



Evance Iskra R9000 Acoustic Noise Assessment according to BWEA Performance and Safety Standard - Summary

Issue 02

Evance

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1. Introduction

Evance are receiving an increasing number of requests from planning authorities in the UK for noise data for the R9000 wind turbine that is collected, analysed and reported according to the methods defined in the BWEA Performance and Safety Standard¹, and this document has been produced to satisfy this requirement.

Two reports have been produced:

- (1) A summary report that provides the noise map. This is the key data for planning application purposes.
- (2) A detailed noise report that describes the test method and provides the raw data.

At the time of writing, Evance are working towards the MCS certification of the R9000 Wind Turbine, which includes producing a noise report in this same BWEA format. However, at the current time this report has not been subjected to external review by a certifying body and therefore the publishing of this report does not imply that Evance has completed the MCS certification process.

2. Test Summary

Noise measurements over a hub height wind speed range from 2.9m/s to 11.1m/s, were carried out at Evance's test site on an Iskra AT5-1 wind turbine mounted on a free-standing 12m tower. The measurements were carried out in accordance with the BWEA Small Wind Turbine Performance and Safety Standard¹ (29 February 2008 Edition).

A summary of the report is shown below in Figure 1. The key results are the Declared Apparent Emission Sound Power Level, $L_{Wd,8m/s}$, at 8m/s hub height wind speed and noise immission predictions for a range of slant distances and hub height wind speeds.

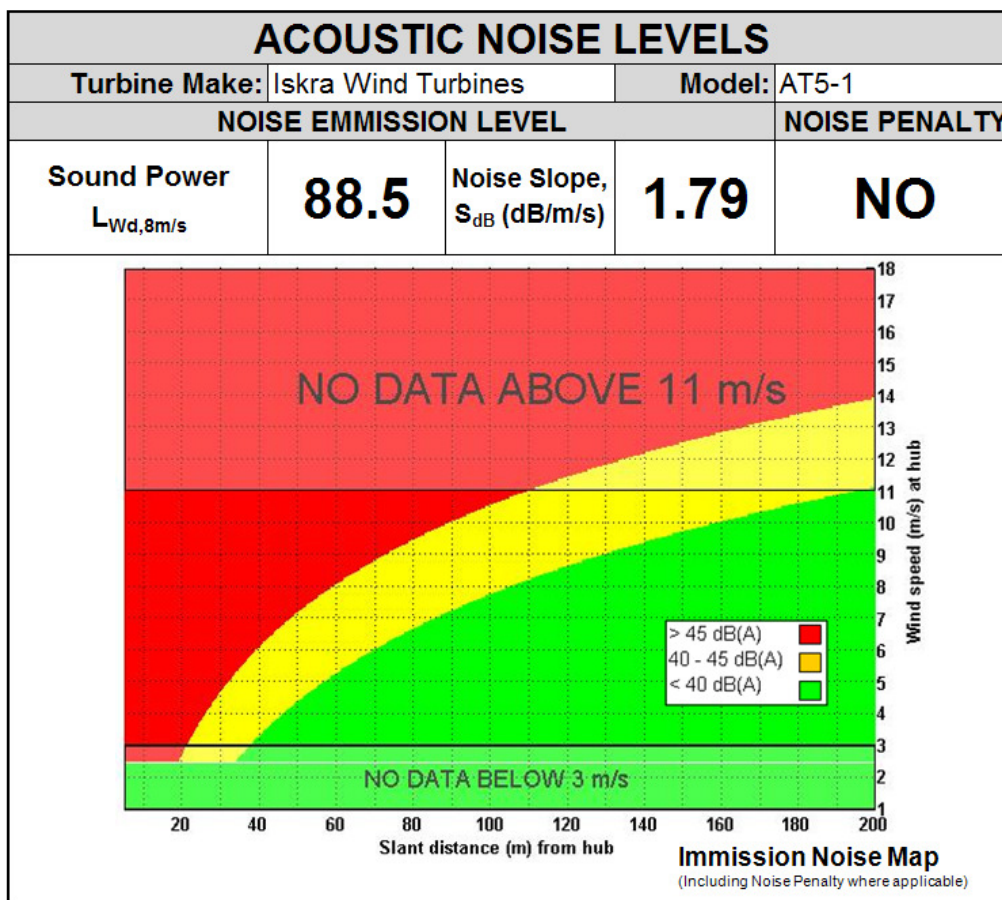


Figure 1 - Noise label

No measurements of directivity were undertaken but the turbine was subjectively much quieter in the plane of the blades (perpendicular to wind direction) than the measured downwind location.

The assessment established the turbine should not be declared as 'tonal' and therefore no penalty should be applied.

The BWEA Reference Sound Levels at 25m and 60m at an 8m/s hub height wind speed are:

$$L_{p,25m} = 52.5\text{dB(A)}$$

$$L_{p,60m} = 45\text{dB(A)}$$

Guidance on the use of the Immission Noise Map can be found in Appendix A of this report and the BWEA standard¹.



3. References

1. Small Wind Turbine Performance and Safety Standard. British Wind Energy Association. 29 Feb 2008



4. Appendix 1 - Guidance on the use of the Immission Noise Map

The following procedure can be used to assist the reader in considering the suitability of a prospective site. This method is the same as in the BWEA standard¹, except that it also includes a look-up chart based on the noise map provided in this report to simplify the process.

The method is based on the NOABL mean wind speed database which provides wind data at 45m, 25m and 10m height in 1 km squares covering Great Britain and Northern Ireland.

The BWEA standard defines the following process:

1. Find the national grid reference for the proposed site. This can be found from a map or from the Postcode if a suitable conversion program is available. Shorten the reference to the NOABL required format; e.g. if the Grid Reference is NS641532, then the NOABL input value is NS 64 53.
2. Use NOABL to get the average annual wind, $V_{avg,10}$ at 10m height for the location.
3. Assume a Rayleigh wind speed distribution and therefore calculate the 90% wind $V_{90,10}$ for 10m height as:

$$V_{90,10} = 1.52 * V_{avg,10}$$

4. Apply a wind correction factor from 10m height using a power law (in accordance with IEC 61400-2) to get an estimate of wind at the installed rotor centre height, H, as:

$$V_{90,H} = V_{90,10} * (H/10)^{0.2}$$

5. Draw a horizontal line on the immission noise map at the $V_{90,H}$ wind speed.
6. Read off the distance for the 45dB(A) and 40dB(A) values.
7. Compare these distances with the slant distances to the nearest noise sensitive location(s) for the planned installation.

The value of 45dB(A) is based on World Health Organisation (WHO) guidance. The second line at 40dB(A) has been included in the standard since at the time of writing firm criteria had not been agreed and adopted by all parties involved in the planning process relating to wind turbines and it therefore this provides a measure of the sensitivity of the process to the assumed noise criteria.

In order to simplify the process, Stages 3 to 6 in the list above have been carried out for a 12m and 15m tower, as shown in Figure 2.

The x-axis is the annual mean wind speed at 10m height and can be found from the NOABL database as described above. The solid lines provide the slant distance (straight line distance between rotor hub and noise sensitive location) that is predicted to meet the 45dB(A) noise criterion for the wind speed that will be exceeded 10% of the time. The dotted lines are for the 40dB(A) criterion.

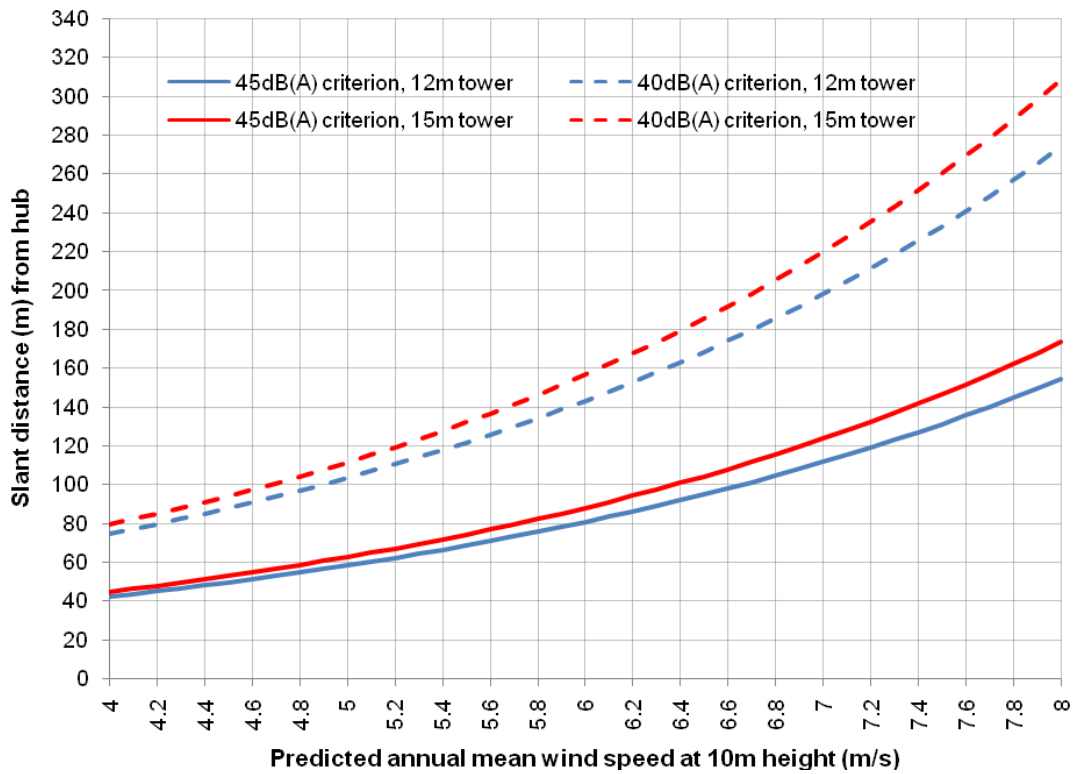


Figure 2 - AMWS noise immission summary