's Hertogenbosch, October 6th 2021

On October 5th 2021 Technisch bureau van Eeden performed measurements of the sound pressure level of two 3 m Flower Turbines. The wind speed was approximately 5 m/s and the measurement distance 4,5 m from the centres of both turbine blades. The ground surface is reflecting. The microphone set up described in IEC 61400-11: 2013 was used for maximum reduction of wind induced noise in the microphone.

It was not possible to distinguish the noise of the turbines from the background / ambient noise by measurement, e.g. the measured sound pressure level with the turbines running was equal to the sound pressure level of the background noise at the same wind speed.

The A-weighted sound pressure level was 45 dB* regardless of the turbine operation. The calculation rules for correction for background noise allow a maximum correction of 3 dB** for determination of the sound pressure level of the turbine under investigation (IEC 61400-11: 2013 clause 9.2.4). For these situations the resulting sound pressure level shall be considered as an estimate of the upper limit of the actual sound pressure level*.

The estimate of the upper limit of the A-weighted sound pressure level of two 3 m turbines at 4,5 m distance is 42 dB, and thus for a single 3 m turbine 39 dB.

The table below shows the estimate of the upper limit of the A-weighted sound pressure level at various distances, with neglect of ground effects, shielding and air absorption.

Estimated upper limit of the A-weighted sound pressure level 3 m Flower Turbine at 5 m/s				
At distance R	10 m	25 m	50 m	100 m
L_{pA}	32 dB	24 dB	18 dB	12 dB

Sound pressure levels are in decibel (dB) re. 20 µPa.

The estimated upper limit for the A-weighted sound power level L_{WA} of a 3 m Flower Turbine at wind speed 5 m/s is 63 dB re. 1 pW.

This rationale only refers to airborne emission of sound, e.g. it excludes possible sources of structure born sound. Generally structure born sound is not an issue because the turbine must be mounted on structures with sufficient mass and stiffness.

M. van Eeden - B.Eng. (Applied physics)

Michiel van Eeden

* The measurements have been conducted during the lowest ambient noise available. The total measurement duration was 80 seconds in a 4 hour time frame.

** Depending on which standard is referred to, the A-weighed sound pressure level with the sound source in operation shall be at least 3 dB or 6 dB higher than the A-weighed sound pressure level of the background noise in order to determine the actual sound pressure level of the source within the requirements of that standard. It is not likely that such condition can be met for a 3 m Flower Turbine, regardless of the wind speed.

Technisch bureau van Eeden

Postbus 5027 . 5201GA 's-Hertogenbosch . tel: +31 73 6149615 . advies@tbve.nl