind energy converter operates in a power-optimised mode to achieve optimum yield. The highest expected sound power level is 107.2 dB(A) in the nominal power range. After reaching the nominal power, the sound power level will not increase further.

Tab. 4: Technical specifications

Parameter	Value	Unit
Nominal power (P_n)	4650	kW
Nominal wind speed	15.5	m/s
Minimum operating speed	3.6	rpm
Speed setpoint	11.2	rpm

The following sound power levels apply, taking into account the specified uncertainties in ch. 2, p. 9.

Tab. 5: Calculated sound power level in dB(A), based on standardised wind speed v_s at a height of 10 m

Wind speed (v_s) at a height of 10 m	Sound power level in dB(A)		
	E-136 EP5-MST-109- FB-C-01	E-136 EP5-MST-120- FB-C-01	E-136 EP5-MST-132- FB-C-02
3 m/s	90.1	90.5	90.8
3.5 m/s	94.2	94.5	94.8
4 m/s	97.5	97.8	98.1
4.5 m/s	100.4	100.7	100.9
5 m/s	102.9	103.2	103.6
5.5 m/s	105.3	105.5	105.5
6 m/s	105.9	106.0	106.0
6.5 m/s	106.5	106.6	106.7
7 m/s	107.1	107.2	107.2
7.5 m/s	107.2	107.2	107.2
8 m/s	107.2	107.2	107.2
8.5 m/s	107.2	107.2	107.2
9 m/s	107.2	107.2	107.2
9.5 m/s	107.2	107.2	107.2
10 m/s	107.2	107.2	107.2
10.5 m/s	107.2	107.2	107.2
11 m/s	107.2	107.2	107.2
11.5 m/s	107.2	107.2	107.2
12 m/s	107.2	107.2	107.2
95 % P_n	107.2	107.2	107.2



3.3 Octave band levels of the loudest condition

3.3.1 Octave band level HH

Tab. 7: Octave band level in dB(A), based on wind speed v_h at hub height

v_h in m/s	Octave band level centre frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
10.5	74.1	84.2	93.3	100.7	102.5	100.7	98.2	93.2	85.8

3.3.2 Octave band level E-136 EP5-MST-109-FB-C-01

Tab. 8: Octave band level in dB(A), based on standardised wind speed v_s at a height of 10 m

v_s at a height of 10 m in m/s	Octave band level centre frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
7.5	74.6	84.6	93.4	100.5	102.4	100.9	98.4	93.3	85.9

3.3.3 Octave band level E-136 EP5-MST-120-FB-C-01

Tab. 9: Octave band level in dB(A), based on standardised wind speed v_s at a height of 10 m

v_s at a height of 10 m in m/s	Octave band level centre frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
7	73.8	84.0	93.2	100.8	102.6	100.6	98.1	93.1	85.7

3.3.4 Octave band level E-136 EP5-MST-132-FB-C-02

Tab. 10: Octave band level in dB(A), based on standardised wind speed v_s at a height of 10 m

v_s at a height of 10 m in m/s	Octave band level centre frequency in Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
7	73.9	84.1	93.2	100.7	102.5	100.6	98.1	93.1	85.7