

DMS 0049-4888\_V01

# V117-3.3/3.45MW

## Third Octaves according to General Specification



## Abstract

This document serves as a paper behind the General Specification.

The document describes the measured/estimated third octave spectra for noise levels according to the General Specification.

The document is a living document and will be updated regularly.

When new measurements exist the document might be updated.

---

## Contents

1.	Introduction.....	4
2.	Method.....	4
	2.1 Procedure.....	4
	2.2 Physical environment.....	4
3.	Results.....	5
4.	Limitations .....	14
5.	Recalculation to 10 m wind speeds.....	14

## 1. Introduction

The purpose of this document is to present the third octave noise spectra corresponding to the estimated sound power levels given in General Specification DMS 0035-1209\_10.

The presented octaves are based on internal measurement results obtained during Sep & Oct 2013 on a V117 turbine with clean blades located at Lem Kær in Denmark, and on a V117 turbine located at Kikkenborg in Denmark during Sep & Oct 2014 for blades mounted with serrated trailing edges.

In order to simplify use of the presented data, hub height wind speeds are used as reference for all values instead of the traditional 10 m height wind speeds. This means that the presented data are made independent of turbine hub height, and needs to be recalculated to 10 m wind speeds for actual hub heights, in case references to 10 m wind speeds are required.

## 2. Method

### 2.1 Procedure

During measurements, a very large number of correlated values for noise emission spectra and turbine operating parameters are identified.

From these a relation between noise emission within each 1/3 octave band, wind speed and operational conditions are extracted. By combination of these extracted values and the actual turbine operation, an estimate of the actual 1/3 octave performance is obtained.

In order to secure that measurement system limitations are not influencing the findings, the frequency content are limited to the frequency range 6.3 Hz to 8 kHz. The stated spectral values are thus representative for the expected noise emission from the turbine at each wind speed.

The method is verified as giving results corresponding to direct measured values.

The reported wind speed range cover hub height wind speeds from 3 to 20 m/s. Extrapolations outside this wind speed range is not possible due to limitations in the measured input data.

Since not including any information whatsoever on uncertainties, this procedure does not enable issuing guarantees on the values.

### 2.2 Physical environment

The results are valid for the downwind reference position as defined according to IEC 61400-11 Ed.3.

Applicable environmental conditions are thus corresponding to the standardized requirements as described in directly and indirectly in IEC 61400-11.

These can be interpreted as air density 1.225 kg/m<sup>3</sup>, yaw errors below +/- 15 deg. and vertical inflow angles below +/- 10 deg. Blade condition is clean and undamaged with all serration elements intact for the noise modes including serrated trailing edges.

### 3. Results

Expected octave band performance for all noise modes, V117-3.3MW 50/60Hz IEC3A

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	23.5	22.2	22.7	24.3	26.0	27.4	28.2	28.2	28.8	29.8	30.3	30.8	31.2	31.5	31.8	32.0	32.2	32.3
8 Hz	27.1	26.1	27.6	30.1	32.6	34.7	36.1	36.3	36.7	37.5	37.9	38.3	38.5	38.7	39.0	39.1	39.2	39.3
10 Hz	29.7	29.6	31.9	35.2	38.3	40.9	42.7	43.3	43.4	43.4	43.4	43.5	43.5	43.5	43.6	43.5	43.5	43.5
12.5 Hz	34.5	35.0	37.9	41.7	45.2	48.2	50.4	51.2	51.0	50.7	50.4	50.3	50.1	50.0	49.9	49.8	49.7	49.5
16 Hz	39.6	40.4	43.5	47.5	51.2	54.3	56.6	57.5	57.2	56.7	56.3	56.0	55.7	55.6	55.4	55.3	55.1	54.9
20 Hz	45.1	46.0	49.2	53.2	56.9	60.1	62.5	63.4	63.1	62.5	62.1	61.8	61.5	61.4	61.2	61.0	60.8	60.6
25 Hz	51.7	52.2	54.9	58.3	61.6	64.4	66.4	67.1	67.0	66.6	66.3	66.2	66.0	65.9	65.8	65.7	65.6	65.4
31.5 Hz	57.2	57.9	60.1	63.1	66.0	68.5	70.4	71.1	70.8	70.4	70.1	69.9	69.7	69.6	69.4	69.3	69.1	69.0
40 Hz	62.1	62.7	64.7	67.4	70.0	72.2	73.9	74.6	74.4	74.0	73.6	73.5	73.2	73.1	73.0	72.8	72.7	72.5
50 Hz	67.0	67.8	69.5	72.0	74.4	76.5	78.1	78.8	78.5	77.9	77.5	77.3	77.0	76.8	76.7	76.5	76.3	76.1
63 Hz	74.7	74.3	75.4	77.3	79.2	80.9	82.0	82.3	82.5	82.7	82.9	83.0	83.1	83.2	83.3	83.3	83.3	83.3
80 Hz	74.9	75.7	77.0	78.8	80.7	82.3	83.7	84.3	83.9	83.3	82.9	82.6	82.3	82.1	81.9	81.7	81.5	81.3
100 Hz	78.4	79.6	80.8	82.6	84.4	86.0	87.3	88.0	87.5	86.6	86.0	85.6	85.1	84.9	84.6	84.4	84.1	83.8
125 Hz	77.9	78.4	80.7	83.8	86.7	89.2	91.0	91.7	91.6	91.3	91.0	90.9	90.7	90.6	90.5	90.4	90.3	90.2
160 Hz	76.5	78.3	80.7	83.6	86.4	88.8	90.8	91.8	91.1	89.8	88.9	88.3	87.7	87.3	87.0	86.6	86.3	85.9
200 Hz	80.1	81.2	83.1	85.7	88.1	90.3	92.0	92.8	92.3	91.5	90.9	90.6	90.1	89.9	89.7	89.4	89.2	88.9
250 Hz	81.1	82.5	84.8	87.6	90.4	92.7	94.6	95.6	94.9	93.9	93.2	92.7	92.2	91.9	91.6	91.3	91.0	90.7
315 Hz	83.5	84.6	86.6	89.2	91.7	93.9	95.6	96.4	95.9	95.1	94.6	94.2	93.8	93.6	93.3	93.1	92.9	92.6
400 Hz	79.9	80.7	83.6	87.3	90.8	93.7	95.9	96.8	96.5	96.0	95.6	95.4	95.1	95.0	94.9	94.7	94.5	94.4
500 Hz	79.2	79.7	83.0	87.1	90.9	94.2	96.6	97.4	97.2	96.9	96.7	96.5	96.3	96.3	96.2	96.1	96.0	95.8
630 Hz	80.8	80.9	84.1	88.2	92.1	95.4	97.7	98.4	98.4	98.4	98.4	98.4	98.3	98.4	98.4	98.3	98.3	98.2
800 Hz	80.7	80.7	84.1	88.6	92.7	96.2	98.6	99.3	99.4	99.5	99.5	99.5	99.5	99.6	99.6	99.6	99.5	99.5
1 kHz	81.5	81.3	84.6	89.0	93.1	96.6	98.9	99.5	99.8	100.1	100.3	100.4	100.5	100.6	100.7	100.8	100.8	100.8
1.25 kHz	80.6	80.0	83.3	87.7	91.8	95.4	97.7	98.2	98.5	99.1	99.4	99.7	99.9	100.0	100.2	100.3	100.4	100.5
1.6 kHz	79.7	79.2	82.3	86.6	90.6	94.0	96.2	96.8	97.1	97.6	97.8	98.1	98.3	98.4	98.6	98.6	98.7	98.8
2 kHz	78.6	78.2	81.2	85.2	89.0	92.3	94.4	94.9	95.2	95.6	95.8	96.0	96.1	96.2	96.3	96.4	96.4	96.5
2.5 kHz	77.9	77.7	80.5	84.2	87.7	90.7	92.8	93.3	93.5	93.7	93.8	94.0	94.0	94.1	94.2	94.2	94.2	94.2
3.15 kHz	77.3	77.7	79.9	82.9	85.8	88.3	90.2	90.8	90.7	90.5	90.3	90.2	90.0	90.0	89.9	89.8	89.7	89.6
4 kHz	77.8	78.3	80.2	82.8	85.3	87.5	89.1	89.8	89.6	89.2	88.9	88.7	88.5	88.4	88.3	88.1	88.0	87.8
5 kHz	73.6	75.8	77.1	78.7	80.3	81.7	83.2	84.2	83.2	81.6	80.5	79.8	79.0	78.6	78.1	77.7	77.2	76.8
6.3 kHz	71.3	74.0	74.4	75.0	75.6	76.3	77.4	78.4	77.1	75.0	73.6	72.6	71.6	71.0	70.4	69.8	69.3	68.7
8 kHz	71.0	72.1	71.3	70.8	70.6	70.6	70.8	71.3	70.7	69.8	69.1	68.6	68.2	67.9	67.6	67.3	67.0	66.8
A-wgt	92.5	93.0	95.5	99.0	102.4	105.5	107.6	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3

Table 1 Expected 1/3 octave band performance Mode 0 – Clean blades

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	21.4	20.9	22.3	24.8	27.5	30.0	31.8	32.2	32.5	33.1	33.3	33.6	33.9	34.1	34.2	34.3	34.4	34.5
8 Hz	18.4	16.6	20.2	25.4	30.6	35.2	38.0	38.3	39.4	41.1	42.2	43.0	43.8	44.3	44.8	45.2	45.6	45.9
10 Hz	21.6	20.0	24.2	30.0	35.7	40.7	43.8	44.3	45.3	46.9	47.8	48.5	49.2	49.7	50.2	50.5	50.8	51.2
12.5 Hz	32.4	31.0	34.5	39.4	44.3	48.6	51.3	51.8	52.6	54.0	54.8	55.4	56.0	56.5	56.9	57.1	57.4	57.7
16 Hz	36.6	35.5	39.4	44.8	50.1	54.7	57.7	58.3	58.9	60.1	60.7	61.2	61.8	62.1	62.4	62.6	62.9	63.1
20 Hz	38.7	37.8	42.4	48.5	54.5	59.7	63.1	63.8	64.4	65.5	66.1	66.6	67.1	67.4	67.7	67.9	68.1	68.3
25 Hz	45.6	44.1	48.1	53.7	59.2	64.0	67.0	67.5	68.4	69.8	70.7	71.3	72.0	72.4	72.9	73.1	73.4	73.7
31.5 Hz	52.7	51.3	54.7	59.6	64.5	68.7	71.5	71.9	72.7	74.1	74.9	75.5	76.2	76.6	77.0	77.2	77.5	77.8
40 Hz	56.6	55.3	58.6	63.3	68.1	72.3	75.0	75.4	76.2	77.5	78.3	78.9	79.5	79.9	80.3	80.6	80.9	81.1
50 Hz	62.1	60.9	63.8	68.0	72.3	76.1	78.6	79.0	79.7	80.9	81.6	82.2	82.7	83.1	83.5	83.7	84.0	84.2
63 Hz	67.5	66.3	68.6	72.1	75.8	79.1	81.2	81.6	82.2	83.4	84.0	84.6	85.1	85.4	85.8	86.0	86.2	86.4
80 Hz	73.3	72.4	73.9	76.6	79.6	82.3	84.1	84.4	84.9	85.8	86.3	86.8	87.2	87.4	87.7	87.9	88.0	88.2
100 Hz	76.3	76.1	77.7	80.3	83.2	85.8	87.7	88.2	88.4	88.9	89.1	89.3	89.5	89.6	89.8	89.8	89.9	89.9
125 Hz	75.2	75.0	77.4	80.9	84.6	87.8	90.1	90.7	90.9	91.3	91.5	91.7	91.9	92.0	92.1	92.2	92.2	92.3
160 Hz	78.0	78.1	79.8	82.5	85.4	88.0	89.9	90.5	90.6	90.8	90.8	90.8	90.9	91.0	91.0	91.0	91.0	91.0
200 Hz	79.4	79.9	81.5	83.9	86.6	89.0	91.0	91.6	91.5	91.4	91.3	91.2	91.2	91.2	91.1	91.0	91.0	90.9
250 Hz	79.9	80.6	82.5	85.1	88.1	90.7	92.8	93.5	93.3	93.1	92.8	92.6	92.5	92.4	92.3	92.2	92.1	92.0
315 Hz	81.6	82.2	83.8	86.2	88.9	91.4	93.3	94.0	93.8	93.7	93.5	93.4	93.4	93.3	93.2	93.2	93.1	93.0
400 Hz	80.7	81.4	83.1	85.7	88.5	91.1	93.1	93.8	93.6	93.4	93.2	93.1	93.0	92.9	92.8	92.7	92.6	92.5
500 Hz	79.0	79.8	82.2	85.3	88.7	91.7	94.0	94.9	94.6	94.3	94.0	93.8	93.7	93.6	93.5	93.3	93.2	93.0
630 Hz	77.2	78.1	81.0	84.9	88.8	92.3	95.0	95.9	95.7	95.4	95.1	94.9	94.8	94.7	94.6	94.4	94.3	94.2
800 Hz	76.6	77.4	80.5	84.6	88.8	92.5	95.2	96.2	96.0	95.7	95.4	95.3	95.2	95.1	95.0	94.9	94.7	94.6
1 kHz	77.0	77.6	80.6	84.5	88.6	92.1	94.8	95.6	95.5	95.5	95.3	95.2	95.2	95.1	95.1	95.0	94.9	94.8
1.25 kHz	77.5	77.6	80.3	84.0	87.8	91.1	93.6	94.3	94.4	94.6	94.6	94.6	94.7	94.8	94.8	94.8	94.8	94.8
1.6 kHz	79.0	78.8	81.0	84.3	87.7	90.8	93.0	93.5	93.7	94.2	94.4	94.6	94.8	94.9	95.0	95.1	95.1	95.1
2 kHz	78.2	78.3	80.3	83.4	86.6	89.5	91.7	92.3	92.4	92.6	92.6	92.7	92.9	92.9	93.0	93.0	93.0	93.0
2.5 kHz	80.0	80.0	81.6	84.2	87.1	89.7	91.7	92.2	92.3	92.6	92.6	92.8	92.9	93.0	93.0	93.0	93.1	93.0
3.15 kHz	78.3	78.0	79.6	82.3	85.2	87.8	89.7	90.1	90.4	90.9	91.2	91.4	91.6	91.8	91.9	92.0	92.1	92.1
4 kHz	78.5	78.0	79.3	81.7	84.5	86.9	88.6	89.0	89.3	90.0	90.3	90.6	90.8	91.0	91.2	91.3	91.4	91.5
5 kHz	76.3	75.9	76.8	78.7	80.9	83.0	84.4	84.8	85.1	85.6	85.8	86.1	86.3	86.4	86.6	86.7	86.7	86.8
6.3 kHz	73.0	72.1	72.9	74.7	77.0	79.0	80.4	80.7	81.2	82.0	82.5	82.9	83.3	83.6	83.8	84.0	84.2	84.3
8 kHz	66.6	64.6	65.5	67.8	70.4	72.7	74.1	74.0	75.0	76.8	77.8	78.6	79.4	79.9	80.4	80.7	81.1	81.4
A-wgt	91.3	91.6	93.5	96.5	99.8	102.8	105.0	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7

**Table 2 Expected 1/3 octave band performance Mode 0 – Serrated trailing edges**

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	21.4	20.9	22.3	24.8	27.5	29.9	31.4	31.9	32.1	32.6	32.9	33.2	33.5	33.7	33.8	33.9	34.0	34.2
8 Hz	18.4	16.6	20.2	25.4	30.6	35.0	37.4	38.0	39.1	40.7	41.8	42.6	43.4	43.9	44.4	44.8	45.1	45.6
10 Hz	21.6	20.0	24.2	30.0	35.7	40.5	43.2	43.9	45.0	46.4	47.4	48.1	48.8	49.3	49.8	50.1	50.4	50.8
12.5 Hz	32.4	31.0	34.5	39.4	44.3	48.4	50.8	51.4	52.3	53.6	54.4	55.0	55.6	56.1	56.5	56.7	57.0	57.4
16 Hz	36.6	35.5	39.4	44.8	50.1	54.5	57.1	57.8	58.6	59.6	60.3	60.8	61.4	61.7	62.0	62.2	62.4	62.7
20 Hz	38.7	37.8	42.4	48.5	54.5	59.5	62.4	63.3	64.0	65.1	65.7	66.2	66.7	67.0	67.3	67.5	67.7	68.0
25 Hz	45.6	44.1	48.1	53.7	59.2	63.8	66.4	67.1	68.1	69.4	70.3	70.9	71.6	72.0	72.5	72.7	73.0	73.4
31.5 Hz	52.7	51.3	54.7	59.6	64.5	68.6	70.9	71.5	72.4	73.7	74.5	75.1	75.8	76.2	76.6	76.8	77.1	77.5
40 Hz	56.6	55.3	58.6	63.3	68.1	72.1	74.4	75.0	75.9	77.1	77.9	78.5	79.1	79.5	79.9	80.2	80.4	80.8
50 Hz	62.1	60.9	63.8	68.0	72.3	75.9	78.1	78.6	79.4	80.5	81.2	81.8	82.3	82.7	83.1	83.3	83.5	83.9
63 Hz	67.5	66.3	68.6	72.1	75.8	79.0	80.8	81.3	82.0	83.0	83.6	84.2	84.7	85.0	85.4	85.6	85.8	86.1
80 Hz	73.3	72.4	73.9	76.6	79.6	82.2	83.7	84.1	84.6	85.4	85.9	86.4	86.8	87.0	87.3	87.5	87.6	87.9
100 Hz	76.3	76.1	77.7	80.3	83.2	85.7	87.4	87.9	88.1	88.5	88.7	88.9	89.1	89.2	89.4	89.4	89.5	89.6
125 Hz	75.2	75.0	77.4	80.9	84.6	87.7	89.7	90.3	90.5	90.9	91.1	91.3	91.5	91.6	91.7	91.8	91.8	91.9
160 Hz	78.0	78.1	79.8	82.5	85.4	87.9	89.6	90.1	90.2	90.3	90.4	90.4	90.5	90.6	90.6	90.6	90.6	90.7
200 Hz	79.4	79.9	81.5	83.9	86.6	89.0	90.7	91.2	91.1	91.0	90.9	90.8	90.8	90.8	90.7	90.6	90.6	90.6
250 Hz	79.9	80.6	82.5	85.1	88.1	90.6	92.5	93.1	92.9	92.6	92.4	92.2	92.1	92.0	91.9	91.8	91.7	91.6
315 Hz	81.6	82.2	83.8	86.2	88.9	91.3	93.0	93.6	93.4	93.3	93.1	93.0	93.0	92.9	92.8	92.8	92.6	92.6
400 Hz	80.7	81.4	83.1	85.7	88.5	91.0	92.8	93.4	93.2	93.0	92.8	92.7	92.6	92.5	92.4	92.3	92.2	92.2
500 Hz	79.0	79.8	82.2	85.3	88.7	91.6	93.7	94.4	94.1	93.9	93.6	93.4	93.3	93.2	93.1	92.9	92.8	92.7
630 Hz	77.2	78.1	81.0	84.9	88.8	92.2	94.6	95.4	95.2	94.9	94.7	94.5	94.4	94.3	94.2	94.0	93.9	93.9
800 Hz	76.6	77.4	80.5	84.6	88.8	92.4	94.8	95.6	95.5	95.3	95.0	94.9	94.8	94.7	94.6	94.5	94.3	94.3
1 kHz	77.0	77.6	80.6	84.5	88.6	92.0	94.4	95.1	95.1	95.0	94.9	94.8	94.8	94.7	94.7	94.6	94.5	94.5
1.25 kHz	77.5	77.6	80.3	84.0	87.8	91.0	93.2	93.9	94.0	94.1	94.2	94.2	94.3	94.4	94.4	94.4	94.4	94.4
1.6 kHz	79.0	78.8	81.0	84.3	87.7	90.7	92.6	93.1	93.4	93.8	94.0	94.2	94.4	94.5	94.6	94.7	94.7	94.8
2 kHz	78.2	78.3	80.3	83.4	86.6	89.4	91.3	91.9	92.0	92.2	92.2	92.3	92.5	92.5	92.6	92.6	92.6	92.6
2.5 kHz	80.0	80.0	81.6	84.2	87.1	89.6	91.3	91.8	91.9	92.1	92.2	92.4	92.5	92.6	92.6	92.6	92.6	92.7
3.15 kHz	78.3	78.0	79.6	82.3	85.2	87.7	89.4	89.8	90.1	90.5	90.8	91.0	91.2	91.4	91.5	91.6	91.7	91.8
4 kHz	78.5	78.0	79.3	81.7	84.5	86.8	88.3	88.7	89.0	89.5	89.9	90.2	90.4	90.6	90.8	90.9	91.0	91.2
5 kHz	76.3	75.9	76.8	78.7	80.9	82.9	84.2	84.5	84.7	85.2	85.4	85.7	85.9	86.0	86.2	86.3	86.3	86.5
6.3 kHz	73.0	72.1	72.9	74.7	77.0	78.9	80.2	80.5	80.9	81.6	82.1	82.5	82.9	83.2	83.4	83.6	83.7	84.0
8 kHz	66.6	64.6	65.5	67.8	70.4	72.6	73.7	73.9	74.9	76.4	77.4	78.2	79.0	79.5	80.0	80.3	80.7	81.1
A-wgt	91.3	91.6	93.5	96.5	99.8	102.7	104.7	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3

Table 3 Expected 1/3 octave band performance Mode 1 – Serrated trailing edges

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	21.4	20.9	22.3	24.8	27.5	29.1	29.8	30.3	31.0	31.7	32.1	32.2	32.5	32.7	32.8	32.9	33.0	33.2
8 Hz	18.4	16.6	20.2	25.4	30.5	33.3	34.2	35.3	37.4	39.3	40.7	41.6	42.3	42.9	43.4	43.8	44.1	44.6
10 Hz	21.6	20.0	24.2	30.0	35.6	38.7	39.7	40.9	43.0	44.9	46.3	47.1	47.8	48.3	48.8	49.1	49.4	49.8
12.5 Hz	32.4	31.0	34.5	39.4	44.2	46.9	47.8	48.8	50.6	52.2	53.3	54.0	54.6	55.1	55.5	55.7	56.0	56.4
16 Hz	36.6	35.5	39.4	44.8	49.9	52.9	54.0	55.0	56.6	58.2	59.2	59.8	60.3	60.7	61.0	61.2	61.4	61.7
20 Hz	38.7	37.8	42.4	48.5	54.4	57.8	59.0	60.0	61.8	63.5	64.6	65.1	65.6	66.0	66.3	66.5	66.7	67.0
25 Hz	45.6	44.1	48.1	53.7	59.0	62.1	63.1	64.2	66.1	67.9	69.2	69.9	70.5	71.0	71.5	71.7	72.0	72.4
31.5 Hz	52.7	51.3	54.7	59.6	64.3	67.0	67.9	69.0	70.7	72.3	73.5	74.1	74.7	75.2	75.6	75.8	76.1	76.5
40 Hz	56.6	55.3	58.6	63.3	68.0	70.6	71.5	72.5	74.2	75.8	76.9	77.5	78.1	78.5	78.9	79.2	79.4	79.8
50 Hz	62.1	60.9	63.8	68.0	72.2	74.6	75.4	76.3	77.8	79.2	80.2	80.8	81.3	81.7	82.1	82.3	82.5	82.9
63 Hz	67.5	66.3	68.6	72.1	75.7	77.8	78.5	79.3	80.6	81.8	82.7	83.2	83.7	84.0	84.4	84.6	84.8	85.1
80 Hz	73.3	72.4	73.9	76.6	79.5	81.2	81.9	82.5	83.5	84.4	85.0	85.4	85.7	86.0	86.3	86.5	86.6	86.9
100 Hz	76.3	76.1	77.7	80.3	83.2	85.0	85.7	86.2	86.8	87.4	87.8	87.9	88.1	88.2	88.4	88.4	88.5	88.6
125 Hz	75.2	75.0	77.4	80.9	84.5	86.7	87.6	88.2	88.9	89.7	90.2	90.3	90.5	90.6	90.7	90.8	90.8	90.9
160 Hz	78.0	78.1	79.8	82.5	85.3	87.2	88.0	88.4	88.8	89.3	89.5	89.4	89.5	89.6	89.6	89.6	89.6	89.7
200 Hz	79.4	79.9	81.5	83.9	86.5	88.4	89.2	89.5	89.6	89.9	90.0	89.8	89.8	89.8	89.7	89.6	89.6	89.6
250 Hz	79.9	80.6	82.5	85.1	88.0	90.1	91.0	91.2	91.3	91.5	91.5	91.2	91.1	91.0	90.9	90.8	90.7	90.6
315 Hz	81.6	82.2	83.8	86.2	88.9	90.8	91.6	91.8	91.9	92.2	92.2	92.0	91.9	91.9	91.8	91.8	91.6	91.6
400 Hz	80.7	81.4	83.1	85.7	88.4	90.4	91.3	91.5	91.6	91.9	91.9	91.7	91.6	91.5	91.4	91.3	91.2	91.2
500 Hz	79.0	79.8	82.2	85.3	88.6	91.0	91.9	92.3	92.4	92.7	92.6	92.4	92.3	92.2	92.1	91.9	91.8	91.7
630 Hz	77.2	78.1	81.0	84.9	88.7	91.4	92.5	92.9	93.2	93.6	93.7	93.5	93.3	93.3	93.2	93.0	92.9	92.9
800 Hz	76.6	77.4	80.5	84.6	88.7	91.5	92.6	93.1	93.4	93.9	94.0	93.8	93.7	93.7	93.6	93.5	93.3	93.3
1 kHz	77.0	77.6	80.6	84.5	88.5	91.1	92.2	92.7	93.1	93.7	93.9	93.8	93.7	93.7	93.7	93.6	93.5	93.5
1.25 kHz	77.5	77.6	80.3	84.0	87.7	90.1	91.1	91.6	92.2	92.9	93.2	93.2	93.3	93.4	93.4	93.4	93.4	93.4
1.6 kHz	79.0	78.8	81.0	84.3	87.6	89.8	90.6	91.1	91.8	92.6	93.0	93.2	93.3	93.5	93.6	93.7	93.7	93.8
2 kHz	78.2	78.3	80.3	83.4	86.5	88.6	89.5	89.9	90.4	91.0	91.3	91.3	91.4	91.5	91.6	91.6	91.6	91.6
2.5 kHz	80.0	80.0	81.6	84.2	87.1	88.9	89.7	90.1	90.6	91.1	91.4	91.4	91.5	91.6	91.6	91.6	91.6	91.7
3.15 kHz	78.3	78.0	79.6	82.3	85.1	86.9	87.6	88.1	88.8	89.5	89.9	90.0	90.2	90.4	90.5	90.6	90.7	90.8
4 kHz	78.5	78.0	79.3	81.7	84.4	86.0	86.7	87.2	87.8	88.6	89.0	89.2	89.4	89.6	89.8	89.9	90.0	90.2
5 kHz	76.3	75.9	76.8	78.7	80.9	82.3	82.8	83.2	83.7	84.3	84.6	84.7	84.9	85.0	85.2	85.3	85.3	85.5
6.3 kHz	73.0	72.1	72.9	74.7	76.9	78.2	78.7	79.2	80.0	80.8	81.3	81.6	81.9	82.2	82.4	82.6	82.7	83.0
8 kHz	66.6	64.6	65.5	67.8	70.3	71.5	71.9	72.7	74.2	75.5	76.5	77.2	77.9	78.5	79.0	79.3	79.7	80.1
A-wgt	91.3	91.6	93.5	96.5	99.7	101.9	102.8	103.2	103.6	104.1	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3

Table 4 Expected 1/3 octave band performance Mode 2 – Serrated trailing edges



Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	21.4	20.9	22.2	24.6	26.9	28.0	28.3	28.5	29.1	29.7	30.2	30.7	30.9	31.0	31.2	31.3	31.4	31.5
8 Hz	18.4	16.6	20.0	25.1	29.2	31.1	31.7	32.2	33.8	35.7	37.5	38.9	39.8	40.5	41.0	41.5	41.9	42.3
10 Hz	21.6	20.0	24.0	29.6	34.3	36.4	37.0	37.5	39.1	41.0	42.7	44.2	45.1	45.7	46.2	46.7	47.0	47.3
12.5 Hz	32.4	31.0	34.3	39.0	43.0	44.9	45.4	45.8	47.2	48.8	50.2	51.5	52.2	52.7	53.2	53.5	53.8	54.1
16 Hz	36.6	35.5	39.2	44.4	48.8	50.8	51.3	51.7	53.0	54.5	55.9	57.1	57.7	58.2	58.6	58.9	59.2	59.4
20 Hz	38.7	37.8	42.2	48.2	53.1	55.4	56.0	56.4	57.8	59.4	60.9	62.1	62.8	63.2	63.7	63.9	64.2	64.4
25 Hz	45.6	44.1	47.9	53.3	57.8	59.9	60.4	60.9	62.4	64.1	65.8	67.1	67.9	68.5	69.0	69.4	69.7	70.0
31.5 Hz	52.7	51.3	54.5	59.2	63.2	65.1	65.5	66.0	67.3	68.9	70.4	71.6	72.3	72.8	73.3	73.6	74.0	74.2
40 Hz	56.6	55.3	58.4	63.0	66.9	68.7	69.1	69.6	70.9	72.4	73.9	75.1	75.7	76.2	76.7	77.0	77.3	77.6
50 Hz	62.1	60.9	63.6	67.7	71.2	72.9	73.3	73.7	74.9	76.2	77.5	78.5	79.1	79.6	80.0	80.3	80.6	80.8
63 Hz	67.5	66.3	68.4	71.8	74.9	76.3	76.6	77.0	78.0	79.2	80.3	81.2	81.7	82.1	82.5	82.7	83.0	83.2
80 Hz	73.3	72.4	73.8	76.4	78.9	80.0	80.3	80.6	81.4	82.3	83.1	83.8	84.1	84.4	84.6	84.9	85.0	85.2
100 Hz	76.3	76.1	77.6	80.1	82.6	83.8	84.1	84.3	84.8	85.4	85.8	86.3	86.4	86.5	86.7	86.8	86.8	86.9
125 Hz	75.2	75.0	77.3	80.7	83.8	85.3	85.6	85.8	86.5	87.2	87.8	88.3	88.5	88.7	88.8	88.9	89.0	89.0
160 Hz	78.0	78.1	79.7	82.3	84.8	86.1	86.3	86.4	86.9	87.2	87.5	87.8	87.9	87.9	88.0	88.0	88.0	88.0
200 Hz	79.4	79.9	81.4	83.7	86.2	87.4	87.5	87.7	87.9	88.1	88.1	88.3	88.2	88.1	88.1	88.0	88.0	87.9
250 Hz	79.9	80.6	82.4	85.0	87.7	89.0	89.1	89.3	89.4	89.5	89.5	89.6	89.4	89.3	89.2	89.1	89.0	88.9
315 Hz	81.6	82.2	83.7	86.1	88.5	89.7	89.9	90.0	90.2	90.3	90.3	90.5	90.3	90.2	90.2	90.1	90.1	90.0
400 Hz	80.7	81.4	83.0	85.5	88.1	89.4	89.5	89.7	89.8	89.9	89.9	90.1	89.9	89.8	89.8	89.7	89.6	89.5
500 Hz	79.0	79.8	82.1	85.2	88.2	89.7	89.9	90.1	90.3	90.4	90.4	90.6	90.4	90.3	90.2	90.1	90.0	89.8
630 Hz	77.2	78.1	80.9	84.7	88.2	89.9	90.2	90.4	90.7	90.9	91.1	91.3	91.3	91.2	91.1	91.0	90.9	90.8
800 Hz	76.6	77.4	80.4	84.4	88.1	89.9	90.2	90.4	90.8	91.1	91.3	91.6	91.6	91.5	91.5	91.4	91.3	91.2
1 kHz	77.0	77.6	80.4	84.3	87.9	89.6	89.9	90.1	90.5	90.9	91.2	91.6	91.6	91.6	91.6	91.6	91.5	91.4
1.25 kHz	77.5	77.6	80.2	83.8	87.1	88.6	88.9	89.2	89.7	90.3	90.7	91.2	91.3	91.3	91.4	91.5	91.5	91.4
1.6 kHz	79.0	78.8	80.9	84.1	87.0	88.4	88.7	88.9	89.6	90.2	90.8	91.3	91.5	91.6	91.8	91.8	91.9	92.0
2 kHz	78.2	78.3	80.2	83.2	86.0	87.4	87.6	87.8	88.3	88.8	89.2	89.6	89.6	89.7	89.8	89.8	89.8	89.8
2.5 kHz	80.0	80.0	81.5	84.1	86.6	87.8	88.0	88.2	88.7	89.1	89.4	89.8	89.8	89.9	90.0	90.0	90.0	90.0
3.15 kHz	78.3	78.0	79.5	82.1	84.6	85.8	86.0	86.2	86.8	87.4	87.9	88.4	88.6	88.7	88.9	89.0	89.1	89.1
4 kHz	78.5	78.0	79.2	81.6	83.8	84.9	85.2	85.4	86.0	86.6	87.2	87.7	87.9	88.0	88.2	88.3	88.4	88.5
5 kHz	76.3	75.9	76.7	78.5	80.4	81.4	81.5	81.7	82.2	82.6	83.0	83.4	83.5	83.6	83.7	83.8	83.9	84.0
6.3 kHz	73.0	72.1	72.8	74.6	76.4	77.3	77.5	77.7	78.4	79.1	79.7	80.3	80.6	80.8	81.0	81.2	81.4	81.5
8 kHz	66.6	64.6	65.4	67.5	69.5	70.4	70.7	71.0	72.2	73.5	74.8	75.8	76.5	77.0	77.5	77.9	78.3	78.6
A-wgt	91.3	91.6	93.4	96.4	99.2	100.6	100.9	101.1	101.4	101.8	102.1	102.4	102.5	102.5	102.5	102.5	102.5	102.5

**Table 5 Expected 1/3 octave band performance Mode 3 – Serrated trailing edges**

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	21.4	21.0	21.0	23.2	26.2	27.2	27.2	27.4	27.9	28.3	28.9	29.4	29.7	29.8	29.9	29.9	30.1	30.2
8 Hz	18.4	16.4	16.4	22.5	28.5	30.1	30.1	30.4	31.8	33.4	35.1	36.5	37.7	38.5	39.0	39.5	40.0	40.4
10 Hz	21.6	19.8	20.1	26.7	33.3	35.1	35.1	35.5	36.8	38.4	40.1	41.6	42.7	43.5	44.0	44.5	45.0	45.4
12.5 Hz	32.4	30.9	31.1	36.6	42.1	43.7	43.8	44.1	45.2	46.5	48.0	49.2	50.2	50.8	51.2	51.6	52.0	52.3
16 Hz	36.6	35.4	35.8	41.7	47.7	49.4	49.5	49.8	50.9	52.1	53.5	54.6	55.5	56.1	56.5	56.9	57.2	57.5
20 Hz	38.7	37.6	38.3	45.0	51.7	53.8	53.9	54.2	55.4	56.7	58.1	59.3	60.3	60.9	61.4	61.7	62.1	62.3
25 Hz	45.6	44.0	44.2	50.5	56.8	58.5	58.6	58.9	60.2	61.7	63.2	64.6	65.6	66.3	66.8	67.3	67.7	68.1
31.5 Hz	52.7	51.2	51.3	56.8	62.3	63.9	64.0	64.2	65.4	66.7	68.1	69.3	70.3	70.9	71.3	71.7	72.1	72.4
40 Hz	56.6	55.1	55.3	60.6	66.0	67.5	67.6	67.9	69.0	70.3	71.7	72.8	73.8	74.3	74.8	75.1	75.5	75.8
50 Hz	62.1	60.9	60.9	65.6	70.4	71.8	71.9	72.1	73.1	74.2	75.5	76.5	77.3	77.8	78.2	78.5	78.8	79.1
63 Hz	67.5	66.3	66.2	70.0	74.2	75.4	75.4	75.6	76.5	77.5	78.6	79.5	80.2	80.6	80.9	81.1	81.4	81.7
80 Hz	73.3	72.4	72.3	75.0	78.3	79.3	79.3	79.5	80.2	80.8	81.6	82.3	82.8	83.1	83.3	83.4	83.7	83.9
100 Hz	76.3	76.1	76.3	78.7	81.8	82.9	82.9	83.1	83.6	83.9	84.4	84.9	85.2	85.3	85.3	85.3	85.5	85.5
125 Hz	75.2	75.0	75.4	78.8	82.7	84.1	84.2	84.4	84.9	85.4	86.0	86.6	87.0	87.1	87.2	87.3	87.4	87.5
160 Hz	78.0	78.2	78.5	80.8	83.9	85.0	85.1	85.2	85.6	85.7	86.0	86.4	86.6	86.6	86.6	86.5	86.6	86.6
200 Hz	79.4	80.0	80.4	82.3	85.1	86.2	86.3	86.4	86.6	86.6	86.7	86.9	87.0	86.9	86.7	86.6	86.6	86.6
250 Hz	79.9	80.7	81.3	83.4	86.4	87.6	87.8	87.9	88.1	87.9	87.9	88.1	88.1	88.0	87.8	87.7	87.6	87.5
315 Hz	81.6	82.3	82.7	84.6	87.4	88.5	88.7	88.8	88.9	88.8	88.9	89.1	89.1	89.0	88.9	88.7	88.7	88.6
400 Hz	80.7	81.5	82.0	83.9	86.9	88.1	88.2	88.3	88.5	88.4	88.4	88.6	88.6	88.5	88.4	88.2	88.2	88.1
500 Hz	79.0	79.9	80.7	83.2	86.8	88.2	88.4	88.5	88.7	88.5	88.6	88.9	88.9	88.8	88.7	88.5	88.5	88.4
630 Hz	77.2	78.1	79.0	82.4	86.6	88.2	88.5	88.6	88.9	88.8	89.1	89.4	89.5	89.5	89.4	89.3	89.2	89.2
800 Hz	76.6	77.4	78.4	82.0	86.5	88.2	88.4	88.6	88.9	88.9	89.2	89.6	89.7	89.7	89.7	89.6	89.6	89.5
1 kHz	77.0	77.6	78.4	82.0	86.4	88.0	88.2	88.3	88.7	88.8	89.2	89.6	89.9	89.9	89.9	89.8	89.8	89.8
1.25 kHz	77.5	77.7	78.2	81.7	85.8	87.2	87.4	87.6	88.0	88.3	88.8	89.3	89.6	89.7	89.8	89.8	89.8	89.9
1.6 kHz	79.0	78.9	79.2	82.2	86.0	87.2	87.4	87.5	88.1	88.5	89.1	89.6	90.0	90.1	90.2	90.3	90.4	90.5
2 kHz	78.2	78.3	78.7	81.4	84.9	86.2	86.3	86.4	86.9	87.1	87.5	88.0	88.2	88.3	88.3	88.3	88.4	88.4
2.5 kHz	80.0	80.1	80.3	82.6	85.7	86.7	86.8	87.0	87.4	87.6	87.9	88.3	88.6	88.6	88.6	88.6	88.6	88.7
3.15 kHz	78.3	78.1	78.1	80.6	83.8	84.8	84.9	85.0	85.5	85.9	86.5	87.0	87.3	87.4	87.5	87.5	87.7	87.8
4 kHz	78.5	78.0	78.0	80.2	83.2	84.1	84.2	84.3	84.8	85.2	85.8	86.3	86.7	86.8	86.9	87.0	87.1	87.2
5 kHz	76.3	76.0	75.9	77.5	79.8	80.6	80.7	80.8	81.2	81.4	81.9	82.3	82.5	82.6	82.6	82.6	82.7	82.8
6.3 kHz	73.0	72.2	71.8	73.6	76.0	76.7	76.7	76.9	77.5	78.0	78.6	79.2	79.6	79.8	79.8	80.0	80.2	80.3
8 kHz	66.6	64.6	63.9	66.5	69.5	70.1	70.0	70.2	71.2	72.4	73.6	74.6	75.4	75.9	76.2	76.6	77.0	77.4
A-wgt	91.3	91.6	92.1	94.6	98.0	99.3	99.5	99.6	99.9	100.1	100.4	100.8	101.0	101.0	101.0	101.0	101.0	101.0

**Table 6 Expected 1/3 octave band performance Mode 4 – Serrated trailing edges**

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	21.4	20.9	22.3	24.8	27.1	28.2	28.4	29.1	30.3	31.4	32.1	32.3	32.5	32.7	32.8	32.9	33.0	33.2
8 Hz	18.4	16.6	20.2	25.5	29.9	31.7	32.0	33.1	35.9	38.9	40.8	41.6	42.4	42.9	43.4	43.8	44.1	44.6
10 Hz	21.6	20.0	24.2	30.1	34.9	36.9	37.3	38.5	41.4	44.5	46.4	47.2	47.8	48.3	48.8	49.1	49.4	49.8
12.5 Hz	32.4	31.0	34.5	39.4	43.6	45.3	45.7	46.7	49.2	51.8	53.4	54.1	54.6	55.1	55.5	55.7	56.0	56.4
16 Hz	36.6	35.5	39.4	44.8	49.2	51.1	51.6	52.7	55.2	57.8	59.3	59.9	60.4	60.7	61.0	61.2	61.4	61.7
20 Hz	38.7	37.8	42.4	48.6	53.6	55.7	56.3	57.5	60.2	63.0	64.6	65.2	65.7	66.0	66.3	66.5	66.7	67.0
25 Hz	45.6	44.1	48.1	53.7	58.4	60.3	60.7	61.9	64.6	67.5	69.2	70.0	70.6	71.0	71.5	71.7	72.0	72.4
31.5 Hz	52.7	51.3	54.7	59.6	63.7	65.5	65.8	66.9	69.3	71.9	73.5	74.2	74.8	75.2	75.6	75.8	76.1	76.5
40 Hz	56.6	55.3	58.6	63.3	67.4	69.1	69.4	70.4	72.8	75.4	76.9	77.6	78.1	78.5	78.9	79.2	79.4	79.8
50 Hz	62.1	60.9	63.8	68.0	71.7	73.2	73.5	74.5	76.6	78.9	80.3	80.8	81.3	81.7	82.1	82.3	82.5	82.9
63 Hz	67.5	66.3	68.6	72.1	75.3	76.6	76.9	77.7	79.6	81.5	82.7	83.2	83.7	84.0	84.4	84.6	84.8	85.1
80 Hz	73.3	72.4	73.9	76.6	79.2	80.3	80.5	81.2	82.6	84.2	85.1	85.4	85.8	86.0	86.3	86.5	86.6	86.9
100 Hz	76.3	76.1	77.7	80.3	82.7	83.9	84.2	84.9	86.1	87.2	87.8	87.9	88.1	88.2	88.4	88.4	88.5	88.6
125 Hz	75.2	75.0	77.4	80.9	83.9	85.4	85.8	86.6	88.1	89.4	90.2	90.3	90.5	90.6	90.7	90.8	90.8	90.9
160 Hz	78.0	78.1	79.8	82.4	84.8	86.0	86.4	87.1	88.1	89.0	89.5	89.5	89.5	89.6	89.6	89.6	89.6	89.7
200 Hz	79.4	79.9	81.5	83.8	86.1	87.2	87.6	88.3	89.1	89.8	90.0	89.8	89.8	89.8	89.7	89.6	89.6	89.6
250 Hz	79.9	80.6	82.5	85.1	87.5	88.8	89.2	90.0	90.8	91.3	91.5	91.2	91.1	91.0	90.9	90.8	90.7	90.6
315 Hz	81.6	82.2	83.8	86.2	88.4	89.6	90.0	90.7	91.5	92.0	92.2	92.0	92.0	91.9	91.8	91.8	91.6	91.6
400 Hz	80.7	81.4	83.1	85.6	88.0	89.2	89.6	90.3	91.1	91.7	91.9	91.7	91.6	91.5	91.4	91.3	91.2	91.2
500 Hz	79.0	79.8	82.2	85.3	88.1	89.5	90.0	90.9	91.8	92.4	92.7	92.4	92.3	92.2	92.1	91.9	91.8	91.7
630 Hz	77.2	78.1	81.0	84.8	88.1	89.7	90.3	91.3	92.4	93.3	93.7	93.5	93.4	93.3	93.2	93.0	92.9	92.9
800 Hz	76.6	77.4	80.5	84.6	88.0	89.7	90.3	91.3	92.6	93.6	94.0	93.9	93.8	93.7	93.6	93.5	93.3	93.3
1 kHz	77.0	77.6	80.6	84.5	87.8	89.4	90.0	91.0	92.3	93.4	93.9	93.8	93.8	93.7	93.7	93.6	93.5	93.5
1.25 kHz	77.5	77.6	80.3	83.9	87.1	88.6	89.1	90.0	91.4	92.6	93.2	93.3	93.3	93.4	93.4	93.4	93.4	93.4
1.6 kHz	79.0	78.8	81.0	84.2	87.1	88.5	88.8	89.7	91.0	92.3	93.1	93.2	93.4	93.5	93.6	93.7	93.7	93.8
2 kHz	78.2	78.3	80.3	83.3	86.1	87.3	87.7	88.5	89.7	90.8	91.3	91.4	91.5	91.5	91.6	91.6	91.6	91.6
2.5 kHz	80.0	80.0	81.6	84.2	86.6	87.8	88.1	88.9	89.9	90.9	91.4	91.4	91.5	91.6	91.6	91.6	91.6	91.7
3.15 kHz	78.3	78.0	79.6	82.3	84.7	85.9	86.1	86.8	88.1	89.2	89.9	90.0	90.2	90.4	90.5	90.6	90.7	90.8
4 kHz	78.5	78.0	79.3	81.7	84.0	85.1	85.3	86.0	87.2	88.3	89.0	89.2	89.4	89.6	89.8	89.9	90.0	90.2
5 kHz	76.3	75.9	76.8	78.7	80.5	81.4	81.6	82.2	83.2	84.1	84.6	84.7	84.9	85.0	85.2	85.3	85.3	85.5
6.3 kHz	73.0	72.1	72.9	74.7	76.6	77.5	77.6	78.2	79.4	80.6	81.3	81.6	81.9	82.2	82.4	82.6	82.7	83.0
8 kHz	66.6	64.6	65.5	67.8	70.0	70.9	70.9	71.5	73.2	75.3	76.6	77.3	78.0	78.5	79.0	79.3	79.7	80.1
A-wgt	91.3	91.6	93.5	96.5	99.2	100.5	101.0	101.8	102.9	103.9	104.3	104.3	104.3	104.3	104.3	104.3	104.3	104.3

**Table 7 Expected 1/3 octave band performance Mode 5 – Serrated trailing edges**

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	23.5	22.2	22.7	24.3	26.0	27.4	28.2	28.2	28.7	29.6	30.3	30.8	31.2	31.5	31.7	32.0	32.2	32.3
8 Hz	27.1	26.1	27.6	30.1	32.6	34.7	36.1	36.3	36.7	37.3	37.9	38.2	38.5	38.7	38.9	39.1	39.2	39.3
10 Hz	29.7	29.6	31.9	35.2	38.3	40.9	42.7	43.2	43.4	43.4	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
12.5 Hz	34.5	35.0	37.9	41.7	45.2	48.2	50.4	51.1	51.1	50.8	50.5	50.4	50.2	50.0	49.8	49.8	49.7	49.6
16 Hz	39.6	40.4	43.5	47.5	51.2	54.3	56.6	57.5	57.3	56.8	56.4	56.1	55.8	55.6	55.4	55.3	55.1	55.0
20 Hz	45.1	46.0	49.2	53.2	56.9	60.1	62.5	63.3	63.2	62.6	62.2	61.9	61.6	61.4	61.1	61.0	60.9	60.7
25 Hz	51.7	52.2	54.9	58.3	61.6	64.4	66.4	67.1	67.0	66.7	66.4	66.3	66.1	66.0	65.8	65.7	65.6	65.5
31.5 Hz	57.2	57.9	60.1	63.1	66.0	68.5	70.4	71.0	70.9	70.5	70.2	70.0	69.7	69.6	69.4	69.3	69.2	69.0
40 Hz	62.1	62.7	64.7	67.4	70.0	72.2	73.9	74.6	74.5	74.0	73.7	73.5	73.3	73.1	72.9	72.9	72.7	72.6
50 Hz	67.0	67.8	69.5	72.0	74.4	76.5	78.1	78.7	78.6	78.0	77.6	77.4	77.1	76.9	76.6	76.6	76.4	76.2
63 Hz	74.7	74.3	75.4	77.3	79.2	80.9	82.0	82.3	82.5	82.7	82.9	83.0	83.1	83.2	83.2	83.3	83.3	83.3
80 Hz	74.9	75.7	77.0	78.8	80.7	82.3	83.7	84.2	84.0	83.4	83.0	82.7	82.4	82.1	81.9	81.8	81.6	81.4
100 Hz	78.4	79.6	80.8	82.6	84.4	86.0	87.3	88.0	87.7	86.8	86.1	85.7	85.3	84.9	84.6	84.4	84.2	83.9
125 Hz	77.9	78.4	80.7	83.8	86.7	89.2	91.0	91.7	91.6	91.3	91.1	90.9	90.8	90.6	90.5	90.4	90.3	90.2
160 Hz	76.5	78.3	80.7	83.6	86.4	88.8	90.8	91.8	91.3	90.0	89.1	88.5	87.8	87.4	86.9	86.7	86.3	86.0
200 Hz	80.1	81.2	83.1	85.7	88.1	90.3	92.0	92.7	92.4	91.6	91.0	90.7	90.2	90.0	89.6	89.5	89.3	89.0
250 Hz	81.1	82.5	84.8	87.6	90.4	92.7	94.6	95.5	95.1	94.1	93.3	92.8	92.3	91.9	91.5	91.3	91.1	90.7
315 Hz	83.5	84.6	86.6	89.2	91.7	93.9	95.6	96.3	96.1	95.3	94.7	94.3	93.9	93.6	93.3	93.2	92.9	92.7
400 Hz	79.9	80.7	83.6	87.3	90.8	93.7	95.9	96.7	96.6	96.1	95.7	95.5	95.2	95.1	94.8	94.7	94.6	94.4
500 Hz	79.2	79.7	83.0	87.1	90.9	94.2	96.6	97.3	97.3	97.0	96.8	96.6	96.4	96.3	96.1	96.1	96.0	95.9
630 Hz	80.8	80.9	84.1	88.2	92.1	95.4	97.7	98.3	98.4	98.4	98.4	98.4	98.4	98.4	98.3	98.3	98.3	98.3
800 Hz	80.7	80.7	84.1	88.6	92.7	96.2	98.6	99.3	99.4	99.5	99.5	99.6	99.6	99.6	99.5	99.6	99.6	99.5
1 kHz	81.5	81.3	84.6	89.0	93.1	96.6	98.9	99.5	99.8	100.0	100.3	100.5	100.5	100.6	100.6	100.8	100.8	100.8
1.25 kHz	80.6	80.0	83.3	87.7	91.8	95.4	97.7	98.2	98.5	99.0	99.4	99.7	99.9	100.0	100.1	100.3	100.4	100.5
1.6 kHz	79.7	79.2	82.3	86.6	90.6	94.0	96.2	96.7	97.1	97.5	97.9	98.1	98.3	98.4	98.5	98.6	98.7	98.8
2 kHz	78.6	78.2	81.2	85.2	89.0	92.3	94.4	94.9	95.2	95.5	95.8	96.0	96.1	96.2	96.3	96.4	96.4	96.5
2.5 kHz	77.9	77.7	80.5	84.2	87.7	90.7	92.8	93.3	93.5	93.7	93.9	94.0	94.0	94.1	94.1	94.2	94.2	94.2
3.15 kHz	77.3	77.7	79.9	82.9	85.8	88.3	90.2	90.8	90.8	90.5	90.3	90.2	90.1	90.0	89.8	89.8	89.7	89.6
4 kHz	77.8	78.3	80.2	82.8	85.3	87.5	89.1	89.7	89.7	89.3	89.0	88.8	88.6	88.4	88.2	88.2	88.0	87.9
5 kHz	73.6	75.8	77.1	78.7	80.3	81.7	83.2	84.1	83.4	81.9	80.7	80.0	79.2	78.7	78.1	77.8	77.3	76.9
6.3 kHz	71.3	74.0	74.4	75.0	75.6	76.3	77.4	78.3	77.4	75.4	73.8	72.8	71.8	71.1	70.4	70.0	69.4	68.8
8 kHz	71.0	72.1	71.3	70.8	70.6	70.6	70.8	71.2	70.9	69.9	69.2	68.8	68.3	67.9	67.6	67.4	67.1	66.8
A-wgt	92.5	93.0	95.5	99.0	102.4	105.5	107.6	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3	108.3

**Table 8 Expected 1/3 octave band performance Power Mode 3.45 MW – Clean blades**

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	21.4	20.9	22.3	24.8	27.5	30.0	31.8	32.1	32.4	32.9	33.4	33.6	33.8	34.0	34.1	34.2	34.4	34.5
8 Hz	18.4	16.6	20.2	25.4	30.6	35.2	38.0	38.3	39.1	40.7	42.1	42.9	43.6	44.2	44.7	45.0	45.5	45.9
10 Hz	21.6	20.0	24.2	30.0	35.7	40.7	43.8	44.3	45.0	46.5	47.7	48.5	49.1	49.6	50.1	50.4	50.8	51.1
12.5 Hz	32.4	31.0	34.5	39.4	44.3	48.6	51.3	51.8	52.4	53.6	54.7	55.4	55.9	56.3	56.7	57.0	57.4	57.7
16 Hz	36.6	35.5	39.4	44.8	50.1	54.7	57.7	58.3	58.7	59.8	60.7	61.2	61.6	62.0	62.3	62.5	62.9	63.1
20 Hz	38.7	37.8	42.4	48.5	54.5	59.7	63.1	63.8	64.2	65.2	66.0	66.6	66.9	67.3	67.6	67.8	68.1	68.3
25 Hz	45.6	44.1	48.1	53.7	59.2	64.0	67.0	67.5	68.1	69.5	70.6	71.3	71.8	72.3	72.7	73.0	73.4	73.7
31.5 Hz	52.7	51.3	54.7	59.6	64.5	68.7	71.5	71.9	72.5	73.8	74.8	75.5	76.0	76.4	76.9	77.1	77.5	77.8
40 Hz	56.6	55.3	58.6	63.3	68.1	72.3	75.0	75.4	76.0	77.2	78.2	78.9	79.4	79.8	80.2	80.5	80.8	81.1
50 Hz	62.1	60.9	63.8	68.0	72.3	76.1	78.6	79.0	79.5	80.6	81.6	82.2	82.6	83.0	83.4	83.6	83.9	84.2
63 Hz	67.5	66.3	68.6	72.1	75.8	79.1	81.2	81.6	82.1	83.1	84.0	84.5	85.0	85.3	85.7	85.9	86.2	86.4
80 Hz	73.3	72.4	73.9	76.6	79.6	82.3	84.1	84.4	84.7	85.6	86.3	86.7	87.1	87.3	87.6	87.8	88.0	88.2
100 Hz	76.3	76.1	77.7	80.3	83.2	85.8	87.7	88.2	88.3	88.7	89.1	89.3	89.4	89.5	89.7	89.7	89.9	89.9
125 Hz	75.2	75.0	77.4	80.9	84.6	87.8	90.1	90.7	90.8	91.2	91.5	91.7	91.8	91.9	92.1	92.1	92.2	92.3
160 Hz	78.0	78.1	79.8	82.5	85.4	88.0	89.9	90.5	90.5	90.6	90.8	90.9	90.9	90.9	91.0	90.9	91.0	91.0
200 Hz	79.4	79.9	81.5	83.9	86.6	89.0	91.0	91.6	91.5	91.4	91.3	91.3	91.1	91.1	91.1	91.0	91.0	90.9
250 Hz	79.9	80.6	82.5	85.1	88.1	90.7	92.8	93.5	93.3	93.0	92.9	92.7	92.5	92.4	92.3	92.2	92.1	92.0
315 Hz	81.6	82.2	83.8	86.2	88.9	91.4	93.3	94.0	93.8	93.6	93.6	93.5	93.3	93.2	93.2	93.1	93.1	93.0
400 Hz	80.7	81.4	83.1	85.7	88.5	91.1	93.1	93.8	93.6	93.4	93.3	93.1	93.0	92.9	92.8	92.7	92.7	92.5
500 Hz	79.0	79.8	82.2	85.3	88.7	91.7	94.0	94.9	94.6	94.3	94.1	93.9	93.7	93.5	93.4	93.3	93.2	93.1
630 Hz	77.2	78.1	81.0	84.9	88.8	92.3	95.0	95.9	95.7	95.4	95.2	95.0	94.8	94.6	94.5	94.4	94.4	94.2
800 Hz	76.6	77.4	80.5	84.6	88.8	92.5	95.2	96.1	96.0	95.7	95.5	95.3	95.1	95.0	94.9	94.8	94.8	94.6
1 kHz	77.0	77.6	80.6	84.5	88.6	92.1	94.8	95.6	95.5	95.4	95.3	95.3	95.1	95.1	95.0	94.9	95.0	94.9
1.25 kHz	77.5	77.6	80.3	84.0	87.8	91.1	93.6	94.3	94.3	94.5	94.6	94.7	94.7	94.7	94.7	94.7	94.8	94.8
1.6 kHz	79.0	78.8	81.0	84.3	87.7	90.8	93.0	93.5	93.7	94.0	94.4	94.6	94.7	94.8	94.9	95.0	95.1	95.1
2 kHz	78.2	78.3	80.3	83.4	86.6	89.5	91.7	92.2	92.3	92.5	92.7	92.8	92.8	92.8	92.9	92.9	93.0	93.0
2.5 kHz	80.0	80.0	81.6	84.2	87.1	89.7	91.7	92.2	92.2	92.5	92.7	92.8	92.8	92.9	93.0	93.0	93.1	93.1
3.15 kHz	78.3	78.0	79.6	82.3	85.2	87.8	89.7	90.1	90.3	90.8	91.2	91.4	91.6	91.7	91.9	91.9	92.1	92.1
4 kHz	78.5	78.0	79.3	81.7	84.5	86.9	88.6	89.0	89.2	89.8	90.3	90.6	90.7	90.9	91.1	91.2	91.4	91.5
5 kHz	76.3	75.9	76.8	78.7	80.9	83.0	84.4	84.8	85.0	85.4	85.8	86.1	86.2	86.3	86.5	86.6	86.7	86.8
6.3 kHz	73.0	72.1	72.9	74.7	77.0	79.0	80.4	80.7	81.0	81.8	82.5	82.9	83.2	83.5	83.7	83.9	84.1	84.3
8 kHz	66.6	64.6	65.5	67.8	70.4	72.7	74.1	74.0	74.8	76.4	77.7	78.5	79.2	79.7	80.2	80.6	81.0	81.4
A-wgt	91.3	91.6	93.5	96.5	99.8	102.8	105.0	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7	105.7

**Table 9 Expected 1/3 octave band performance Power Mode 3.45 MW – Serrated trailing edges**

## 4. Limitations

The values as stated in the present document are to be regarded as “best estimates” for the octave band performance for the turbine. The values are to be regarded as informative and cannot in any way be used as guaranteed for any projects.

The complete document can be handed out as pdf and must always be referred to using the complete document DMS number.

## 5. Recalculation to 10 m wind speeds

In case 10 m height wind speed references are required, recalculation of the stated values can be made using the following procedure:

1. The stated hub height wind speeds are recalculated to 10 m reference height.
2. Integer 10 m height wind speed related sound power levels are calculated using linear interpolation between the nearest non integer values.

Recalculation is made using procedures as defined in IEC 61400-11 ed.3. Appendix D.