Appendix D

Noise Impact Assessment Report by Herring Storer (November 2021)

HERRING STORER ACOUSTICS

MOONIES HILL ENERGY

FLAT ROCKS WIND FARM

KOJONUP

NOISE IMPACT ASSESSMENT

NOVEMBER 2021

OUR REFERENCE: 27351-4-10226-04

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NOISE IMPACT ASSESSMENT
KOJONUP

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FOR

MOONIES HILL ENERGY

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Author:	George Watts	**Checked By:**	Paul Daly
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REVISION HISTORY

Revision	Description	Date	Author	Checked
2	Revision to clarify noise contour plots	26/3/2021	GW	PLD
3	Revision of WTG locations	12/7/2021	GW	TR
4	Updated nomenclature and references	23/11/2021	GW	TR

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APPENDICIES

1. INTRODUCTION

Herring Storer Acoustics were commissioned to carry out a noise impact assessment for the proposed Flat Rocks Wind Farm development, to address the development approval conditions for the project.

The proposed development site is located to the east of Albany Highway, approximately 260km southeast of Perth and 27km southwest of the township of Katanning in southwest Western Australia.

The proposed wind farm consists of 42 wind turbines, in cleared wheat farming country.

See Appendix A for locations of turbines and noise sensitive premises.

The noise impact assessment has been carried out in accordance with the EPA of South Australia *"Wind Farms – Environmental noise guidelines– July 2009, Updated November 2021"* (Guidelines) which is the guidelines recognised by the Department of Environment and Conservation for the assessment of wind farms.

2. SUMMARY

Noise levels were assessed at 33 identified receiver points, with these locations shown in Appendix A.

Noise emissions at "non-stake holders" have been calculated to comply with the background noise criteria under all wind conditions.

Noise levels at all "stake holders" have been calculated to comply with the background noise criteria under all wind conditions.

3. CRITERIA

According to the Western Australian Planning Position Statement : Renewable energy facilities - March 2020, the noise impact of proposed wind farms in Western Australia should be assessed in accordance with the criteria and approach of assessing wind farms described in the EPA of South Australia *"Wind Farms – Environmental noise guidelines– July 2009, Updated November 2021"* (Guidelines)

The Guidelines recommend the following criteria for the assessment of noise levels associated with proposed wind farms.

The predicted equivalent noise level ($L_{Aeq\ ,10\ minutes}$), adjusted for tonality in accordance with the Guidelines, should not exceed :

- 35 dB(A), or
- 40 dB(A) in a primary production / rural industry zone, or
- the "Alternative Minimum Criteria" (Varying with Wind Speed); or
- the background noise ($L_{A90,10\ minutes}$) by more than 5 dB(A).

The criteria for background noise levels will vary with wind speed, as will wind turbine generated noise.

The alternative minimum criterion, varying with wind speed, is listed below in Table 3.1. This conservative minimum criterion has been determined based on a comparison of background noise levels at a number of existing and proposed wind farm sites around Australia.

TABLE 3.1 – ALTERNATIVE MINIMUM CRITERIA (VARYING WITH WIND SPEED)

	Wind Speed at 10m above ground level					
	≤ 5	**6**	**7**	**8**	**9**	**≥ 10**
Minimum Criteria L_{Aeq} [dB(A)]	35	37	38	40	41	43

Based on the results of background noise monitoring undertaken during November 2010 – February 2011 (presented in Herring Storer Report ref: 12777-4-10226-01), the criteria for wind turbine noise are as presented in Table 3.2. See Appendix D for background noise monitoring locations.

TABLE 3.2 – NOISE CRITERIA BASED ON BACKGROUND NOISE LEVELS, dB(A)

Background Monitoring Location	ID #	WIND SPEED AT 80m ABOVE GROUND LEVEL (m/s)						
		3	**4**	**5**	**6**	**7**	**8**	**9**
1	NSH12	41	40	39	39	39	39	40
2	NSH13	35	35	35	35	36	37	39
3	SH28	38	39	40	41	41	42	42
4	SH29	39	39	40	41	42	43	44
5	NSH09	35	35	35	36	38	40	42
6	SH27	35	35	35	35	35	37	38
7	NSH19	35	35	35	35	36	37	38
8	NSH06	35	35	36	37	39	41	42
9	NSH14	35	35	36	37	39	41	43
10	NSH15	39	39	39	39	40	41	42
11	SH30	38	38	38	37	38	38	39

Following feedback from the Department of Environment Regulation Noise Branch, now the Department of Water Environment Regulation Noise Branch, their reference “CEO60/17”, the validity of the background noise monitoring data – specifically the correlation of noise data to wind speed, was queried. This feedback listed Locations 2, 5, 6, 7, 8, 9 as “reliable” data sets. Hence, for this noise impact assessment, the noise criteria based on background noise levels for the geographically closest reliable background noise monitoring point to the identified receiver location, has been utilised as the relevant criteria.

Table 3.3 below summarises the background noise monitoring location utilised in determining the noise criteria based on background noise levels for each identified receiver location.

TABLE 3.3 – BACKGROUND NOISE MONITORING LOCATION UTILISED TO DETERMINE NOISE CRITERIA FOR EACH RECEIVER LOCATION

ID#	Background Noise Monitoring Location Utilised
NSH01	2
NSH02	2
NSH03	8
NSH04	8
NSH05	8
NSH06	8
NSH07	8
NSH08	5
NSH09	5
NSH10	2
NSH11	2
NSH12	2
NSH13	2
NSH14	9
NSH15	9
NSH16	2
NSH17	2
NSH18	7
NSH19	7
NSH20	5
NSH21	2
NSH22	2
NSH23	2
NSH24	2
NSH25	8
SH26	6
SH27	6
SH28	2
SH29	8
SH30	7
SH31	7
SH32	7
SH33	6

This assessment has been based on the noise criteria based on monitored background noise levels. It is noted that the Guidelines have been developed to minimise the impact on the amenity of premises that do not have an agreement with wind farm developers. Our assessment includes all identified residential premises in the surrounding area, some of which may have such an agreement.

Participation in the development (or otherwise) is denoted in the ID of the residential premise, with “NSH” denoting “Non-Stake Holder” and “SH” denoting “Stake-Holder”.

4. MODELLING

Noise immissions at residential premises, due to the proposed wind farm, were determined by noise modelling, using the computer program "SoundPlan" version 8.2.

SoundPlan uses the theoretical sound power levels determined from measured sound pressure levels to calculate the noise level at any location.

The following input data was used in the SoundPlan model:

a) Topographical Information – Ground contours of the development area;

b) Residential and Wind Turbine Locations – See Appendix A; and

c) Sound Power Levels, varying with wind speed, of the wind turbines intended to be utilised (Vestas V150-4.2 MW, 125m hub height) – See Appendix B.

The Guidelines indicate that noise immissions should be modelled to reflect typical, (but not extreme) "worst case" meteorological conditions for sound propagation towards the receiver.

After a review of the literature available on the subject, noise level emissions were modelled using the ISO 9613-2:1996 algorithm, with the conditions listed in Table 4.1. These conditions, and calculating noise levels utilising a "G=0" ground absorption have been found to provide a generally realistic and conservative assessment of noise levels associated with wind turbines.

TABLE 4.1 – METEOROLOGICAL CONDITIONS

Condition	Value
Temperature	15 ^{o}C
Relative humidity	70%
Atmospheric Pressure	101.325 kPa

Noise levels attributable to the proposed wind farm were calculated for integer wind speeds 4 – 9m/s at a height of 80m (to compare against background noise criteria). The sound power level of the turbines were varied for each integer wind speed, however the weather conditions within the model remained constant at the conditions stipulated in Table 4.1 above.

5. RESULTS

Noise contour plots are attached in Appendix C.

The predicted noise level at each identified residential premises are listed in Table 5.1 below for each of the hub height wind speeds considered.

TABLE 5.1 – PREDICTED NOISE LEVELS AT IDENTIFIED RECEIVER LOCATIONS – NOISE MODE 0, (SERRATED TRAILING EDGE)

ID#	Predicted Noise Level, L_{Aeq} [dB(A)]					
	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s
NSH01	9	12	16	19	22	22
NSH02	11	14	17	21	23	23
NSH03	19	22	26	29	32	32
NSH04	23	25	29	33	35	35
NSH05	11	13	17	21	23	23
NSH06	17	20	24	27	30	30
NSH07	11	14	18	21	23	24
NSH08	18	20	24	28	30	30
NSH09	20	23	27	30	33	33
NSH10	4	7	10	14	16	17
NSH11	8	10	14	18	20	20
NSH12	20	22	26	30	32	33
NSH13	19	22	25	29	31	32
NSH14	21	24	28	31	34	34
NSH15	20	22	26	29	32	32
NSH16	3	6	9	13	15	15
NSH17	2	5	8	12	14	15
NSH18	1	4	8	11	13	14
NSH19	9	12	15	19	21	22
NSH20	1	4	8	11	13	14
NSH21	5	8	11	15	17	18
NSH22	19	21	25	29	31	31
NSH23	5	8	11	15	17	18
NSH24	18	21	25	28	31	31
NSH25	5	8	11	15	17	18
SH26	5	8	11	15	17	17
SH27	23	25	29	33	35	35
SH28	23	25	29	33	35	36
SH29	24	26	30	34	36	36
SH30	21	23	27	31	33	33
SH31	10	13	17	20	23	23
SH32	5	7	11	14	17	17
SH33	2	4	8	12	14	14

6. ASSESSMENT

Table 6.1 below summarises the level of exceedance to the noise criteria based on background noise monitoring, with the predicted levels exceeding the criteria highlighted in red and the level of exceedance listed in brackets adjacent.

TABLE 6.1 – ASSESSMENT OF NOISE LEVELS AT IDENTIFIED RECEIVER LOCATIONS – NOISE MODE 0, (SERRATED TRAILING EDGE)

ID#	Predicted Noise Level, L_{Aeq} [dB(A)]						Noise Criteria Based on Background Noise Level, L_{Aeq} [dB(A)]					
	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s	4m/s	5m/s	6m/s	7m/s	8m/s	9m/s
NSH01	9	12	16	19	22	22	35	35	35	36	37	39
NSH02	11	14	17	21	23	23	35	35	35	36	37	39
NSH03	19	22	26	29	32	32	35	36	37	39	41	42
NSH04	23	25	29	33	35	35	35	36	37	39	41	42
NSH05	11	13	17	21	23	23	35	36	37	39	41	42
NSH06	17	20	24	27	30	30	35	36	37	39	41	42
NSH07	11	14	18	21	23	24	35	36	37	39	41	42
NSH08	18	20	24	28	30	30	35	35	36	38	40	42
NSH09	20	23	27	30	33	33	35	35	36	38	40	42
NSH10	4	7	10	14	16	17	35	35	35	36	37	39
NSH11	8	10	14	18	20	20	35	35	35	36	37	39
NSH12	20	22	26	30	32	33	35	35	35	36	37	39
NSH13	19	22	25	29	31	32	35	35	35	36	37	39
NSH14	21	24	28	31	34	34	35	36	37	39	41	43
NSH15	20	22	26	29	32	32	35	36	37	39	41	43
NSH16	3	6	9	13	15	15	35	35	35	36	37	39
NSH17	2	5	8	12	14	15	35	35	35	36	37	39
NSH18	1	4	8	11	13	14	35	35	35	36	37	38
NSH19	9	12	15	19	21	22	35	35	35	36	37	38
NSH20	1	4	8	11	13	14	35	35	36	38	40	42
NSH21	5	8	11	15	17	18	35	35	35	36	37	39
NSH22	19	21	25	29	31	31	35	35	35	36	37	39
NSH23	5	8	11	15	17	18	35	35	35	36	37	39
NSH24	18	21	25	28	31	31	35	35	35	36	37	39
NSH25	5	8	11	15	17	18	35	36	37	39	41	42
SH26	5	8	11	15	17	17	35	35	35	35	37	38
SH27	23	25	29	33	35	35	35	35	35	35	37	38
SH28	23	25	29	33	35	36	35	35	35	36	37	39
SH29	24	26	30	34	36	36	35	36	37	39	41	42
SH30	21	23	27	31	33	33	35	35	35	36	37	38
SH31	10	13	17	20	23	23	35	35	35	36	37	38
SH32	5	7	11	14	17	17	35	35	35	36	37	38
SH33	2	4	8	12	14	14	35	35	35	35	37	38

As can be seen from the above tables, calculated noise levels at “non-stake holders” and “stake-holder” locations have been found to be in compliance with the noise criteria based on background noise monitoring.

7. CONCLUSION

Noise emissions at “non-stake holders” have been calculated to comply with the background noise criteria under all wind conditions.

Noise levels at all “stake holders” have also been calculated to comply with the background noise criteria under all wind conditions.

I trust the above meets your requirements on this matter. Should you have any further queries, do not hesitate to contact the undersigned.

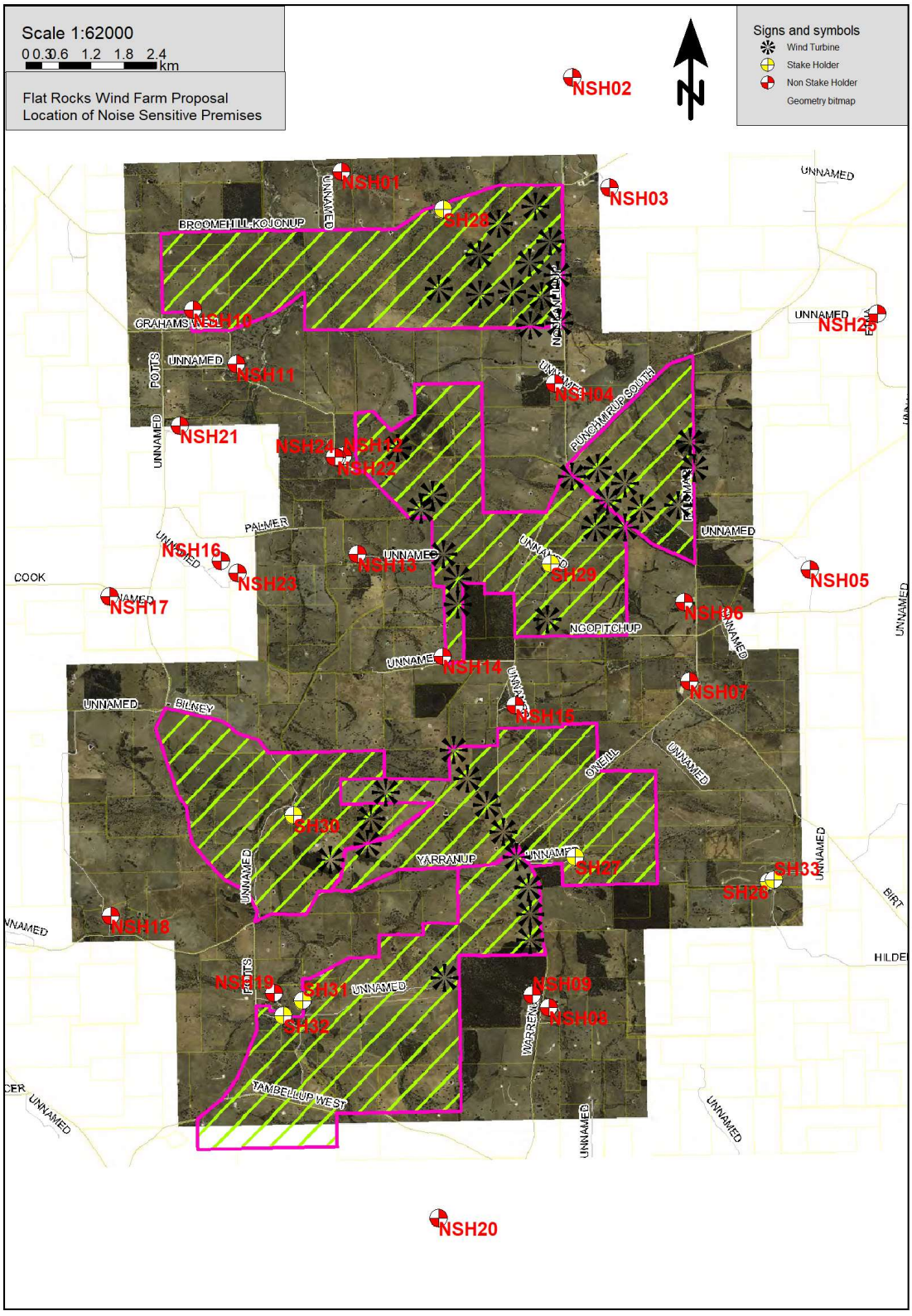
Yours faithfully,
For **HERRING STORER ACOUSTICS**

George Watts

Att.

APPENDIX A

RESIDENTIAL AND WIND TURBINE LOCATIONS


Scale 1:62000
0 0.3 0.6 1.2 1.8 2.4
km
Flat Rocks Wind Farm Proposal
Location of Noise Sensitive Premises
Signs and symbols
Wind Turbine
Stake Holder
Non Stake Holder
Geometry bitmap
NSH01
NSH02
NSH03
NSH04
NSH05
NSH06
NSH07
NSH08
NSH09
NSH10
NSH11
NSH12
NSH13
NSH14
NSH15
NSH16
NSH17
NSH18
NSH19
NSH20
NSH21
NSH22
NSH23
NSH24
NSH25
SH26
SH27
SH28
SH29
SH30
SH31
SH32
SH33
BROOMEHILL-KOJONUP
GRAHAMS WEST
POTTS
PALMER
BILNEY
YARRANUP
PUNCHMIRUP SOUTH
NGOPITCHUP
O'NEILL
WARREN
TAMBELLUP WEST
UNNAMED
COOK
BIRT
HILDE

APPENDIX B

TURBINE SPECIFICATIONS

DMS 0067-4767_07

V150-4.0/4.2 MW
Third octave
noise emission

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

The purpose of this document is to present the third octave noise spectra for the V150-4.0/4.2 MW turbine.

Results for the turbine with Serrated Trailing Edges are based upon internal measurement results obtained on the V150 prototype turbine located at the Østerild test site in Denmark during August and September 2019.

There are no results for V150 without Serrated Trailing Edges available, so results for the turbine without Serrated Trailing Edges are based on internal measurement results on a V136-3.3 MW located at the Østerild test site in Denmark during April to June 2014.

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 and rotor size, an estimate of the actual 1/3 octave performance is obtained.

The frequency content is limited to the frequency range 6.3 Hz to 10 kHz in order to secure that measurement system limitations are not influencing the findings. 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.

The stated values represent the expected turbine performance, but do not in any way 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 directly and indirectly in IEC 61400-11.

These can be interpreted as air density 1.225 kg/m^3, yaw errors below +/- 15 deg. and vertical inflow angles below +/- 10 deg. Blade condition is clean and undamaged.

3. Results

3.1 Mode 0

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	7.4	3.0	7.5	13.5	19.4	25.0	28.2	30.2	33.4	35.9	38.0	39.9	41.7	43.3	44.6	46.0	46.8	47.0
8 Hz	15.0	11.2	15.3	21.0	26.6	32.0	35.0	36.7	39.5	41.8	43.6	45.3	46.8	48.2	49.4	50.7	51.3	51.5
10 Hz	21.7	18.4	22.3	27.6	33.0	38.2	41.0	42.5	45.0	46.9	48.5	50.0	51.4	52.6	53.7	54.8	55.4	55.5
12.5 Hz	28.1	25.2	28.8	33.9	39.1	44.0	46.7	48.0	50.1	51.8	53.2	54.5	55.7	56.8	57.7	58.7	59.2	59.4
16 Hz	34.7	32.3	35.7	40.5	45.4	50.1	52.6	53.7	55.5	57.0	58.1	59.2	60.3	61.2	62.0	62.8	63.2	63.4
20 Hz	40.3	38.3	41.5	46.1	50.8	55.3	57.6	58.6	60.1	61.3	62.3	63.3	64.1	64.9	65.6	66.3	66.6	66.8
25 Hz	45.6	43.9	46.9	51.3	55.8	60.1	62.3	63.1	64.4	65.4	66.2	67.0	67.8	68.4	69.0	69.5	69.9	70.0
31.5 Hz	50.6	49.4	52.1	56.3	60.6	64.8	66.9	67.5	68.5	69.3	70.0	70.7	71.3	71.8	72.3	72.7	73.0	73.1
40 Hz	55.5	54.5	57.1	61.1	65.2	69.2	71.2	71.7	72.5	73.1	73.7	74.2	74.6	75.1	75.4	75.8	76.0	76.1
50 Hz	59.6	59.0	61.4	65.2	69.2	73.1	75.0	75.3	75.9	76.4	76.8	77.2	77.6	77.9	78.2	78.4	78.6	78.7
63 Hz	63.5	63.1	65.5	69.1	73.0	76.7	78.5	78.7	79.2	79.5	79.8	80.1	80.3	80.6	80.8	81.0	81.1	81.1
80 Hz	67.2	67.0	69.2	72.7	76.4	80.1	81.8	81.9	82.2	82.4	82.6	82.8	82.9	83.1	83.2	83.3	83.4	83.5
100 Hz	70.2	70.3	72.3	75.7	79.4	82.9	84.6	84.6	84.7	84.9	85.0	85.1	85.1	85.2	85.3	85.4	85.4	85.5
125 Hz	72.9	73.1	75.1	78.4	81.9	85.4	87.0	87.0	87.0	87.0	87.1	87.1	87.1	87.1	87.2	87.2	87.2	87.2
160 Hz	75.5	75.8	77.7	80.9	84.4	87.8	89.3	89.3	89.2	89.1	89.1	89.1	89.0	89.0	89.0	89.0	88.9	89.0
200 Hz	77.4	77.8	79.7	82.8	86.3	89.6	91.1	91.0	90.9	90.8	90.7	90.6	90.5	90.5	90.4	90.3	90.3	90.3
250 Hz	79.0	79.5	81.3	84.4	87.8	91.1	92.6	92.5	92.3	92.1	92.0	91.9	91.8	91.7	91.6	91.5	91.5	91.5
315 Hz	80.3	80.8	82.6	85.6	89.0	92.3	93.8	93.6	93.4	93.3	93.1	93.0	92.9	92.7	92.6	92.5	92.5	92.5
400 Hz	81.2	81.7	83.5	86.5	89.9	93.2	94.7	94.5	94.3	94.1	94.0	93.8	93.7	93.6	93.5	93.4	93.3	93.3
500 Hz	81.7	82.1	83.9	87.0	90.4	93.6	95.2	95.0	94.8	94.7	94.5	94.4	94.3	94.1	94.0	93.9	93.8	93.8
630 Hz	81.8	82.2	84.0	87.1	90.5	93.8	95.3	95.2	95.1	94.9	94.8	94.7	94.6	94.5	94.4	94.3	94.2	94.2
800 Hz	81.5	81.8	83.6	86.8	90.3	93.6	95.2	95.1	95.0	94.9	94.8	94.7	94.7	94.6	94.5	94.4	94.4	94.4
1 kHz	80.9	81.0	82.9	86.2	89.7	93.1	94.7	94.7	94.7	94.6	94.6	94.6	94.5	94.4	94.4	94.3	94.3	94.3
1.25 kHz	79.9	79.9	81.9	85.2	88.8	92.2	93.9	94.0	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.0	94.0	94.0
1.6 kHz	78.4	78.2	80.3	83.7	87.4	90.9	92.7	92.8	93.0	93.2	93.3	93.3	93.4	93.4	93.5	93.5	93.5	93.5
2 kHz	76.7	76.2	78.4	82.0	85.7	89.4	91.2	91.5	91.8	92.1	92.3	92.4	92.5	92.6	92.7	92.8	92.8	92.8
2.5 kHz	74.6	73.9	76.2	79.9	83.8	87.6	89.4	89.8	90.3	90.7	91.0	91.2	91.4	91.6	91.7	91.9	91.9	91.9
3.15 kHz	72.1	71.1	73.5	77.3	81.4	85.3	87.3	87.8	88.5	89.0	89.4	89.7	90.0	90.3	90.5	90.7	90.8	90.8
4 kHz	69.1	67.7	70.3	74.3	78.5	82.6	84.7	85.3	86.3	87.0	87.5	87.9	88.4	88.7	89.0	89.3	89.4	89.4
5 kHz	65.9	64.2	66.9	71.1	75.5	79.7	82.0	82.7	83.9	84.8	85.4	86.0	86.5	87.0	87.4	87.7	87.9	87.9
6.3 kHz	62.2	60.1	63.0	67.5	72.0	76.4	78.8	79.7	81.2	82.2	83.0	83.8	84.4	85.0	85.5	85.9	86.2	86.2
8 kHz	58.0	55.4	58.6	63.3	68.0	72.7	75.2	76.3	78.0	79.3	80.3	81.2	82.0	82.7	83.2	83.8	84.1	84.1
10 kHz	53.7	50.7	54.1	59.0	64.0	68.8	71.4	72.8	74.8	76.3	77.4	78.5	79.4	80.3	81.0	81.7	82.0	82.0
A-wgt	91.1	91.3	93.2	96.4	99.9	103.3	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9

Table 1: V150-4.0MW Mode 0, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

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	11.0	12.0	15.2	18.5	21.8	24.6	25.9	25.8	25.9	26.2	26.6	27.0	27.4	27.7	28.1	28.5	28.8	29.2
8 Hz	18.3	19.2	22.4	25.8	29.1	31.9	33.2	33.1	33.3	33.6	33.9	34.3	34.7	35.1	35.4	35.8	36.1	36.4
10 Hz	24.7	25.6	28.9	32.3	35.6	38.4	39.8	39.7	39.8	40.1	40.4	40.8	41.2	41.5	41.9	42.2	42.5	42.8
12.5 Hz	30.8	31.7	35.0	38.4	41.8	44.6	45.9	45.8	46.0	46.3	46.6	46.9	47.3	47.7	48.0	48.3	48.6	48.9
16 Hz	37.1	38.0	41.3	44.8	48.2	51.0	52.4	52.3	52.4	52.7	53.0	53.3	53.7	54.0	54.4	54.7	55.0	55.2
20 Hz	42.5	43.4	46.7	50.2	53.6	56.5	57.8	57.7	57.9	58.1	58.4	58.8	59.1	59.4	59.7	60.1	60.3	60.6
25 Hz	47.6	48.5	51.8	55.3	58.7	61.6	63.0	62.9	63.0	63.2	63.5	63.8	64.2	64.5	64.8	65.1	65.3	65.5
31.5 Hz	52.5	53.4	56.7	60.2	63.6	66.5	67.9	67.8	67.9	68.2	68.4	68.7	69.0	69.3	69.6	69.9	70.1	70.3
40 Hz	57.2	58.0	61.4	64.9	68.3	71.2	72.6	72.5	72.6	72.9	73.1	73.4	73.7	74.0	74.2	74.5	74.7	74.9
50 Hz	61.2	62.1	65.4	69.0	72.4	75.3	76.7	76.6	76.7	76.9	77.1	77.4	77.7	77.9	78.2	78.4	78.6	78.8
63 Hz	65.0	65.9	69.2	72.8	76.2	79.1	80.5	80.4	80.5	80.7	80.9	81.2	81.4	81.7	81.9	82.2	82.3	82.5
80 Hz	68.6	69.4	72.8	76.4	79.8	82.7	84.1	84.0	84.1	84.3	84.5	84.7	84.9	85.2	85.4	85.6	85.8	85.9
100 Hz	71.6	72.4	75.8	79.3	82.8	85.7	87.1	87.0	87.1	87.2	87.4	87.6	87.9	88.1	88.2	88.4	88.6	88.7
125 Hz	74.3	75.1	78.4	82.0	85.4	88.3	89.7	89.6	89.7	89.9	90.0	90.2	90.4	90.6	90.8	90.9	91.1	91.2
160 Hz	76.9	77.7	81.0	84.5	87.9	90.8	92.2	92.2	92.2	92.4	92.5	92.7	92.8	93.0	93.1	93.3	93.4	93.5
200 Hz	78.9	79.6	82.9	86.5	89.9	92.7	94.2	94.1	94.2	94.3	94.4	94.5	94.7	94.8	94.9	95.1	95.2	95.2
250 Hz	80.6	81.3	84.5	88.1	91.5	94.3	95.7	95.7	95.7	95.8	95.9	96.1	96.2	96.3	96.4	96.5	96.5	96.6
315 Hz	81.9	82.6	85.9	89.4	92.7	95.6	97.0	97.0	97.0	97.1	97.2	97.3	97.3	97.4	97.5	97.6	97.6	97.7
400 Hz	83.0	83.6	86.9	90.3	93.7	96.5	97.9	97.9	97.9	98.0	98.0	98.1	98.2	98.2	98.3	98.3	98.3	98.4
500 Hz	83.6	84.3	87.4	90.9	94.2	97.1	98.5	98.4	98.5	98.5	98.5	98.5	98.6	98.6	98.6	98.6	98.7	98.7
630 Hz	83.9	84.5	87.7	91.1	94.4	97.2	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6
800 Hz	83.9	84.5	87.5	90.9	94.2	97.0	98.4	98.4	98.4	98.4	98.4	98.3	98.3	98.3	98.2	98.2	98.2	98.1
1 kHz	83.5	84.0	87.1	90.4	93.7	96.5	97.9	97.9	97.9	97.8	97.8	97.7	97.6	97.6	97.5	97.4	97.4	97.3
1.25 kHz	82.8	83.3	86.3	89.6	92.8	95.6	97.0	97.0	97.0	96.9	96.8	96.7	96.6	96.5	96.4	96.3	96.3	96.2
1.6 kHz	81.6	82.1	85.0	88.3	91.5	94.2	95.6	95.6	95.6	95.5	95.4	95.2	95.1	95.0	94.8	94.7	94.6	94.5
2 kHz	80.2	80.6	83.5	86.8	89.9	92.6	94.0	94.0	94.0	93.8	93.7	93.5	93.4	93.2	93.0	92.9	92.7	92.7
2.5 kHz	78.4	78.9	81.7	84.9	88.0	90.7	92.0	92.1	92.0	91.9	91.7	91.5	91.3	91.1	90.9	90.7	90.5	90.4
3.15 kHz	76.3	76.7	79.4	82.6	85.7	88.3	89.6	89.7	89.6	89.4	89.2	89.0	88.7	88.5	88.3	88.0	87.9	87.8
4 kHz	73.7	74.0	76.7	79.8	82.8	85.4	86.8	86.9	86.8	86.6	86.3	86.0	85.7	85.5	85.2	84.9	84.7	84.6
5 kHz	70.9	71.2	73.8	76.9	79.9	82.4	83.8	83.9	83.8	83.5	83.2	82.9	82.6	82.3	82.0	81.6	81.4	81.3
6.3 kHz	67.7	68.0	70.5	73.5	76.4	79.0	80.3	80.4	80.3	80.0	79.7	79.3	78.9	78.6	78.2	77.9	77.6	77.5
8 kHz	64.0	64.2	66.7	69.6	72.5	75.0	76.3	76.4	76.3	76.0	75.6	75.2	74.8	74.4	74.0	73.6	73.3	73.2
10 kHz	60.2	60.4	62.8	65.6	68.5	70.9	72.2	72.3	72.2	71.8	71.4	71.0	70.5	70.1	69.7	69.2	68.9	68.8
A-wgt	93.4	94.0	97.1	100.5	103.8	106.6	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0

Table 2: V150-4.0MW Mode 0-0S, expected 1/3 octave band performance
(Blades without serrated trailing edge)

3.2 Mode PO1

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	7.4	3.0	7.5	13.5	19.4	25.0	28.2	29.7	32.6	35.1	37.3	39.4	40.9	42.7	44.1	45.5	46.8	47.0
8 Hz	15.0	11.2	15.3	21.0	26.6	32.0	35.0	36.3	38.8	41.0	42.9	44.8	46.1	47.8	48.9	50.2	51.3	51.5
10 Hz	21.7	18.4	22.3	27.6	33.0	38.1	41.0	42.1	44.4	46.3	48.0	49.6	50.8	52.2	53.3	54.3	55.4	55.5
12.5 Hz	28.1	25.2	28.8	33.9	39.1	44.0	46.7	47.7	49.6	51.2	52.7	54.2	55.2	56.4	57.4	58.3	59.2	59.4
16 Hz	34.7	32.3	35.7	40.5	45.4	50.1	52.6	53.4	55.1	56.5	57.7	59.0	59.8	60.9	61.7	62.5	63.2	63.4
20 Hz	40.3	38.3	41.5	46.1	50.8	55.2	57.6	58.3	59.7	60.9	62.0	63.0	63.7	64.6	65.3	66.0	66.6	66.8
25 Hz	45.6	43.9	46.9	51.3	55.8	60.1	62.3	62.9	64.1	65.0	65.9	66.8	67.4	68.2	68.7	69.3	69.9	70.0
31.5 Hz	50.6	49.4	52.1	56.3	60.6	64.8	66.9	67.3	68.3	69.1	69.8	70.5	71.0	71.6	72.1	72.5	73.0	73.1
40 Hz	55.5	54.5	57.1	61.1	65.2	69.2	71.2	71.6	72.3	72.9	73.5	74.0	74.4	74.9	75.3	75.6	76.0	76.1
50 Hz	59.6	59.0	61.4	65.2	69.2	73.0	75.0	75.2	75.8	76.2	76.7	77.1	77.4	77.8	78.0	78.3	78.6	78.7
63 Hz	63.5	63.1	65.5	69.1	73.0	76.7	78.5	78.7	79.0	79.4	79.7	80.0	80.2	80.5	80.7	80.9	81.1	81.1
80 Hz	67.2	67.0	69.2	72.7	76.4	80.1	81.8	81.9	82.1	82.3	82.5	82.7	82.9	83.0	83.2	83.3	83.4	83.5
100 Hz	70.2	70.3	72.3	75.7	79.4	82.9	84.6	84.6	84.7	84.8	84.9	85.0	85.1	85.2	85.3	85.3	85.4	85.5
125 Hz	72.9	73.1	75.1	78.4	81.9	85.4	87.0	87.0	87.0	87.0	87.1	87.1	87.1	87.1	87.2	87.2	87.2	87.2
160 Hz	75.5	75.8	77.7	80.9	84.4	87.8	89.3	89.3	89.2	89.2	89.1	89.1	89.1	89.0	89.0	89.0	88.9	89.0
200 Hz	77.4	77.8	79.7	82.8	86.3	89.6	91.1	91.0	90.9	90.8	90.7	90.6	90.6	90.5	90.4	90.4	90.3	90.3
250 Hz	79.0	79.5	81.3	84.4	87.8	91.1	92.6	92.5	92.3	92.2	92.0	91.9	91.8	91.7	91.6	91.6	91.5	91.5
315 Hz	80.3	80.8	82.6	85.6	89.0	92.3	93.8	93.7	93.5	93.3	93.2	93.0	92.9	92.8	92.7	92.6	92.5	92.5
400 Hz	81.2	81.7	83.5	86.5	89.9	93.2	94.7	94.6	94.4	94.2	94.0	93.9	93.8	93.6	93.5	93.4	93.3	93.3
500 Hz	81.7	82.1	83.9	87.0	90.4	93.7	95.2	95.1	94.9	94.7	94.6	94.4	94.3	94.2	94.1	94.0	93.8	93.8
630 Hz	81.8	82.2	84.0	87.1	90.5	93.8	95.3	95.3	95.1	95.0	94.9	94.7	94.6	94.5	94.4	94.3	94.2	94.2
800 Hz	81.5	81.8	83.6	86.8	90.3	93.6	95.2	95.1	95.0	95.0	94.9	94.8	94.7	94.6	94.5	94.4	94.4	94.4
1 kHz	80.9	81.0	82.9	86.2	89.7	93.1	94.7	94.7	94.7	94.7	94.6	94.6	94.5	94.5	94.4	94.4	94.3	94.3
1.25 kHz	79.9	79.9	81.9	85.2	88.8	92.2	93.9	94.0	94.0	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.0	94.0
1.6 kHz	78.4	78.2	80.3	83.7	87.4	90.9	92.7	92.8	93.0	93.1	93.2	93.3	93.4	93.4	93.5	93.5	93.5	93.5
2 kHz	76.7	76.2	78.4	82.0	85.7	89.4	91.2	91.4	91.7	92.0	92.2	92.4	92.5	92.6	92.7	92.8	92.8	92.8
2.5 kHz	74.6	73.9	76.2	79.9	83.8	87.6	89.4	89.7	90.2	90.6	90.9	91.2	91.3	91.5	91.7	91.8	91.9	91.9
3.15 kHz	72.1	71.1	73.5	77.3	81.4	85.3	87.3	87.7	88.3	88.8	89.3	89.7	89.9	90.2	90.4	90.6	90.8	90.8
4 kHz	69.1	67.7	70.3	74.3	78.5	82.6	84.7	85.2	86.1	86.7	87.3	87.8	88.2	88.6	88.9	89.2	89.4	89.4
5 kHz	65.9	64.2	66.9	71.1	75.5	79.7	82.0	82.5	83.6	84.5	85.2	85.9	86.3	86.8	87.2	87.6	87.9	87.9
6.3 kHz	62.2	60.1	63.0	67.5	72.0	76.4	78.8	79.5	80.8	81.9	82.8	83.6	84.1	84.8	85.3	85.7	86.2	86.2
8 kHz	58.0	55.4	58.6	63.3	68.1	72.6	75.2	76.0	77.6	78.9	79.9	80.9	81.6	82.4	83.0	83.6	84.1	84.1
10 kHz	53.7	50.7	54.1	59.0	64.0	68.8	71.4	72.4	74.3	75.8	77.0	78.2	79.0	80.0	80.7	81.4	82.0	82.0
A-wgt	91.1	91.3	93.2	96.4	99.9	103.3	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9

Table 3: V150-4.2MW PO1, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

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	11.0	12.0	15.2	18.5	21.8	24.6	25.9	25.8	25.8	26.1	26.4	26.8	27.2	27.6	28.0	28.3	28.8	29.2
8 Hz	18.3	19.2	22.4	25.8	29.1	31.9	33.2	33.1	33.2	33.4	33.8	34.2	34.5	34.9	35.3	35.6	36.1	36.4
10 Hz	24.7	25.6	28.9	32.3	35.6	38.4	39.8	39.7	39.7	40.0	40.3	40.7	41.0	41.4	41.7	42.1	42.5	42.8
12.5 Hz	30.8	31.7	35.0	38.4	41.8	44.6	45.9	45.8	45.9	46.1	46.5	46.8	47.1	47.5	47.9	48.2	48.6	48.9
16 Hz	37.1	38.0	41.3	44.8	48.2	51.0	52.4	52.3	52.3	52.6	52.9	53.2	53.5	53.9	54.2	54.6	55.0	55.2
20 Hz	42.5	43.4	46.7	50.2	53.6	56.5	57.8	57.7	57.8	58.0	58.3	58.7	58.9	59.3	59.6	59.9	60.3	60.6
25 Hz	47.6	48.5	51.8	55.3	58.7	61.6	63.0	62.9	62.9	63.1	63.4	63.8	64.0	64.4	64.7	65.0	65.3	65.5
31.5 Hz	52.5	53.4	56.7	60.2	63.6	66.5	67.9	67.8	67.9	68.1	68.3	68.6	68.9	69.2	69.5	69.8	70.1	70.3
40 Hz	57.2	58.0	61.4	64.9	68.3	71.2	72.6	72.5	72.6	72.8	73.0	73.3	73.6	73.9	74.1	74.4	74.7	74.9
50 Hz	61.2	62.1	65.4	69.0	72.4	75.3	76.7	76.6	76.6	76.8	77.0	77.3	77.6	77.9	78.1	78.3	78.6	78.8
63 Hz	65.0	65.9	69.2	72.8	76.2	79.1	80.5	80.4	80.5	80.6	80.9	81.1	81.3	81.6	81.8	82.1	82.3	82.5
80 Hz	68.6	69.4	72.8	76.4	79.8	82.7	84.1	84.0	84.1	84.2	84.4	84.6	84.8	85.1	85.3	85.5	85.8	85.9
100 Hz	71.6	72.4	75.8	79.3	82.8	85.7	87.1	87.0	87.0	87.2	87.4	87.6	87.8	88.0	88.2	88.4	88.6	88.7
125 Hz	74.3	75.1	78.4	82.0	85.4	88.3	89.7	89.7	89.7	89.8	90.0	90.2	90.3	90.5	90.7	90.9	91.1	91.2
160 Hz	76.9	77.7	81.0	84.5	87.9	90.8	92.2	92.2	92.2	92.3	92.5	92.6	92.8	92.9	93.1	93.2	93.4	93.5
200 Hz	78.9	79.6	82.9	86.5	89.9	92.7	94.2	94.1	94.1	94.2	94.4	94.5	94.6	94.8	94.9	95.0	95.2	95.2
250 Hz	80.6	81.3	84.5	88.1	91.5	94.3	95.7	95.7	95.7	95.8	95.9	96.0	96.1	96.2	96.3	96.4	96.5	96.6
315 Hz	81.9	82.6	85.9	89.4	92.7	95.6	97.0	97.0	97.0	97.1	97.1	97.2	97.3	97.4	97.5	97.5	97.6	97.7
400 Hz	83.0	83.6	86.9	90.3	93.7	96.5	97.9	97.9	97.9	98.0	98.0	98.1	98.1	98.2	98.2	98.3	98.3	98.4
500 Hz	83.6	84.3	87.4	90.9	94.2	97.1	98.5	98.4	98.5	98.5	98.5	98.5	98.6	98.6	98.6	98.6	98.7	98.7
630 Hz	83.9	84.5	87.7	91.1	94.4	97.2	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6
800 Hz	83.9	84.5	87.5	90.9	94.2	97.0	98.4	98.4	98.4	98.4	98.4	98.4	98.3	98.3	98.2	98.2	98.2	98.1
1 kHz	83.5	84.0	87.1	90.4	93.7	96.5	97.9	97.9	97.9	97.8	97.8	97.7	97.7	97.6	97.5	97.5	97.4	97.3
1.25 kHz	82.8	83.3	86.3	89.6	92.8	95.6	97.0	97.0	97.0	96.9	96.9	96.8	96.7	96.6	96.5	96.4	96.3	96.2
1.6 kHz	81.6	82.1	85.0	88.3	91.5	94.2	95.6	95.6	95.6	95.5	95.4	95.3	95.2	95.0	94.9	94.8	94.6	94.5
2 kHz	80.2	80.6	83.5	86.8	89.9	92.6	94.0	94.0	94.0	93.9	93.8	93.6	93.4	93.3	93.1	92.9	92.7	92.7
2.5 kHz	78.4	78.9	81.7	84.9	88.0	90.7	92.0	92.1	92.1	91.9	91.8	91.5	91.4	91.1	91.0	90.7	90.5	90.4
3.15 kHz	76.3	76.7	79.4	82.6	85.7	88.3	89.6	89.7	89.7	89.5	89.3	89.1	88.9	88.6	88.4	88.1	87.9	87.8
4 kHz	73.7	74.0	76.7	79.8	82.8	85.4	86.8	86.9	86.8	86.6	86.4	86.1	85.9	85.6	85.3	85.0	84.7	84.6
5 kHz	70.9	71.2	73.8	76.9	79.9	82.4	83.8	83.9	83.8	83.6	83.3	83.0	82.7	82.4	82.1	81.8	81.4	81.3
6.3 kHz	67.7	68.0	70.5	73.5	76.4	79.0	80.3	80.4	80.3	80.1	79.8	79.4	79.1	78.7	78.4	78.0	77.6	77.5
8 kHz	64.0	64.2	66.7	69.6	72.5	75.0	76.3	76.4	76.3	76.1	75.7	75.3	75.0	74.5	74.1	73.7	73.3	73.2
10 kHz	60.2	60.4	62.8	65.6	68.5	70.9	72.2	72.3	72.2	72.0	71.6	71.1	70.7	70.2	69.8	69.4	68.9	68.8
A-wgt	93.4	94.0	97.1	100.5	103.8	106.6	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0

Table 4: V150-4.2MW PO1-0S, expected 1/3 octave band performance
(Blades without serrated trailing edge)

3.3 Mode LO1

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	7.4	3.0	7.5	13.5	19.4	25.0	28.4	31.1	34.2	36.6	38.7	40.7	42.2	43.8	45.2	46.6	47.1	47.0
8 Hz	15.0	11.2	15.3	21.0	26.6	32.0	35.1	37.5	40.2	42.3	44.2	45.9	47.3	48.7	49.9	51.2	51.6	51.5
10 Hz	21.7	18.4	22.3	27.6	33.0	38.2	41.1	43.2	45.6	47.4	49.1	50.6	51.8	53.0	54.1	55.2	55.6	55.5
12.5 Hz	28.1	25.2	28.8	33.9	39.1	44.0	46.8	48.6	50.7	52.3	53.7	55.0	56.1	57.2	58.1	59.1	59.4	59.4
16 Hz	34.7	32.3	35.7	40.5	45.4	50.1	52.7	54.2	56.0	57.3	58.5	59.7	60.6	61.5	62.3	63.1	63.4	63.4
20 Hz	40.3	38.3	41.5	46.1	50.8	55.3	57.7	59.0	60.5	61.6	62.7	63.6	64.4	65.2	65.8	66.5	66.8	66.8
25 Hz	45.6	43.9	46.9	51.3	55.8	60.1	62.4	63.4	64.7	65.7	66.5	67.3	68.0	68.6	69.2	69.8	70.0	70.0
31.5 Hz	50.6	49.4	52.1	56.3	60.6	64.8	66.9	67.8	68.8	69.6	70.3	70.9	71.4	72.0	72.4	72.9	73.1	73.1
40 Hz	55.5	54.5	57.1	61.1	65.2	69.2	71.3	71.9	72.7	73.3	73.9	74.4	74.8	75.2	75.6	75.9	76.1	76.1
50 Hz	59.6	59.0	61.4	65.2	69.2	73.1	75.0	75.5	76.1	76.5	77.0	77.3	77.7	78.0	78.3	78.5	78.7	78.7
63 Hz	63.5	63.1	65.5	69.1	73.0	76.7	78.5	78.8	79.3	79.6	79.9	80.2	80.4	80.6	80.8	81.0	81.1	81.1
80 Hz	67.2	67.0	69.2	72.7	76.4	80.1	81.8	82.0	82.3	82.5	82.7	82.9	83.0	83.1	83.3	83.4	83.5	83.5
100 Hz	70.2	70.3	72.3	75.7	79.4	82.9	84.6	84.6	84.8	84.9	85.0	85.1	85.2	85.3	85.3	85.4	85.4	85.5
125 Hz	72.9	73.1	75.1	78.4	81.9	85.4	87.0	87.0	87.0	87.0	87.1	87.1	87.1	87.2	87.2	87.2	87.2	87.2
160 Hz	75.5	75.8	77.7	80.9	84.4	87.8	89.3	89.2	89.2	89.1	89.1	89.1	89.0	89.0	89.0	88.9	88.9	89.0
200 Hz	77.4	77.8	79.7	82.8	86.3	89.6	91.1	91.0	90.8	90.7	90.7	90.6	90.5	90.4	90.4	90.3	90.3	90.3
250 Hz	79.0	79.5	81.3	84.4	87.8	91.1	92.6	92.4	92.2	92.1	92.0	91.9	91.8	91.7	91.6	91.5	91.5	91.5
315 Hz	80.3	80.8	82.6	85.6	89.0	92.3	93.8	93.6	93.4	93.2	93.1	92.9	92.8	92.7	92.6	92.5	92.5	92.5
400 Hz	81.2	81.7	83.5	86.5	89.9	93.2	94.7	94.5	94.2	94.1	93.9	93.8	93.7	93.5	93.4	93.3	93.3	93.3
500 Hz	81.7	82.1	83.9	87.0	90.4	93.6	95.1	95.0	94.8	94.6	94.5	94.3	94.2	94.1	94.0	93.9	93.8	93.8
630 Hz	81.8	82.2	84.0	87.1	90.5	93.8	95.3	95.2	95.0	94.9	94.8	94.6	94.5	94.4	94.3	94.2	94.2	94.2
800 Hz	81.5	81.8	83.6	86.8	90.3	93.6	95.2	95.1	95.0	94.9	94.8	94.7	94.6	94.5	94.5	94.4	94.3	94.4
1 kHz	80.9	81.0	82.9	86.2	89.7	93.1	94.7	94.7	94.7	94.6	94.6	94.5	94.5	94.4	94.4	94.3	94.3	94.3
1.25 kHz	79.9	79.9	81.9	85.2	88.8	92.2	93.9	94.0	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.0	94.0	94.0
1.6 kHz	78.4	78.2	80.3	83.7	87.4	90.9	92.7	92.9	93.1	93.2	93.3	93.4	93.4	93.5	93.5	93.5	93.5	93.5
2 kHz	76.7	76.2	78.4	82.0	85.7	89.4	91.2	91.6	91.9	92.1	92.3	92.5	92.6	92.7	92.7	92.8	92.8	92.8
2.5 kHz	74.6	73.9	76.2	79.9	83.8	87.6	89.5	90.0	90.5	90.8	91.1	91.3	91.5	91.7	91.8	91.9	92.0	91.9
3.15 kHz	72.1	71.1	73.5	77.3	81.4	85.3	87.3	88.0	88.7	89.1	89.5	89.9	90.1	90.4	90.6	90.8	90.9	90.8
4 kHz	69.1	67.7	70.3	74.3	78.5	82.6	84.7	85.6	86.5	87.1	87.7	88.1	88.5	88.8	89.1	89.4	89.5	89.4
5 kHz	65.9	64.2	66.9	71.1	75.5	79.7	82.0	83.1	84.2	85.0	85.6	86.2	86.7	87.1	87.5	87.9	88.0	87.9
6.3 kHz	62.2	60.1	63.0	67.5	72.0	76.4	78.9	80.2	81.5	82.5	83.3	84.0	84.6	85.2	85.6	86.1	86.3	86.2
8 kHz	58.0	55.4	58.6	63.3	68.0	72.7	75.2	76.8	78.4	79.6	80.6	81.5	82.2	82.9	83.5	84.1	84.2	84.1
10 kHz	53.7	50.7	54.1	59.0	64.0	68.8	71.5	73.4	75.3	76.7	77.8	78.9	79.7	80.5	81.2	81.9	82.2	82.0
A-wgt	91.1	91.3	93.2	96.4	99.9	103.3	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9

Table 5: V150-4.0MW LO1, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

3.1 Mode LO2

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	7.4	3.0	7.5	13.5	19.4	24.4	25.5	28.8	32.1	34.5	36.5	38.5	40.3	41.6	43.3	44.7	45.8	46.1
8 Hz	15.0	11.2	15.3	21.0	26.6	31.4	32.4	35.4	38.2	40.3	42.2	43.9	45.5	46.7	48.1	49.4	50.4	50.6
10 Hz	21.7	18.4	22.3	27.6	33.0	37.6	38.6	41.2	43.7	45.5	47.1	48.7	50.1	51.1	52.4	53.5	54.4	54.5
12.5 Hz	28.1	25.2	28.8	33.9	39.1	43.5	44.4	46.7	48.9	50.5	51.9	53.2	54.4	55.3	56.5	57.4	58.2	58.3
16 Hz	34.7	32.3	35.7	40.5	45.4	49.7	50.5	52.4	54.3	55.6	56.8	57.9	59.0	59.7	60.7	61.5	62.2	62.3
20 Hz	40.3	38.3	41.5	46.1	50.8	54.9	55.7	57.3	58.8	60.0	61.0	62.0	62.8	63.5	64.3	65.0	65.6	65.7
25 Hz	45.6	43.9	46.9	51.3	55.8	59.7	60.5	61.8	63.1	64.1	64.9	65.7	66.5	67.0	67.7	68.3	68.8	68.9
31.5 Hz	50.6	49.4	52.1	56.3	60.6	64.4	65.2	66.2	67.3	68.1	68.8	69.4	70.0	70.5	71.0	71.5	71.9	72.0
40 Hz	55.5	54.5	57.1	61.1	65.2	68.9	69.6	70.4	71.3	71.9	72.4	72.9	73.4	73.8	74.2	74.6	74.9	74.9
50 Hz	59.6	59.0	61.4	65.2	69.2	72.8	73.5	74.1	74.7	75.2	75.6	76.0	76.3	76.6	76.9	77.2	77.5	77.5
63 Hz	63.5	63.1	65.5	69.1	73.0	76.4	77.1	77.5	77.9	78.3	78.6	78.9	79.1	79.3	79.6	79.8	79.9	80.0
80 Hz	67.2	67.0	69.2	72.7	76.4	79.8	80.5	80.7	81.0	81.2	81.4	81.6	81.7	81.9	82.0	82.2	82.3	82.3
100 Hz	70.2	70.3	72.3	75.7	79.4	82.7	83.3	83.4	83.5	83.6	83.8	83.9	84.0	84.0	84.1	84.2	84.2	84.3
125 Hz	72.9	73.1	75.1	78.4	81.9	85.2	85.8	85.8	85.8	85.8	85.9	85.9	85.9	86.0	86.0	86.0	86.0	86.0
160 Hz	75.5	75.8	77.7	80.9	84.4	87.6	88.2	88.1	88.0	87.9	87.9	87.9	87.9	87.8	87.8	87.8	87.8	87.8
200 Hz	77.4	77.8	79.7	82.8	86.3	89.4	90.0	89.8	89.7	89.6	89.5	89.4	89.4	89.3	89.2	89.2	89.1	89.1
250 Hz	79.0	79.5	81.3	84.4	87.8	90.9	91.5	91.3	91.1	90.9	90.8	90.7	90.6	90.5	90.4	90.3	90.3	90.3
315 Hz	80.3	80.8	82.6	85.6	89.0	92.1	92.7	92.4	92.2	92.1	91.9	91.8	91.7	91.6	91.5	91.4	91.3	91.3
400 Hz	81.2	81.7	83.5	86.5	89.9	93.0	93.6	93.3	93.1	92.9	92.8	92.7	92.5	92.4	92.3	92.2	92.1	92.1
500 Hz	81.7	82.1	83.9	87.0	90.4	93.5	94.0	93.8	93.6	93.5	93.3	93.2	93.1	93.0	92.8	92.7	92.6	92.6
630 Hz	81.8	82.2	84.0	87.1	90.5	93.6	94.2	94.1	93.9	93.8	93.6	93.5	93.4	93.3	93.2	93.1	93.0	93.0
800 Hz	81.5	81.8	83.6	86.8	90.3	93.4	94.0	93.9	93.8	93.7	93.6	93.6	93.5	93.4	93.3	93.2	93.1	93.1
1 kHz	80.9	81.0	82.9	86.2	89.7	92.9	93.5	93.5	93.5	93.4	93.4	93.4	93.3	93.3	93.2	93.1	93.1	93.1
1.25 kHz	79.9	79.9	81.9	85.2	88.8	92.0	92.6	92.8	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.8	92.8	92.8
1.6 kHz	78.4	78.2	80.3	83.7	87.4	90.7	91.3	91.6	91.8	92.0	92.1	92.1	92.2	92.2	92.3	92.3	92.3	92.3
2 kHz	76.7	76.2	78.4	82.0	85.7	89.1	89.8	90.3	90.6	90.8	91.0	91.2	91.3	91.4	91.5	91.6	91.6	91.6
2.5 kHz	74.6	73.9	76.2	79.9	83.8	87.3	88.0	88.6	89.1	89.5	89.7	90.0	90.2	90.3	90.5	90.7	90.8	90.8
3.15 kHz	72.1	71.1	73.5	77.3	81.4	85.0	85.7	86.6	87.3	87.8	88.1	88.5	88.8	89.0	89.3	89.5	89.6	89.6
4 kHz	69.1	67.7	70.3	74.3	78.5	82.2	83.0	84.1	85.1	85.7	86.2	86.7	87.1	87.4	87.7	88.0	88.3	88.3
5 kHz	65.9	64.2	66.9	71.1	75.5	79.4	80.1	81.5	82.7	83.5	84.1	84.7	85.3	85.6	86.1	86.5	86.8	86.8
6.3 kHz	62.2	60.1	63.0	67.5	72.0	76.0	76.8	78.5	79.9	80.9	81.7	82.5	83.1	83.6	84.2	84.7	85.0	85.1
8 kHz	58.0	55.4	58.6	63.3	68.1	72.2	73.1	75.0	76.8	78.0	78.9	79.8	80.7	81.2	81.9	82.5	83.0	83.0
10 kHz	53.7	50.7	54.1	59.0	64.0	68.3	69.2	71.5	73.5	74.9	76.1	77.2	78.1	78.8	79.6	80.3	80.9	81.0
A-wgt	91.1	91.3	93.2	96.4	99.9	103.1	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7	103.7

Table 6: V150-4.0MW LO2, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

3.1 Mode SO1

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	7.4	3.0	7.5	13.5	19.5	25.4	26.3	27.9	31.1	33.7	36.2	38.2	40.1	41.7	43.1	44.5	45.3	45.5
8 Hz	15.0	11.2	15.3	21.0	26.7	32.2	33.1	34.5	37.3	39.6	41.8	43.6	45.2	46.7	47.9	49.2	49.8	50.0
10 Hz	21.7	18.4	22.3	27.6	33.1	38.3	39.1	40.4	42.8	44.9	46.8	48.4	49.8	51.1	52.2	53.3	53.9	54.0
12.5 Hz	28.1	25.2	28.8	33.9	39.2	44.0	44.9	45.9	48.1	49.8	51.5	52.9	54.1	55.3	56.2	57.2	57.7	57.9
16 Hz	34.7	32.3	35.7	40.5	45.5	50.0	50.8	51.7	53.5	55.0	56.5	57.6	58.7	59.6	60.5	61.3	61.7	61.9
20 Hz	40.3	38.3	41.5	46.1	50.8	55.1	55.9	56.6	58.1	59.4	60.7	61.7	62.6	63.4	64.1	64.8	65.1	65.3
25 Hz	45.6	43.9	46.9	51.3	55.8	59.9	60.6	61.2	62.5	63.6	64.6	65.4	66.2	66.9	67.5	68.0	68.4	68.5
31.5 Hz	50.6	49.4	52.1	56.3	60.7	64.5	65.2	65.7	66.7	67.6	68.4	69.1	69.7	70.3	70.7	71.2	71.5	71.6
40 Hz	55.5	54.5	57.1	61.1	65.3	68.8	69.5	69.9	70.7	71.4	72.1	72.6	73.1	73.5	73.9	74.3	74.5	74.6
50 Hz	59.6	59.0	61.4	65.2	69.2	72.6	73.3	73.6	74.2	74.7	75.3	75.7	76.0	76.4	76.6	76.9	77.1	77.2
63 Hz	63.5	63.1	65.5	69.1	73.0	76.2	76.8	77.0	77.5	77.8	78.3	78.6	78.8	79.1	79.3	79.5	79.6	79.6
80 Hz	67.2	67.0	69.2	72.7	76.5	79.5	80.1	80.3	80.5	80.8	81.1	81.3	81.4	81.6	81.7	81.8	81.9	82.0
100 Hz	70.2	70.3	72.3	75.7	79.4	82.3	82.9	83.0	83.1	83.2	83.4	83.6	83.6	83.7	83.8	83.9	83.9	84.0
125 Hz	72.9	73.1	75.1	78.4	81.9	84.8	85.4	85.4	85.4	85.4	85.6	85.6	85.6	85.6	85.7	85.7	85.7	85.7
160 Hz	75.5	75.8	77.7	80.9	84.4	87.1	87.7	87.7	87.6	87.6	87.6	87.6	87.5	87.5	87.5	87.5	87.4	87.5
200 Hz	77.4	77.8	79.7	82.8	86.2	88.9	89.5	89.4	89.3	89.2	89.2	89.1	89.0	89.0	88.9	88.8	88.8	88.8
250 Hz	79.0	79.5	81.3	84.4	87.8	90.4	91.0	90.9	90.7	90.6	90.5	90.4	90.3	90.2	90.1	90.0	90.0	90.0
315 Hz	80.3	80.8	82.6	85.6	89.0	91.6	92.2	92.1	91.9	91.7	91.6	91.5	91.4	91.2	91.1	91.0	91.0	91.0
400 Hz	81.2	81.7	83.5	86.5	89.9	92.5	93.1	93.0	92.7	92.6	92.5	92.4	92.2	92.1	92.0	91.9	91.8	91.8
500 Hz	81.7	82.1	83.9	87.0	90.4	93.0	93.6	93.5	93.3	93.1	93.0	92.9	92.8	92.6	92.5	92.4	92.3	92.3
630 Hz	81.8	82.2	84.0	87.1	90.5	93.2	93.8	93.7	93.5	93.4	93.3	93.2	93.1	93.0	92.9	92.8	92.7	92.7
800 Hz	81.5	81.8	83.6	86.8	90.3	93.0	93.6	93.5	93.4	93.3	93.4	93.3	93.2	93.1	93.0	92.9	92.9	92.9
1 kHz	80.9	81.0	82.9	86.2	89.7	92.5	93.1	93.1	93.1	93.1	93.1	93.1	93.0	92.9	92.9	92.8	92.8	92.8
1.25 kHz	79.9	79.9	81.9	85.2	88.8	91.7	92.3	92.4	92.4	92.5	92.6	92.6	92.6	92.6	92.6	92.5	92.5	92.5
1.6 kHz	78.4	78.2	80.3	83.7	87.4	90.4	91.1	91.2	91.4	91.6	91.8	91.8	91.9	91.9	92.0	92.0	92.0	92.0
2 kHz	76.7	76.2	78.4	82.0	85.8	89.0	89.6	89.8	90.2	90.4	90.7	90.9	91.0	91.1	91.2	91.3	91.3	91.3
2.5 kHz	74.6	73.9	76.2	79.9	83.8	87.2	87.8	88.1	88.6	89.0	89.4	89.7	89.9	90.1	90.2	90.4	90.4	90.4
3.15 kHz	72.1	71.1	73.5	77.3	81.4	85.0	85.6	86.0	86.8	87.3	87.8	88.2	88.5	88.8	89.0	89.2	89.3	89.3
4 kHz	69.1	67.7	70.3	74.3	78.6	82.3	83.0	83.6	84.5	85.2	85.9	86.4	86.8	87.2	87.5	87.8	87.9	87.9
5 kHz	65.9	64.2	66.9	71.1	75.6	79.6	80.3	80.9	82.1	83.0	83.8	84.4	85.0	85.5	85.9	86.2	86.4	86.4
6.3 kHz	62.2	60.1	63.0	67.5	72.1	76.4	77.1	77.9	79.3	80.4	81.4	82.2	82.9	83.5	84.0	84.4	84.7	84.7
8 kHz	58.0	55.4	58.6	63.3	68.2	72.7	73.4	74.4	76.1	77.4	78.6	79.6	80.4	81.1	81.7	82.3	82.6	82.6
10 kHz	53.7	50.7	54.1	59.0	64.1	68.9	69.7	70.8	72.8	74.3	75.8	76.9	77.9	78.7	79.4	80.2	80.5	80.5
A-wgt	91.1	91.3	93.2	96.4	99.9	102.7	103.3	103.3	103.3	103.3	103.4	103.4	103.4	103.4	103.4	103.4	103.4	103.4

Table 7: V150-4.0MW SO1, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

3.1 Mode SO2

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	8.7	4.1	8.7	14.1	19.2	22.9	25.9	30.1	33.0	35.5	37.5	39.3	40.8	42.2	43.9	45.0	46.2	47.5
8 Hz	16.3	12.3	16.5	21.6	26.4	29.9	32.6	36.3	38.9	41.1	42.8	44.4	45.7	46.9	48.4	49.4	50.5	51.6
10 Hz	23.0	19.5	23.5	28.2	32.8	36.1	38.5	41.8	44.0	46.0	47.5	48.9	50.1	51.1	52.5	53.4	54.3	55.3
12.5 Hz	29.4	26.3	30.0	34.5	38.9	42.0	44.1	47.0	48.9	50.6	52.0	53.2	54.2	55.2	56.3	57.1	57.9	58.8
16 Hz	36.0	33.4	36.9	41.1	45.2	48.2	50.0	52.4	54.1	55.5	56.6	57.7	58.6	59.4	60.3	61.0	61.7	62.4
20 Hz	41.6	39.4	42.7	46.7	50.5	53.4	55.0	57.0	58.4	59.6	60.6	61.5	62.3	62.9	63.8	64.3	64.9	65.6
25 Hz	46.9	45.0	48.1	51.9	55.5	58.3	59.6	61.3	62.5	63.5	64.3	65.1	65.7	66.3	67.0	67.5	68.0	68.5
31.5 Hz	51.9	50.5	53.3	56.9	60.4	63.0	64.1	65.5	66.5	67.3	68.0	68.6	69.1	69.6	70.1	70.5	70.9	71.4
40 Hz	56.8	55.6	58.3	61.7	65.0	67.5	68.4	69.5	70.2	70.9	71.4	71.9	72.3	72.7	73.1	73.5	73.8	74.1
50 Hz	60.9	60.1	62.6	65.8	68.9	71.4	72.1	72.9	73.5	74.0	74.4	74.8	75.1	75.4	75.7	76.0	76.2	76.5
63 Hz	64.8	64.2	66.7	69.7	72.7	75.0	75.6	76.2	76.6	77.0	77.3	77.5	77.8	78.0	78.2	78.4	78.6	78.8
80 Hz	68.5	68.1	70.4	73.3	76.2	78.4	78.9	79.3	79.5	79.8	80.0	80.1	80.3	80.4	80.6	80.7	80.8	80.9
100 Hz	71.5	71.4	73.5	76.3	79.1	81.3	81.6	81.8	82.0	82.1	82.2	82.3	82.4	82.5	82.6	82.6	82.7	82.8
125 Hz	74.2	74.2	76.3	79.0	81.6	83.8	84.1	84.1	84.1	84.2	84.2	84.3	84.3	84.3	84.4	84.4	84.4	84.4
160 Hz	76.8	76.9	78.9	81.5	84.1	86.2	86.4	86.3	86.3	86.2	86.2	86.2	86.2	86.1	86.1	86.1	86.1	86.0
200 Hz	78.7	78.9	80.9	83.4	85.9	88.0	88.2	88.0	87.9	87.8	87.7	87.6	87.6	87.5	87.5	87.4	87.4	87.3
250 Hz	80.3	80.6	82.5	85.0	87.5	89.5	89.6	89.4	89.2	89.1	89.0	88.9	88.8	88.7	88.6	88.6	88.5	88.4
315 Hz	81.6	81.9	83.8	86.2	88.7	90.7	90.8	90.5	90.4	90.2	90.1	90.0	89.8	89.8	89.6	89.5	89.4	89.3
400 Hz	82.5	82.8	84.7	87.1	89.6	91.6	91.7	91.4	91.2	91.1	90.9	90.8	90.7	90.6	90.4	90.3	90.2	90.1
500 Hz	83.0	83.2	85.1	87.6	90.1	92.1	92.2	91.9	91.8	91.6	91.5	91.3	91.2	91.1	91.0	90.9	90.8	90.7
630 Hz	83.1	83.3	85.2	87.7	90.2	92.2	92.4	92.2	92.0	91.9	91.8	91.7	91.6	91.5	91.3	91.2	91.1	91.0
800 Hz	82.8	82.9	84.8	87.4	90.0	92.0	92.3	92.1	92.0	91.9	91.8	91.7	91.7	91.6	91.5	91.4	91.3	91.2
1 kHz	82.2	82.1	84.1	86.8	89.4	91.5	91.8	91.8	91.7	91.7	91.6	91.6	91.5	91.5	91.4	91.3	91.3	91.2
1.25 kHz	81.2	81.0	83.1	85.8	88.5	90.6	91.0	91.2	91.2	91.2	91.2	91.2	91.2	91.2	91.1	91.1	91.1	91.0
1.6 kHz	79.7	79.3	81.5	84.3	87.1	89.3	89.8	90.1	90.3	90.4	90.4	90.5	90.5	90.6	90.6	90.6	90.6	90.6
2 kHz	78.0	77.3	79.6	82.6	85.5	87.7	88.4	88.9	89.2	89.4	89.5	89.6	89.7	89.8	89.9	89.9	90.0	90.0
2.5 kHz	75.9	75.0	77.4	80.5	83.5	85.8	86.7	87.4	87.8	88.1	88.3	88.5	88.7	88.8	89.0	89.1	89.2	89.3
3.15 kHz	73.4	72.2	74.7	77.9	81.1	83.5	84.6	85.5	86.1	86.5	86.9	87.2	87.4	87.6	87.8	88.0	88.2	88.3
4 kHz	70.4	68.8	71.5	74.9	78.3	80.8	82.0	83.3	84.0	84.6	85.1	85.5	85.8	86.1	86.4	86.7	86.9	87.1
5 kHz	67.2	65.3	68.1	71.7	75.3	77.9	79.3	80.9	81.9	82.6	83.2	83.7	84.1	84.5	84.9	85.2	85.5	85.8
6.3 kHz	63.5	61.2	64.2	68.1	71.8	74.5	76.2	78.1	79.3	80.2	81.0	81.6	82.1	82.6	83.1	83.5	83.9	84.3
8 kHz	59.3	56.5	59.8	63.9	67.9	70.7	72.7	75.0	76.4	77.5	78.4	79.2	79.8	80.4	81.1	81.5	82.0	82.5
10 kHz	55.0	51.8	55.3	59.6	63.8	66.8	69.0	71.7	73.4	74.7	75.7	76.7	77.4	78.1	78.9	79.5	80.1	80.7
A-wgt	92.4	92.4	94.4	97.0	99.6	101.7	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0

Table 8: V150-4.0MW SO2, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

3.1 Mode SO3

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	7.4	3.0	7.5	13.4	19.6	24.5	27.5	30.1	32.4	34.2	36.2	37.9	39.4	40.9	42.1	43.4	44.7	46.0
8 Hz	15.0	11.2	15.3	20.9	26.8	31.0	33.7	36.0	38.0	39.6	41.4	42.9	44.2	45.5	46.6	47.7	48.9	50.0
10 Hz	21.7	18.4	22.3	27.5	33.1	36.9	39.2	41.2	43.0	44.4	45.9	47.3	48.4	49.6	50.6	51.6	52.6	53.6
12.5 Hz	28.1	25.2	28.8	33.8	39.1	42.4	44.4	46.2	47.7	49.0	50.3	51.5	52.5	53.5	54.4	55.2	56.1	57.0
16 Hz	34.7	32.3	35.7	40.4	45.3	48.1	49.8	51.3	52.7	53.7	54.9	55.9	56.7	57.6	58.3	59.0	59.8	60.5
20 Hz	40.3	38.3	41.5	46.0	50.6	53.0	54.4	55.7	56.8	57.8	58.7	59.6	60.3	61.1	61.7	62.3	62.9	63.6
25 Hz	45.6	43.9	46.9	51.2	55.6	57.5	58.8	59.8	60.8	61.6	62.4	63.1	63.7	64.3	64.9	65.4	65.9	66.5
31.5 Hz	50.6	49.4	52.1	56.2	60.4	62.0	63.0	63.8	64.6	65.2	65.9	66.5	67.0	67.5	67.9	68.4	68.8	69.2
40 Hz	55.5	54.5	57.1	61.0	64.9	66.2	67.0	67.7	68.3	68.8	69.3	69.8	70.2	70.6	70.9	71.2	71.6	71.9
50 Hz	59.6	59.0	61.4	65.1	68.9	69.8	70.4	70.9	71.4	71.8	72.2	72.6	72.9	73.2	73.5	73.7	74.0	74.2
63 Hz	63.5	63.1	65.5	69.0	72.6	73.2	73.7	74.1	74.4	74.7	75.0	75.3	75.5	75.7	75.9	76.1	76.3	76.5
80 Hz	67.2	67.0	69.2	72.6	76.1	76.5	76.7	77.0	77.2	77.4	77.6	77.8	77.9	78.1	78.2	78.3	78.5	78.6
100 Hz	70.2	70.3	72.3	75.6	78.9	79.2	79.3	79.5	79.6	79.7	79.8	79.9	80.0	80.1	80.2	80.2	80.3	80.4
125 Hz	72.9	73.1	75.1	78.3	81.5	81.5	81.6	81.7	81.7	81.8	81.8	81.8	81.9	81.9	81.9	81.9	82.0	82.0
160 Hz	75.5	75.8	77.7	80.8	83.9	83.8	83.8	83.8	83.8	83.7	83.7	83.7	83.7	83.7	83.6	83.6	83.6	83.6
200 Hz	77.4	77.8	79.7	82.7	85.8	85.6	85.5	85.4	85.3	85.3	85.2	85.1	85.1	85.0	85.0	84.9	84.9	84.8
250 Hz	79.0	79.5	81.3	84.3	87.3	87.0	86.9	86.8	86.7	86.6	86.5	86.4	86.3	86.2	86.1	86.0	86.0	85.9
315 Hz	80.3	80.8	82.6	85.5	88.5	88.2	88.1	87.9	87.8	87.6	87.5	87.4	87.3	87.2	87.1	87.0	86.9	86.8
400 Hz	81.2	81.7	83.5	86.4	89.4	89.1	88.9	88.8	88.6	88.5	88.4	88.2	88.1	88.0	87.9	87.8	87.7	87.6
500 Hz	81.7	82.1	83.9	86.9	89.9	89.6	89.5	89.3	89.2	89.0	88.9	88.8	88.7	88.5	88.4	88.3	88.2	88.1
630 Hz	81.8	82.2	84.0	87.0	90.1	89.9	89.7	89.6	89.4	89.3	89.2	89.1	89.0	88.9	88.8	88.7	88.6	88.5
800 Hz	81.5	81.8	83.6	86.7	89.9	89.7	89.6	89.5	89.5	89.4	89.3	89.2	89.1	89.0	88.9	88.8	88.8	88.7
1 kHz	80.9	81.0	82.9	86.1	89.3	89.3	89.3	89.2	89.2	89.2	89.1	89.0	89.0	88.9	88.9	88.8	88.7	88.7
1.25 kHz	79.9	79.9	81.9	85.1	88.4	88.6	88.6	88.7	88.7	88.7	88.7	88.7	88.6	88.6	88.6	88.6	88.5	88.5
1.6 kHz	78.4	78.2	80.3	83.6	87.1	87.4	87.6	87.7	87.8	87.9	88.0	88.0	88.0	88.1	88.1	88.1	88.1	88.1
2 kHz	76.7	76.2	78.4	81.9	85.5	86.1	86.4	86.6	86.8	86.9	87.1	87.2	87.3	87.3	87.4	87.4	87.5	87.5
2.5 kHz	74.6	73.9	76.2	79.8	83.6	84.4	84.9	85.2	85.5	85.7	85.9	86.1	86.3	86.4	86.5	86.6	86.7	86.8
3.15 kHz	72.1	71.1	73.5	77.2	81.2	82.4	83.0	83.5	83.9	84.2	84.5	84.8	85.0	85.2	85.4	85.6	85.7	85.9
4 kHz	69.1	67.7	70.3	74.2	78.4	79.9	80.7	81.4	81.9	82.4	82.8	83.2	83.5	83.8	84.0	84.3	84.5	84.7
5 kHz	65.9	64.2	66.9	71.0	75.5	77.3	78.3	79.2	79.9	80.4	81.0	81.4	81.8	82.2	82.5	82.9	83.2	83.5
6.3 kHz	62.2	60.1	63.0	67.4	72.1	74.3	75.6	76.6	77.4	78.1	78.8	79.4	79.9	80.4	80.8	81.2	81.6	82.0
8 kHz	58.0	55.4	58.6	63.2	68.2	70.9	72.4	73.6	74.6	75.5	76.3	77.1	77.7	78.3	78.8	79.3	79.8	80.3
10 kHz	53.7	50.7	54.1	58.9	64.2	67.3	69.1	70.6	71.8	72.8	73.7	74.6	75.3	76.1	76.7	77.3	77.9	78.5
A-wgt	91.1	91.3	93.2	96.3	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5

Table 9: V150-4.0MW SO3, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

3.1 Mode SO11

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	7.4	3.0	7.8	13.9	19.0	23.2	27.0	30.0	32.4	34.5	36.2	38.0	39.5	40.7	42.2	43.2	44.5	45.4
8 Hz	15.0	11.2	15.6	21.1	25.7	29.6	33.1	35.8	37.9	39.9	41.4	42.9	44.2	45.3	46.7	47.5	48.6	49.5
10 Hz	21.7	18.4	22.5	27.5	31.7	35.2	38.5	41.0	42.9	44.6	45.9	47.3	48.4	49.4	50.6	51.3	52.3	53.1
12.5 Hz	28.1	25.2	29.0	33.5	37.4	40.6	43.6	45.8	47.5	49.1	50.2	51.4	52.4	53.3	54.3	55.0	55.8	56.5
16 Hz	34.7	32.3	35.8	39.9	43.3	46.2	48.9	51.0	52.4	53.8	54.7	55.8	56.6	57.3	58.2	58.8	59.5	60.1
20 Hz	40.3	38.3	41.5	45.2	48.3	50.9	53.4	55.3	56.6	57.7	58.6	59.4	60.2	60.8	61.5	62.0	62.7	63.1
25 Hz	45.6	43.9	46.9	50.2	53.0	55.4	57.7	59.4	60.5	61.5	62.2	62.9	63.5	64.0	64.7	65.1	65.6	66.0
31.5 Hz	50.6	49.4	52.1	55.0	57.5	59.7	61.8	63.3	64.3	65.1	65.7	66.3	66.8	67.2	67.7	68.0	68.5	68.8
40 Hz	55.5	54.5	57.1	59.6	61.9	63.8	65.7	67.1	67.9	68.6	69.1	69.5	69.9	70.2	70.6	70.9	71.2	71.5
50 Hz	59.6	59.0	61.3	63.6	65.6	67.4	69.1	70.4	71.0	71.6	72.0	72.3	72.6	72.9	73.2	73.4	73.6	73.8
63 Hz	63.5	63.1	65.3	67.4	69.1	70.7	72.3	73.4	74.0	74.5	74.7	75.0	75.2	75.4	75.6	75.7	75.9	76.1
80 Hz	67.2	67.0	69.0	70.8	72.4	73.9	75.3	76.3	76.8	77.2	77.3	77.5	77.6	77.7	77.9	78.0	78.1	78.2
100 Hz	70.2	70.3	72.1	73.8	75.2	76.5	77.9	78.8	79.1	79.4	79.5	79.6	79.7	79.7	79.8	79.9	79.9	80.0
125 Hz	72.9	73.1	74.9	76.3	77.6	78.9	80.1	81.0	81.2	81.4	81.5	81.5	81.5	81.5	81.6	81.6	81.6	81.6
160 Hz	75.5	75.8	77.5	78.8	80.0	81.1	82.3	83.1	83.2	83.4	83.4	83.4	83.3	83.3	83.3	83.2	83.2	83.2
200 Hz	77.4	77.8	79.5	80.7	81.7	82.8	84.0	84.7	84.8	84.9	84.9	84.8	84.7	84.7	84.6	84.6	84.5	84.4
250 Hz	79.0	79.5	81.0	82.2	83.2	84.3	85.3	86.0	86.1	86.2	86.1	86.0	85.9	85.9	85.8	85.7	85.6	85.5
315 Hz	80.3	80.8	82.3	83.4	84.4	85.5	86.5	87.2	87.2	87.3	87.2	87.1	86.9	86.9	86.7	86.7	86.5	86.5
400 Hz	81.2	81.7	83.2	84.3	85.3	86.3	87.4	88.0	88.1	88.1	88.0	87.9	87.8	87.7	87.5	87.4	87.3	87.2
500 Hz	81.7	82.1	83.7	84.8	85.8	86.9	87.9	88.6	88.6	88.7	88.6	88.4	88.3	88.2	88.1	88.0	87.9	87.8
630 Hz	81.8	82.2	83.8	85.0	86.0	87.1	88.2	88.8	88.9	89.0	88.9	88.8	88.7	88.6	88.4	88.4	88.2	88.2
800 Hz	81.5	81.8	83.4	84.8	85.9	87.0	88.1	88.8	88.9	89.0	89.0	88.9	88.8	88.7	88.6	88.5	88.4	88.4
1 kHz	80.9	81.0	82.8	84.2	85.4	86.6	87.8	88.5	88.7	88.8	88.8	88.7	88.7	88.6	88.5	88.5	88.4	88.4
1.25 kHz	79.9	79.9	81.7	83.3	84.7	85.9	87.2	88.0	88.2	88.4	88.4	88.4	88.4	88.3	88.3	88.3	88.2	88.2
1.6 kHz	78.4	78.2	80.1	81.9	83.4	84.8	86.2	87.1	87.4	87.6	87.7	87.7	87.8	87.8	87.8	87.8	87.8	87.8
2 kHz	76.7	76.2	78.3	80.3	82.0	83.5	85.0	86.0	86.4	86.7	86.8	86.9	87.0	87.1	87.1	87.2	87.2	87.3
2.5 kHz	74.6	73.9	76.1	78.4	80.3	81.9	83.5	84.6	85.1	85.5	85.7	85.9	86.0	86.2	86.3	86.4	86.5	86.6
3.15 kHz	72.1	71.1	73.5	76.1	78.1	80.0	81.7	82.9	83.5	84.0	84.3	84.6	84.8	85.0	85.2	85.4	85.5	85.6
4 kHz	69.1	67.7	70.3	73.2	75.6	77.6	79.5	80.9	81.6	82.3	82.6	83.0	83.3	83.6	83.9	84.1	84.3	84.5
5 kHz	65.9	64.2	67.0	70.3	72.9	75.1	77.2	78.7	79.5	80.3	80.8	81.3	81.7	82.0	82.4	82.7	83.0	83.2
6.3 kHz	62.2	60.1	63.2	66.8	69.7	72.2	74.5	76.1	77.2	78.1	78.7	79.3	79.8	80.2	80.7	81.1	81.5	81.8
8 kHz	58.0	55.4	58.8	62.9	66.2	68.9	71.4	73.2	74.4	75.5	76.3	77.0	77.6	78.1	78.8	79.2	79.7	80.0
10 kHz	53.7	50.7	54.3	58.8	62.5	65.4	68.2	70.2	71.6	72.9	73.7	74.6	75.4	76.0	76.7	77.2	77.8	78.2
A-wgt	91.1	91.3	93.0	94.4	95.6	96.8	98.0	98.8	99.0	99.2	99.2	99.2	99.2	99.2	99.2	99.2	99.2	99.2

Table 10: V150-4.0MW SO11, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

3.1 Mode SO12

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	7.4	3.0	7.7	13.6	19.5	24.5	28.1	30.9	33.2	35.1	36.7	38.2	39.6	41.1	42.4	43.6	44.9	45.8
8 Hz	15.0	11.2	15.5	20.9	26.3	31.0	34.2	36.8	38.8	40.4	41.9	43.1	44.4	45.8	46.9	48.0	49.1	49.9
10 Hz	21.7	18.4	22.4	27.4	32.4	36.7	39.7	41.9	43.7	45.2	46.4	47.6	48.7	49.9	50.8	51.8	52.8	53.5
12.5 Hz	28.1	25.2	28.9	33.5	38.2	42.2	44.8	46.8	48.4	49.7	50.8	51.8	52.8	53.8	54.6	55.5	56.3	56.9
16 Hz	34.7	32.3	35.7	39.9	44.1	47.9	50.2	52.0	53.3	54.4	55.3	56.1	57.0	57.9	58.6	59.3	60.0	60.6
20 Hz	40.3	38.3	41.5	45.3	49.2	52.7	54.8	56.3	57.4	58.4	59.2	59.9	60.6	61.3	62.0	62.6	63.2	63.6
25 Hz	45.6	43.9	46.9	50.4	54.0	57.2	59.1	60.4	61.3	62.1	62.8	63.4	64.0	64.6	65.1	65.7	66.2	66.5
31.5 Hz	50.6	49.4	52.1	55.3	58.6	61.6	63.2	64.4	65.1	65.8	66.3	66.8	67.3	67.8	68.2	68.6	69.1	69.4
40 Hz	55.5	54.5	57.0	59.9	63.0	65.7	67.2	68.1	68.8	69.3	69.7	70.1	70.5	70.9	71.2	71.5	71.8	72.1
50 Hz	59.6	59.0	61.3	64.0	66.7	69.3	70.6	71.4	71.9	72.3	72.6	72.9	73.2	73.5	73.8	74.0	74.3	74.4
63 Hz	63.5	63.1	65.3	67.8	70.3	72.7	73.8	74.5	74.9	75.1	75.4	75.6	75.8	76.0	76.2	76.4	76.6	76.7
80 Hz	67.2	67.0	69.0	71.3	73.6	75.9	76.9	77.4	77.6	77.8	78.0	78.1	78.3	78.4	78.5	78.6	78.8	78.8
100 Hz	70.2	70.3	72.1	74.2	76.4	78.6	79.4	79.9	80.0	80.1	80.2	80.3	80.3	80.4	80.5	80.5	80.6	80.6
125 Hz	72.9	73.1	74.9	76.8	78.9	81.0	81.7	82.1	82.1	82.1	82.2	82.2	82.2	82.2	82.2	82.3	82.3	82.3
160 Hz	75.5	75.8	77.5	79.3	81.3	83.2	83.9	84.2	84.1	84.1	84.1	84.1	84.0	84.0	84.0	83.9	83.9	83.9
200 Hz	77.4	77.8	79.5	81.2	83.1	85.0	85.6	85.8	85.7	85.6	85.6	85.5	85.4	85.4	85.3	85.3	85.2	85.2
250 Hz	79.0	79.5	81.1	82.8	84.6	86.4	87.0	87.1	87.0	86.9	86.8	86.7	86.6	86.6	86.5	86.4	86.3	86.2
315 Hz	80.3	80.8	82.3	84.0	85.8	87.6	88.1	88.3	88.1	88.0	87.9	87.8	87.7	87.6	87.5	87.4	87.3	87.2
400 Hz	81.2	81.7	83.2	84.9	86.7	88.5	89.0	89.1	89.0	88.8	88.7	88.6	88.5	88.4	88.3	88.2	88.0	88.0
500 Hz	81.7	82.1	83.7	85.4	87.2	89.0	89.5	89.7	89.5	89.4	89.3	89.2	89.0	88.9	88.8	88.7	88.6	88.5
630 Hz	81.8	82.2	83.8	85.5	87.4	89.2	89.8	89.9	89.8	89.7	89.6	89.5	89.4	89.3	89.2	89.1	89.0	88.9
800 Hz	81.5	81.8	83.4	85.3	87.2	89.1	89.7	89.9	89.8	89.7	89.7	89.6	89.5	89.4	89.3	89.2	89.2	89.1
1 kHz	80.9	81.0	82.8	84.7	86.7	88.7	89.4	89.6	89.6	89.5	89.5	89.4	89.4	89.3	89.3	89.2	89.1	89.1
1.25 kHz	79.9	79.9	81.7	83.8	85.9	88.0	88.8	89.1	89.1	89.1	89.1	89.1	89.1	89.0	89.0	89.0	88.9	88.9
1.6 kHz	78.4	78.2	80.1	82.4	84.7	86.9	87.7	88.2	88.3	88.3	88.4	88.4	88.5	88.5	88.5	88.5	88.5	88.5
2 kHz	76.7	76.2	78.3	80.7	83.2	85.5	86.5	87.1	87.3	87.4	87.5	87.6	87.7	87.8	87.8	87.9	87.9	88.0
2.5 kHz	74.6	73.9	76.1	78.7	81.4	83.9	85.0	85.7	86.0	86.2	86.4	86.5	86.7	86.8	87.0	87.1	87.2	87.2
3.15 kHz	72.1	71.1	73.4	76.3	79.2	81.9	83.2	84.0	84.4	84.7	85.0	85.2	85.5	85.7	85.9	86.0	86.2	86.3
4 kHz	69.1	67.7	70.3	73.5	76.6	79.5	81.0	81.9	82.5	82.9	83.3	83.6	83.9	84.2	84.5	84.7	85.0	85.1
5 kHz	65.9	64.2	66.9	70.4	73.9	76.9	78.6	79.7	80.4	81.0	81.5	81.9	82.3	82.7	83.0	83.3	83.7	83.9
6.3 kHz	62.2	60.1	63.1	66.9	70.7	74.0	75.9	77.2	78.1	78.8	79.3	79.9	80.4	80.9	81.3	81.7	82.1	82.4
8 kHz	58.0	55.4	58.7	62.9	67.0	70.6	72.7	74.2	75.3	76.2	76.9	77.5	78.1	78.8	79.3	79.8	80.3	80.6
10 kHz	53.7	50.7	54.2	58.8	63.3	67.1	69.5	71.2	72.5	73.5	74.3	75.1	75.8	76.6	77.2	77.8	78.4	78.8
A-wgt	91.1	91.3	93.0	94.9	96.9	98.9	99.6	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9

Table 11: V150-4.0MW SO12, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

3.1 Mode SO13

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	7.4	3.0	9.9	14.6	18.0	21.6	25.4	28.1	30.4	32.5	34.2	36.0	37.3	38.8	40.1	41.4	42.7	43.8
8 Hz	15.0	11.2	17.3	21.5	24.6	27.9	31.4	33.9	36.0	37.8	39.3	40.9	42.0	43.4	44.5	45.7	46.8	47.7
10 Hz	21.7	18.4	23.8	27.6	30.4	33.5	36.7	39.0	40.9	42.5	43.9	45.3	46.2	47.5	48.5	49.5	50.5	51.3
12.5 Hz	28.1	25.2	30.0	33.3	35.9	38.7	41.8	43.9	45.5	47.0	48.2	49.4	50.3	51.3	52.2	53.1	54.0	54.7
16 Hz	34.7	32.3	36.5	39.3	41.7	44.2	47.0	48.9	50.4	51.7	52.7	53.7	54.4	55.3	56.1	56.8	57.6	58.2
20 Hz	40.3	38.3	41.9	44.4	46.5	48.9	51.5	53.2	54.6	55.7	56.5	57.4	58.0	58.8	59.4	60.1	60.7	61.2
25 Hz	45.6	43.9	47.1	49.1	51.1	53.2	55.7	57.3	58.5	59.4	60.1	60.8	61.4	62.0	62.5	63.1	63.6	64.0
31.5 Hz	50.6	49.4	52.0	53.7	55.5	57.5	59.8	61.2	62.2	63.0	63.6	64.2	64.6	65.1	65.6	66.0	66.5	66.8
40 Hz	55.5	54.5	56.7	58.1	59.8	61.5	63.7	64.9	65.8	66.5	66.9	67.4	67.7	68.2	68.5	68.9	69.2	69.5
50 Hz	59.6	59.0	60.8	61.9	63.4	65.0	67.0	68.2	69.0	69.5	69.8	70.2	70.5	70.8	71.0	71.3	71.6	71.8
63 Hz	63.5	63.1	64.6	65.5	66.8	68.3	70.2	71.2	71.9	72.3	72.6	72.8	73.0	73.3	73.5	73.6	73.8	74.0
80 Hz	67.2	67.0	68.2	68.8	70.1	71.4	73.2	74.1	74.7	75.0	75.2	75.3	75.5	75.6	75.7	75.9	76.0	76.1
100 Hz	70.2	70.3	71.2	71.6	72.8	74.0	75.7	76.5	77.0	77.3	77.4	77.5	77.5	77.6	77.7	77.7	77.8	77.8
125 Hz	72.9	73.1	73.8	74.1	75.1	76.3	77.9	78.7	79.1	79.3	79.3	79.3	79.4	79.4	79.4	79.4	79.4	79.4
160 Hz	75.5	75.8	76.3	76.5	77.4	78.5	80.1	80.8	81.1	81.2	81.2	81.2	81.2	81.1	81.1	81.1	81.0	81.0
200 Hz	77.4	77.8	78.2	78.3	79.2	80.2	81.7	82.4	82.7	82.7	82.7	82.6	82.6	82.5	82.4	82.4	82.3	82.3
250 Hz	79.0	79.5	79.8	79.8	80.7	81.6	83.1	83.7	84.0	84.0	83.9	83.8	83.8	83.7	83.6	83.5	83.4	83.3
315 Hz	80.3	80.8	81.0	81.0	81.8	82.8	84.3	84.8	85.1	85.1	85.0	84.9	84.8	84.7	84.6	84.5	84.3	84.3
400 Hz	81.2	81.7	81.9	81.9	82.7	83.7	85.1	85.7	86.0	85.9	85.8	85.7	85.6	85.5	85.3	85.2	85.1	85.0
500 Hz	81.7	82.1	82.4	82.4	83.2	84.2	85.7	86.2	86.5	86.5	86.4	86.2	86.1	86.0	85.9	85.8	85.7	85.6
630 Hz	81.8	82.2	82.5	82.6	83.5	84.4	85.9	86.5	86.8	86.8	86.7	86.6	86.5	86.3	86.2	86.1	86.0	85.9
800 Hz	81.5	81.8	82.3	82.4	83.3	84.4	85.9	86.5	86.8	86.8	86.7	86.6	86.6	86.5	86.4	86.3	86.2	86.1
1 kHz	80.9	81.0	81.7	81.9	82.9	84.0	85.6	86.2	86.6	86.6	86.6	86.5	86.5	86.4	86.3	86.3	86.2	86.1
1.25 kHz	79.9	79.9	80.8	81.1	82.2	83.3	85.0	85.7	86.1	86.2	86.2	86.2	86.1	86.1	86.1	86.0	86.0	86.0
1.6 kHz	78.4	78.2	79.4	79.9	81.0	82.3	84.0	84.8	85.3	85.4	85.5	85.5	85.5	85.6	85.6	85.6	85.6	85.6
2 kHz	76.7	76.2	77.7	78.4	79.7	81.0	82.8	83.7	84.2	84.5	84.6	84.7	84.8	84.9	84.9	85.0	85.0	85.1
2.5 kHz	74.6	73.9	75.7	76.6	78.0	79.5	81.4	82.3	83.0	83.3	83.5	83.7	83.8	84.0	84.1	84.2	84.3	84.4
3.15 kHz	72.1	71.1	73.3	74.5	76.0	77.6	79.6	80.7	81.4	81.8	82.1	82.4	82.6	82.8	83.0	83.2	83.3	83.5
4 kHz	69.1	67.7	70.3	71.9	73.5	75.3	77.4	78.6	79.5	80.1	80.4	80.8	81.1	81.4	81.6	81.9	82.1	82.3
5 kHz	65.9	64.2	67.3	69.1	70.9	72.8	75.1	76.5	77.5	78.1	78.6	79.1	79.5	79.9	80.2	80.5	80.8	81.1
6.3 kHz	62.2	60.1	63.7	65.9	67.9	70.0	72.5	74.0	75.1	75.9	76.5	77.1	77.6	78.1	78.5	78.9	79.3	79.6
8 kHz	58.0	55.4	59.7	62.2	64.4	66.8	69.4	71.1	72.3	73.3	74.1	74.8	75.4	76.0	76.5	77.0	77.5	77.9
10 kHz	53.7	50.7	55.5	58.5	60.9	63.4	66.3	68.1	69.5	70.7	71.5	72.4	73.1	73.8	74.5	75.1	75.7	76.2
A-wgt	91.1	91.3	91.9	92.1	93.1	94.2	95.8	96.5	96.9	97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0

Table 12: V150-4.0MW SO13, expected 1/3 octave band performance,
(Blades with serrated trailing edge)

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.

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Performance Specification

V150-4.0/4.2 MW 50/60 Hz

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Recipient acknowledges that (i) this Performance Specification is provided for recipient's information only, and, does not create or constitute a warranty, guarantee, promise, commitment, or other representation (Commitment) by Vestas Wind Systems or any of its affiliated or subsidiary companies (Vestas), all of which are disclaimed by Vestas and (ii) any and all Commitments by Vestas to recipient as to this Performance Specification (or any of the contents herein) are to be contained exclusively in signed written contracts between recipient and Vestas, and not within this document.

See general reservations, notes and disclaimers (including, Section 5, p. 11) to this Performance Specification.

1 General Description

The Vestas V150-4.0/4.2 MW wind turbine is a pitch regulated upwind turbine with active yaw and a three-blade rotor. The Vestas V150-4.0/4.2 MW turbine has a rotor diameter of 150 m and a rated power of 4.0 MW.

Vestas offers an optional Power Optimized (PO) mode at 4.2 MW for the V150-4.0 MW variant.

2 Type Approvals and Available Hub Heights

The standard turbine is type certified according to the certification standards and available hub heights listed below:

Certification	**Wind Class**	**Hub Height**		
Tower type		**Standard**	**Large diameter (split)**	**Large diameter (non-split)** [1]
IEC61400-22	IEC IIIB/IEC S	105 m		155 m
DIBt 2012	WZ2(S), GK2	123 m	145 / 166 m	

Table 2-1: Type approval data and available hub heights

[1]: These towers require special transport conditions as the bottom diameter is above 5 m and are not available as standard to the US/Canadian market but can be evaluated on a case-by-case basis.

The hub height can be increased by up to 3 m by use of raised foundation. Use of raised foundation is subject to site-specific evaluation and is not available for all soil conditions.

3 Operational Envelope and Performance Guidelines

Actual climate and site conditions have many variables and should be considered in evaluating actual turbine performance. The design and operating parameters set forth in this section do not constitute warranties, guarantees, or representations as to turbine performance at actual sites.

3.1 Climate and Site Conditions

The standard turbine is designed for the wind climate conditions listed below. Values refer to hub height.

Wind Climate	**IEC IIIB**	**IEC S**
Hub Height	**105/155m**	**105/155m**
Power Rating	**4.0MW**	**4.2MW**
Extr Wind Speed (10 min average), V_{50}	37.5 m/s	37.5 m/s
Survival Wind Speed (3 s gust), V_{e50}	52.5 m/s	52.5 m/s
Turbulence Intensity, I_{V50}	11%	11%

Table 3-1: Extreme design parameters – IEC

Wind Climate	IEC IIIB	IEC S
Hub Height	**105/155m**	**105/155m**
Power Rating	**4.0MW**	**4.2MW**
Wind Speed (10 min average), V_{ave}	7.5 m/s	7.0 m/s
Weibull Scale Factor, *C*	8.5 m/s	7.9 m/s
Weibull Shape Factor, *k*	2.0	2.0
I_{ref} acc. to IEC 61400-1	0.14	0.14
Turbulence Intensity acc. to IEC 61400-1, Including Wind Farm Turbulence (@15 m/s) I_{90} (90% quantile)	15.7%	15.7%
Wind Shear, α	0.20	0.20
Inflow Angle (vertical)	8°	8°

Table 3-2: Average design parameters – IEC

Wind Climate	WZ2(S)	WZ2(S)	WZ2(S)	WZ2(S)	WZ2(S)	WZ2(S)
Hub Height	**123 m**	**123 m**	**145 m**	**145 m**	**166 m**	**166 m**
Power Rating	**4.0MW**	**4.2MW**	**4.0MW**	**4.2MW**	**4.0MW**	**4.2MW**
Extr Wind Speed (10 min average), V_{50}	37.45 m/s	37.45 m/s	37.50 m/s	37.50 m/s	37.50 m/s	37.50 m/s
Survival Wind Speed (3 s gust), V_{e50}	52.43 m/s	52.43 m/s	52.50 m/s	52.50 m/s	52.50 m/s	52.50 m/s
Turbulence intensity, $I_{v(z)}$	12.7%	12.7%	12.4%	12.4%	12.1%	12.1%

Table 3-3: Extreme design parameters – DIBt

Wind Climate	WZ2(S)	WZ2(S)	WZ2(S)	WZ2(S)	WZ2(S)	WZ2(S)
Hub Height	**123 m**	**123 m**	**145 m**	**145 m**	**166 m**	**166 m**
Power Rating	**4.0MW**	**4.2MW**	**4.0MW**	**4.2MW**	**4.0MW**	**4.2MW**
Wind Speed (10 min average), V_{ave}	7.4 m/s	7.0 m/s	7.5 m/s	7.0 m/s	7.05 m/s	7.0 m/s
I_{ref} acc. to IEC 61400-1	0.14	0.14	0.14	0.14	0.14	0.14
Turbulence Intensity, I_{90} (90% quant.)	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%

Table 3-4: Average design parameters – DIBt

3.1.1 Complex Terrain

Classification of complex terrain according to IEC 61400-1:2005 Chapter 11.2. For sites classified as complex, appropriate measures are to be included in site assessment. Positioning of each turbine must be verified via Vestas Site Check.

3.1.2 Altitude

The turbine is designed for use at altitudes up to 1000 m above sea level as standard and optional up to 2000 m above sea level.

3.1.3 Wind Power Plant Layout

Turbine spacing is to be evaluated site-specifically. Spacing below two rotor diameters (2D) may require sector-wise curtailment.

NOTE

As evaluation of climate and site conditions is complex, consult Vestas for every project. If conditions exceed the above parameters, Vestas must be consulted.

3.2 Operational Envelope – Wind

Values refer to hub height and are determined by the sensors and control system of the turbine.

Wind Climate	**IEC IIIB/ IEC S**
Hub Height	**105 / 155 m**
Cut-In, V_{in}	3 m/s
Cut-Out (10 min exponential avg.), V_{out}	24.5 m/s
Re-Cut In (10 min exponential avg.)	22.5 m/s

Table 3-5: Operational envelope – wind – IEC

Wind climate	**WZ2(S)**
Hub height	**123 / 145 / 166 m**
Cut-In, V_{in}	3 m/s
Cut-Out (10 min exponential avg.), V_{out}	24.5 m/s
Re-Cut In (10 min exponential avg.)	22.5 m/s

Table 3-6: Operational envelope – wind – DIBt

3.3 Operational Envelope – Conditions for Power Curve and Ct Values (at Hub Height)

Consult Section 6 and following sections, p. 12 for power curves and C_t values.

Conditions for Power Curve and C_t Values (at Hub Height)	
Wind Shear, *α*	0.00-0.30 (10 minute average)
Turbulence Intensity, *I*	6-12% (10 minute average)
Blades	Clean
Rain	No
Ice/Snow on Blades	No
Leading Edge	No damage
Terrain	IEC 61400-12-1
Inflow Angle (Vertical)	0 ±2°
Grid Voltage	Nominal Voltage ±2.5%
Grid Frequency	Nominal Frequency ±0.5 Hz
Grid Active Power (LV-side)	Per tabulated values in Section 6 and following sections
Grid Reactive Power (LV-side)	Power Factor 1.0

Table 3-7: Conditions for power curve and Ct values

3.4 Sound Modes

The sound modes listed below are available for the turbine.

Sound modes			
Mode No.	**Maximum Sound Level**	**Serrated trailing edges**	**Available hub heights**
0	104.9 dBA	Yes (standard)	105 / 123 / 145 / 155 / 166 m
0-0S	108.0 dBA	No (option)	105 / 123 / 145 / 155 / 166 m
PO1	104.9 dBA	Yes (standard)	105 / 123 / 145 / 155 / 166 m
PO1-0S	108.0 dBA	No (option)	105 / 123 / 145 / 155 / 166 m

Table 3-8: Available sound performance

NOTE The turbine is as standard equipped with serrated trailing edges on the blades. Optionally, Mode 0-0S can be offered without serrated trailing edges mounted on the blades.

In addition, Sound Optimized (SO) modes as listed below are available as options for the turbine.

Sound Optimized (SO) modes			
Mode No.	**Maximum Sound Level**	**Serrated trailing edges**	**Available hub heights**
SO1	103.4 dBA	Yes	105 / 123 / 155 / 166 m
SO2	102.0 dBA	Yes	105 / 123 / 166 m
SO3	99.5 dBA	Yes	105 / 123 / 145 / 155 / 166 m
SO11	99.2 dBA	Yes	105 m
SO12	99.9 dBA	Yes	105 m
SO13	97.0 dBA	Yes	105 m

Table 3-9: Available Sound Optimized modes

NOTE Sound Optimized (SO) modes are only available with serrated trailing edges on the blades. For further details on sound performance and in case of specific requests for sound modes per tower, please contact Vestas Wind Systems A/S.

3.5 Load Modes

The Load Optimized (LO) modes listed below are available for the turbine.

Load Optimized (LO) modes				
Mode No.	**Power**	**Maximum Sound Level**	**Serrated trailing edges**	**Available hub heights**
LO1	3.8 MW	104.9 dBA	Yes	105 / 123 / 145 / 155 / 166 m
LO2	3.6 MW	104.9 dBA	Yes	105 / 123 / 155 / 166 m

Table 3-10: Available Load Optimized modes

NOTE Load Optimized (LO) modes are only available with serrated trailing edges mounted on the blades.

4 Drawings

4.1 Structural Design – Illustration of Outer Dimensions

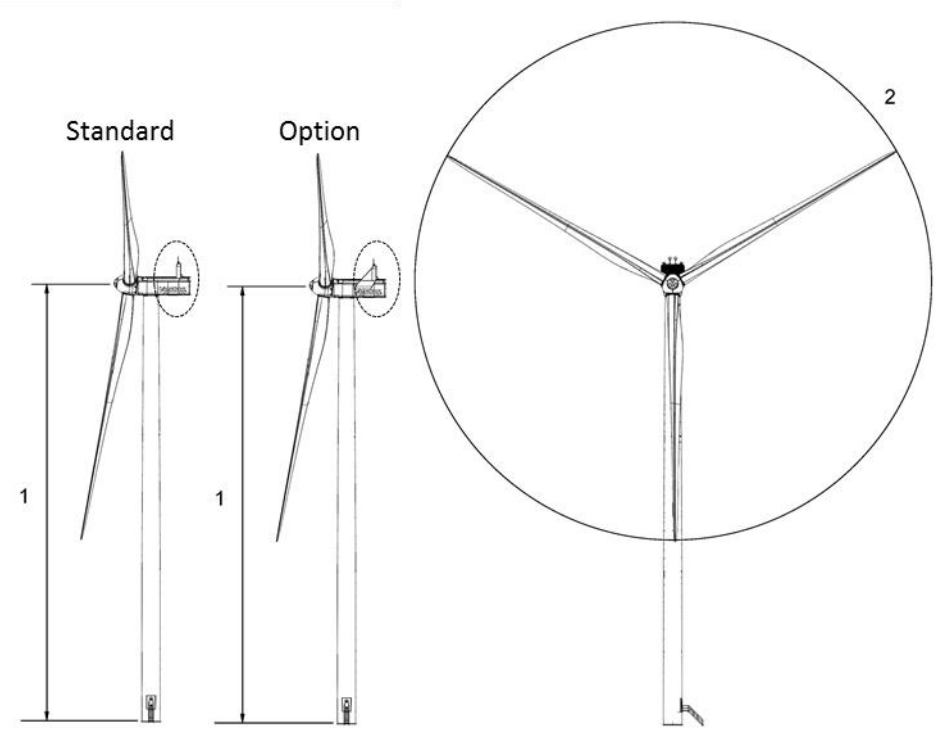


Figure 4-1: Illustration of outer dimensions – structure.

1 Hub height:
105/123/145/155/166 m

2 Diameter:
150 m

NOTE The turbine to the right is shown with side panels on the cooler top (Option).

5 General Reservations, Notes and Disclaimers

-
- The performance specifications described in this document apply to the current version of the V150-4.0/4.2 MW wind turbine. Updated versions of the V150-4.0/4.2 MW wind turbine, which may be manufactured in the future, may differ from these performance specifications. In the event that Vestas supplies an updated version of the V150-4.0/4.2 MW wind, Vestas will provide an updated performance specification applicable to the updated version.
- All listed start/stop parameters (e.g. wind speeds) are equipped with hysteresis control. This can, in certain borderline situations, result in turbine stops even though the ambient conditions are within the listed operation parameters.
- This document, Performance Specification, is not an offer for sale, and does not contain any guarantee, warranty and/or verification of the power curve and sound (including, without limitation, the power curve and sound verification method). Any guarantee, warranty and/or verification of the power curve and sound (including, without limitation, the power curve and sound verification method) must be agreed to separately in writing.

6 Power Curves, Ct Values and Sound Curves, Mode 0/0-0S

6.1 Power Curves, Mode 0/0-0S

Air density [kg/m³]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	56	59	62	65	67	70	73	75	78	84	86
3.5	**172**	122	127	131	136	140	145	149	154	158	163	167	176	181
4.0	**285**	210	217	223	230	237	244	251	258	264	271	278	291	298
4.5	**424**	317	327	337	346	356	366	375	385	395	404	414	433	443
5.0	**596**	451	464	477	491	504	517	530	543	557	570	583	609	622
5.5	**808**	615	632	650	668	685	703	720	738	755	773	790	825	843
6.0	**1061**	811	834	857	880	902	925	948	970	993	1016	1039	1084	1107
6.5	**1360**	1043	1072	1101	1130	1159	1187	1216	1245	1274	1303	1331	1388	1417
7.0	**1711**	1316	1352	1388	1424	1460	1496	1532	1568	1604	1639	1675	1746	1781
7.5	**2102**	1626	1670	1714	1758	1802	1845	1888	1931	1974	2017	2060	2145	2187
8.0	**2548**	1982	2034	2087	2139	2191	2242	2294	2345	2396	2447	2497	2597	2647
8.5	**3021**	2376	2437	2498	2559	2620	2679	2737	2796	2854	2910	2966	3075	3129
9.0	**3471**	2795	2861	2927	2993	3059	3119	3180	3241	3302	3358	3414	3522	3574
9.5	**3788**	3188	3255	3321	3388	3455	3509	3563	3617	3671	3710	3749	3816	3844
10.0	**3937**	3553	3607	3660	3714	3767	3798	3829	3860	3891	3906	3922	3946	3956
10.5	**3982**	3814	3842	3869	3897	3925	3936	3946	3957	3968	3973	3977	3985	3988
11.0	**3999**	3957	3965	3973	3981	3989	3991	3993	3995	3997	3998	3999	4000	4000
11.5	**4000**	3991	3993	3995	3997	3999	3999	3999	4000	4000	4000	4000	4000	4000
12.0	**4000**	3999	3999	3999	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
12.5	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
13.0	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
13.5	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
14.0	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
14.5	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
15.0	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
15.5	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
16.0	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
16.5	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
17.0	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
17.5	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
18.0	**4000**	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
18.5	**3996**	3996	3996	3996	3996	3996	3996	3996	3996	3996	3996	3996	3996	3996
19.0	**3971**	3971	3971	3971	3971	3971	3971	3971	3971	3971	3971	3971	3971	3971
19.5	**3896**	3896	3896	3896	3896	3896	3896	3896	3896	3896	3896	3896	3896	3896
20.0	**3773**	3773	3773	3773	3773	3773	3773	3773	3773	3773	3773	3773	3773	3773
20.5	**3613**	3612	3612	3612	3612	3612	3612	3613	3613	3613	3613	3613	3613	3613
21.0	**3416**	3416	3416	3416	3416	3416	3416	3416	3416	3416	3416	3416	3416	3416
21.5	**3191**	3190	3190	3190	3190	3191	3191	3191	3191	3191	3191	3191	3191	3191
22.0	**2929**	2930	2930	2930	2930	2930	2930	2930	2930	2930	2929	2929	2929	2929
22.5	**2657**	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657
23.0	**2377**	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377
23.5	**2085**	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085
24.0	**1795**	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795
24.5	**1570**	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570

Table 6-1: Power curve, Mode 0/0-0S

6.2 Ct Values, Mode 0/0-0S

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.886**	0.890	0.890	0.890	0.889	0.889	0.888	0.888	0.888	0.887	0.887	0.886	0.886	0.885
3.5	**0.845**	0.851	0.850	0.850	0.849	0.848	0.848	0.847	0.847	0.846	0.846	0.845	0.845	0.845
4.0	**0.828**	0.827	0.827	0.827	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828
4.5	**0.825**	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.825	0.825	0.825	0.824
5.0	**0.820**	0.824	0.823	0.823	0.823	0.822	0.822	0.822	0.821	0.821	0.821	0.820	0.820	0.819
5.5	**0.817**	0.821	0.820	0.820	0.820	0.819	0.819	0.819	0.818	0.818	0.818	0.817	0.817	0.816
6.0	**0.813**	0.818	0.817	0.817	0.816	0.816	0.816	0.815	0.815	0.814	0.814	0.813	0.812	0.812
6.5	**0.808**	0.814	0.814	0.813	0.813	0.812	0.811	0.811	0.810	0.810	0.809	0.809	0.807	0.807
7.0	**0.807**	0.813	0.813	0.812	0.812	0.811	0.811	0.810	0.810	0.809	0.809	0.808	0.806	0.806
7.5	**0.799**	0.809	0.808	0.807	0.806	0.805	0.804	0.803	0.803	0.802	0.801	0.800	0.798	0.797
8.0	**0.791**	0.804	0.803	0.802	0.801	0.800	0.799	0.798	0.796	0.795	0.793	0.792	0.789	0.787
8.5	**0.764**	0.803	0.800	0.798	0.796	0.793	0.789	0.786	0.782	0.779	0.774	0.769	0.760	0.755
9.0	**0.703**	0.773	0.767	0.761	0.755	0.749	0.743	0.736	0.730	0.723	0.716	0.710	0.696	0.689
9.5	**0.617**	0.712	0.705	0.698	0.690	0.683	0.674	0.665	0.657	0.648	0.638	0.628	0.607	0.596
10.0	**0.523**	0.649	0.639	0.629	0.618	0.608	0.596	0.584	0.572	0.560	0.548	0.536	0.512	0.500
10.5	**0.439**	0.576	0.563	0.550	0.537	0.523	0.510	0.498	0.485	0.472	0.461	0.450	0.429	0.419
11.0	**0.372**	0.500	0.486	0.472	0.458	0.444	0.433	0.422	0.411	0.399	0.390	0.381	0.363	0.355
11.5	**0.319**	0.426	0.414	0.402	0.390	0.379	0.369	0.360	0.351	0.341	0.334	0.326	0.312	0.305
12.0	**0.277**	0.366	0.356	0.346	0.336	0.326	0.319	0.311	0.303	0.296	0.289	0.283	0.271	0.265
12.5	**0.242**	0.317	0.309	0.301	0.293	0.284	0.278	0.271	0.265	0.259	0.253	0.248	0.238	0.233
13.0	**0.214**	0.278	0.271	0.264	0.257	0.250	0.245	0.239	0.234	0.228	0.223	0.219	0.210	0.206
13.5	**0.191**	0.246	0.240	0.234	0.228	0.222	0.217	0.212	0.208	0.203	0.199	0.195	0.187	0.183
14.0	**0.171**	0.219	0.214	0.209	0.203	0.198	0.194	0.190	0.185	0.181	0.178	0.174	0.167	0.164
14.5	**0.153**	0.196	0.192	0.187	0.182	0.178	0.174	0.170	0.167	0.163	0.160	0.157	0.151	0.148
15.0	**0.139**	0.177	0.173	0.169	0.164	0.160	0.157	0.154	0.150	0.147	0.144	0.141	0.136	0.134
15.5	**0.126**	0.160	0.156	0.153	0.149	0.145	0.142	0.139	0.136	0.133	0.131	0.128	0.124	0.121
16.0	**0.115**	0.145	0.142	0.139	0.135	0.132	0.129	0.127	0.124	0.121	0.119	0.117	0.113	0.111
16.5	**0.105**	0.133	0.130	0.127	0.124	0.121	0.118	0.116	0.113	0.111	0.109	0.107	0.103	0.101
17.0	**0.096**	0.121	0.119	0.116	0.113	0.111	0.108	0.106	0.104	0.102	0.100	0.098	0.095	0.093
17.5	**0.089**	0.112	0.110	0.107	0.105	0.102	0.100	0.098	0.096	0.094	0.093	0.091	0.088	0.086
18.0	**0.082**	0.103	0.101	0.099	0.097	0.094	0.092	0.091	0.089	0.087	0.085	0.084	0.081	0.080
18.5	**0.076**	0.095	0.093	0.091	0.089	0.087	0.085	0.084	0.082	0.080	0.079	0.078	0.075	0.074
19.0	**0.070**	0.087	0.085	0.084	0.082	0.080	0.078	0.077	0.075	0.074	0.072	0.071	0.069	0.068
19.5	**0.064**	0.080	0.078	0.076	0.074	0.073	0.071	0.070	0.069	0.067	0.066	0.065	0.063	0.062
20.0	**0.058**	0.072	0.070	0.069	0.067	0.066	0.064	0.063	0.062	0.061	0.060	0.059	0.057	0.056
20.5	**0.052**	0.064	0.063	0.062	0.060	0.059	0.058	0.057	0.056	0.054	0.054	0.053	0.051	0.050
21.0	**0.046**	0.057	0.056	0.055	0.053	0.052	0.051	0.050	0.049	0.048	0.048	0.047	0.045	0.045
21.5	**0.041**	0.050	0.049	0.048	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041	0.040	0.039
22.0	**0.036**	0.044	0.043	0.042	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.035	0.035
22.5	**0.031**	0.038	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.032	0.032	0.031	0.030	0.030
23.0	**0.027**	0.032	0.032	0.031	0.031	0.030	0.029	0.029	0.028	0.028	0.027	0.027	0.026	0.026
23.5	**0.023**	0.027	0.027	0.026	0.026	0.025	0.025	0.025	0.024	0.024	0.023	0.023	0.022	0.022
24.0	**0.019**	0.023	0.023	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.020	0.019	0.019	0.019
24.5	**0.017**	0.020	0.019	0.019	0.019	0.018	0.018	0.018	0.018	0.017	0.017	0.017	0.016	0.016

Table 6-2: C_t values, Mode 0/0-0S

6.3 Sound Curves, Mode 0/0-0S

Sound Power Level at Hub Height		
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3 Maximum turbulence at hub height: 30% Inflow angle (vertical): 0 ±2° Air density: 1.225 kg/m^3**	
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA] Mode 0 (Blades with serrated trailing edge)**	**Sound Power Level at Hub Height [dBA] Mode 0-0S (Blades without serrated trailing edge)**
3	91.1	93.4
4	91.3	94.0
5	93.2	97.1
6	96.4	100.5
7	99.9	103.8
8	103.3	106.6
9	104.9	108.0
10	104.9	108.0
11	104.9	108.0
12	104.9	108.0
13	104.9	108.0
14	104.9	108.0
15	104.9	108.0
16	104.9	108.0
17	104.9	108.0
18	104.9	108.0
19	104.9	108.0
20	104.9	108.0

Table 6-3: Sound curves, Mode 0/0-0S

7 Power Curves, Ct Values and Sound Curves, Power Optimized Mode PO1/PO1-0S

7.1 Power Curves, Power Optimized Mode PO1/PO1-0S

Air density [kg/m³]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	56	59	62	65	67	70	73	76	78	84	86
3.5	**172**	122	127	131	136	140	145	149	154	158	163	167	176	181
4.0	**285**	210	217	223	230	237	244	251	258	264	271	278	291	298
4.5	**424**	317	327	337	346	356	366	375	385	395	404	414	433	443
5.0	**596**	451	464	477	491	504	517	530	543	557	570	583	609	622
5.5	**808**	615	632	650	668	685	703	720	738	755	773	790	825	843
6.0	**1061**	811	834	857	880	902	925	948	971	993	1016	1039	1084	1106
6.5	**1360**	1043	1072	1101	1130	1159	1187	1216	1245	1274	1302	1331	1388	1417
7.0	**1711**	1316	1352	1388	1424	1461	1496	1532	1568	1604	1639	1675	1746	1781
7.5	**2102**	1626	1670	1714	1758	1802	1845	1888	1931	1975	2017	2060	2145	2187
8.0	**2548**	1982	2034	2086	2138	2191	2242	2294	2345	2397	2447	2497	2598	2648
8.5	**3021**	2376	2437	2498	2559	2620	2679	2737	2796	2854	2910	2966	3075	3129
9.0	**3471**	2795	2860	2926	2992	3058	3119	3180	3241	3302	3359	3415	3523	3576
9.5	**3820**	3189	3255	3322	3388	3454	3511	3569	3626	3683	3728	3774	3858	3896
10.0	**4047**	3554	3614	3674	3733	3793	3835	3878	3920	3963	3991	4019	4067	4087
10.5	**4146**	3852	3894	3936	3978	4020	4043	4066	4089	4112	4124	4135	4153	4160
11.0	**4192**	4065	4086	4108	4129	4151	4158	4166	4174	4182	4185	4189	4194	4196
11.5	**4199**	4157	4164	4172	4179	4187	4189	4192	4195	4197	4198	4199	4200	4200
12.0	**4200**	4187	4190	4193	4195	4198	4199	4199	4200	4200	4200	4200	4200	4200
12.5	**4200**	4198	4199	4199	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
13.0	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
13.5	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
14.0	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
14.5	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
15.0	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
15.5	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
16.0	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
16.5	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
17.0	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
17.5	**4200**	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200	4200
18.0	**4163**	4163	4163	4163	4163	4163	4163	4163	4163	4163	4163	4163	4163	4163
18.5	**4081**	4081	4081	4081	4081	4081	4081	4081	4081	4081	4081	4081	4081	4081
19.0	**3998**	3998	3998	3998	3998	3998	3998	3998	3998	3998	3998	3998	3998	3998
19.5	**3898**	3897	3897	3897	3897	3898	3898	3898	3898	3898	3898	3898	3898	3898
20.0	**3774**	3773	3773	3773	3773	3774	3774	3774	3774	3774	3774	3774	3774	3774
20.5	**3613**	3612	3612	3612	3612	3612	3612	3613	3613	3613	3613	3613	3613	3613
21.0	**3416**	3415	3415	3415	3415	3415	3415	3415	3415	3415	3415	3415	3416	3416
21.5	**3190**	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190
22.0	**2929**	2929	2929	2929	2929	2929	2929	2929	2929	2929	2929	2929	2929	2929
22.5	**2657**	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657
23.0	**2376**	2376	2376	2376	2376	2376	2376	2376	2376	2376	2376	2376	2376	2376
23.5	**2085**	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085
24.0	**1794**	1794	1794	1794	1794	1794	1794	1794	1794	1794	1794	1794	1794	1794
24.5	**1570**	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570

Table 7-1: Power curve, Power Optimized Mode PO1/PO1-0S

7.2 Ct Values, Power Optimized Mode PO1/PO1-0S

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.886**	0.890	0.890	0.890	0.889	0.889	0.888	0.888	0.888	0.887	0.887	0.886	0.886	0.885
3.5	**0.845**	0.851	0.850	0.850	0.849	0.848	0.848	0.847	0.847	0.846	0.846	0.846	0.845	0.845
4.0	**0.828**	0.827	0.827	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828
4.5	**0.825**	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.825	0.825	0.825	0.824
5.0	**0.820**	0.824	0.823	0.823	0.823	0.823	0.822	0.822	0.821	0.821	0.821	0.820	0.820	0.819
5.5	**0.817**	0.821	0.820	0.820	0.820	0.819	0.819	0.819	0.819	0.818	0.818	0.817	0.817	0.816
6.0	**0.813**	0.818	0.817	0.817	0.816	0.816	0.816	0.815	0.815	0.814	0.814	0.813	0.812	0.812
6.5	**0.808**	0.814	0.814	0.813	0.813	0.812	0.811	0.811	0.810	0.810	0.809	0.809	0.807	0.807
7.0	**0.807**	0.812	0.812	0.812	0.812	0.812	0.811	0.810	0.810	0.809	0.809	0.808	0.806	0.806
7.5	**0.799**	0.809	0.808	0.807	0.807	0.806	0.805	0.804	0.803	0.802	0.801	0.800	0.798	0.797
8.0	**0.791**	0.804	0.803	0.802	0.801	0.800	0.799	0.798	0.797	0.796	0.794	0.792	0.789	0.788
8.5	**0.765**	0.803	0.800	0.798	0.796	0.793	0.789	0.786	0.782	0.779	0.774	0.769	0.760	0.755
9.0	**0.703**	0.773	0.767	0.761	0.755	0.749	0.743	0.736	0.730	0.723	0.717	0.710	0.696	0.689
9.5	**0.624**	0.712	0.705	0.697	0.690	0.683	0.675	0.667	0.659	0.651	0.642	0.633	0.615	0.606
10.0	**0.541**	0.649	0.640	0.631	0.622	0.613	0.603	0.593	0.583	0.573	0.562	0.552	0.531	0.520
10.5	**0.460**	0.584	0.572	0.561	0.550	0.539	0.527	0.516	0.505	0.493	0.482	0.471	0.450	0.440
11.0	**0.392**	0.517	0.504	0.492	0.479	0.467	0.455	0.444	0.433	0.421	0.412	0.402	0.384	0.375
11.5	**0.336**	0.448	0.436	0.424	0.412	0.400	0.390	0.380	0.370	0.361	0.353	0.344	0.329	0.322
12.0	**0.291**	0.386	0.376	0.365	0.355	0.345	0.337	0.328	0.320	0.312	0.305	0.298	0.285	0.279
12.5	**0.255**	0.335	0.327	0.318	0.309	0.300	0.293	0.286	0.279	0.272	0.266	0.261	0.250	0.245
13.0	**0.225**	0.294	0.286	0.279	0.271	0.264	0.258	0.252	0.246	0.240	0.235	0.230	0.221	0.216
13.5	**0.200**	0.259	0.253	0.246	0.240	0.234	0.228	0.223	0.218	0.213	0.209	0.204	0.196	0.192
14.0	**0.179**	0.231	0.225	0.219	0.214	0.208	0.204	0.199	0.195	0.190	0.186	0.183	0.176	0.172
14.5	**0.161**	0.206	0.201	0.197	0.192	0.187	0.183	0.179	0.175	0.171	0.167	0.164	0.158	0.155
15.0	**0.145**	0.186	0.181	0.177	0.173	0.168	0.165	0.161	0.158	0.154	0.151	0.148	0.143	0.140
15.5	**0.132**	0.168	0.164	0.160	0.156	0.152	0.149	0.146	0.143	0.140	0.137	0.134	0.129	0.127
16.0	**0.120**	0.152	0.149	0.145	0.142	0.138	0.136	0.133	0.130	0.127	0.125	0.122	0.118	0.116
16.5	**0.110**	0.139	0.136	0.133	0.130	0.126	0.124	0.121	0.119	0.116	0.114	0.112	0.108	0.106
17.0	**0.101**	0.127	0.124	0.122	0.119	0.116	0.114	0.111	0.109	0.107	0.105	0.103	0.099	0.097
17.5	**0.093**	0.117	0.115	0.112	0.110	0.107	0.105	0.103	0.101	0.099	0.097	0.095	0.092	0.090
18.0	**0.085**	0.107	0.105	0.103	0.100	0.098	0.096	0.094	0.092	0.090	0.089	0.087	0.084	0.083
18.5	**0.078**	0.097	0.095	0.093	0.091	0.089	0.087	0.085	0.084	0.082	0.081	0.079	0.076	0.075
19.0	**0.070**	0.088	0.086	0.084	0.082	0.080	0.079	0.077	0.076	0.074	0.073	0.072	0.069	0.068
19.5	**0.064**	0.080	0.078	0.076	0.074	0.073	0.071	0.070	0.069	0.067	0.066	0.065	0.063	0.062
20.0	**0.058**	0.072	0.070	0.069	0.067	0.066	0.064	0.063	0.062	0.061	0.060	0.059	0.057	0.056
20.5	**0.052**	0.064	0.063	0.062	0.060	0.059	0.058	0.057	0.056	0.054	0.054	0.053	0.051	0.050
21.0	**0.046**	0.057	0.056	0.055	0.053	0.052	0.051	0.050	0.049	0.048	0.048	0.047	0.045	0.045
21.5	**0.041**	0.050	0.049	0.048	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041	0.040	0.039
22.0	**0.036**	0.044	0.043	0.042	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.035	0.035
22.5	**0.031**	0.038	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.032	0.032	0.031	0.030	0.030
23.0	**0.027**	0.032	0.032	0.031	0.030	0.030	0.029	0.029	0.028	0.028	0.027	0.027	0.026	0.026
23.5	**0.023**	0.027	0.027	0.026	0.026	0.025	0.025	0.025	0.024	0.024	0.023	0.023	0.022	0.022
24.0	**0.019**	0.023	0.023	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.020	0.019	0.019	0.019
24.5	**0.017**	0.020	0.019	0.019	0.019	0.018	0.018	0.018	0.018	0.017	0.017	0.017	0.016	0.016

Table 7-2: C_t values, Power Optimized Mode PO1/PO1-0S

7.3 Sound Curves, Power Optimized Mode PO1/PO1-0S

Sound Power Level at Hub Height		
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**	
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA]** **Power Optimized Mode PO1 (Blades with serrated trailing edge)**	**Sound Power Level at Hub Height [dBA]** **Power Optimized Mode PO1-0S (Blades without serrated trailing edge)**
3	91.1	93.4
4	91.3	94.0
5	93.2	97.1
6	96.4	100.5
7	99.9	103.8
8	103.3	106.6
9	104.9	108.0
10	104.9	108.0
11	104.9	108.0
12	104.9	108.0
13	104.9	108.0
14	104.9	108.0
15	104.9	108.0
16	104.9	108.0
17	104.9	108.0
18	104.9	108.0
19	104.9	108.0
20	104.9	108.0

Table 7-3: Sound curves, Power Optimized Mode PO1/PO1-0S

8 Power Curves, Ct Values and Sound Curves, Load Mode LO1

8.1 Power Curves, Load Mode LO1

Air density [kg/m³]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	56	59	62	65	67	70	73	75	78	84	86
3.5	**172**	122	127	131	136	140	145	149	154	158	163	167	176	181
4.0	**285**	210	217	223	230	237	244	251	258	264	271	278	291	298
4.5	**424**	317	327	337	346	356	366	375	385	395	404	414	433	443
5.0	**596**	451	464	477	491	504	517	530	543	557	570	583	609	622
5.5	**808**	615	632	650	668	685	703	720	738	755	773	790	825	843
6.0	**1061**	811	834	857	880	902	925	948	970	993	1016	1039	1084	1107
6.5	**1360**	1043	1072	1101	1130	1159	1187	1216	1245	1274	1303	1331	1388	1417
7.0	**1711**	1316	1352	1388	1424	1460	1496	1532	1568	1604	1639	1675	1746	1781
7.5	**2102**	1626	1670	1714	1758	1802	1845	1888	1931	1974	2017	2060	2145	2187
8.0	**2548**	1982	2034	2087	2139	2191	2242	2294	2345	2396	2447	2497	2597	2647
8.5	**3020**	2376	2437	2498	2559	2620	2679	2737	2796	2854	2909	2965	3073	3126
9.0	**3438**	2795	2860	2926	2991	3057	3115	3174	3233	3292	3341	3390	3478	3517
9.5	**3657**	3181	3239	3297	3354	3412	3453	3494	3535	3576	3603	3630	3675	3693
10.0	**3753**	3490	3529	3567	3605	3644	3664	3684	3704	3724	3734	3744	3759	3766
10.5	**3787**	3677	3694	3711	3729	3746	3753	3760	3768	3775	3779	3783	3789	3792
11.0	**3800**	3770	3776	3781	3787	3792	3794	3795	3797	3799	3799	3799	3800	3800
11.5	**3800**	3793	3795	3796	3798	3799	3800	3800	3800	3800	3800	3800	3800	3800
12.0	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
12.5	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
13.0	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
13.5	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
14.0	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
14.5	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
15.0	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
15.5	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
16.0	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
16.5	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
17.0	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
17.5	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
18.0	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
18.5	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
19.0	**3800**	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
19.5	**3778**	3778	3778	3778	3778	3778	3778	3778	3778	3778	3778	3778	3778	3778
20.0	**3715**	3714	3714	3714	3714	3714	3714	3714	3714	3714	3714	3714	3715	3715
20.5	**3595**	3595	3595	3595	3595	3595	3595	3595	3595	3595	3595	3595	3595	3596
21.0	**3415**	3415	3415	3415	3415	3415	3415	3415	3415	3415	3415	3415	3415	3415
21.5	**3191**	3190	3190	3190	3190	3191	3191	3191	3191	3191	3191	3191	3191	3191
22.0	**2929**	2930	2930	2930	2930	2930	2930	2930	2930	2930	2929	2929	2929	2929
22.5	**2657**	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657
23.0	**2377**	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377
23.5	**2085**	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085
24.0	**1795**	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795
24.5	**1570**	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570

Table 8-1: Power curve, Load Mode LO1

8.2 Ct Values, Load Mode LO1

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.886**	0.890	0.890	0.890	0.889	0.889	0.888	0.888	0.888	0.887	0.887	0.886	0.886	0.885
3.5	**0.845**	0.851	0.850	0.850	0.849	0.848	0.848	0.847	0.847	0.846	0.846	0.845	0.845	0.845
4.0	**0.828**	0.827	0.827	0.827	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828
4.5	**0.825**	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.825	0.825	0.825	0.824
5.0	**0.820**	0.824	0.823	0.823	0.823	0.822	0.822	0.822	0.821	0.821	0.821	0.820	0.820	0.819
5.5	**0.817**	0.821	0.820	0.820	0.820	0.819	0.819	0.819	0.818	0.818	0.818	0.817	0.817	0.816
6.0	**0.813**	0.818	0.817	0.817	0.816	0.816	0.816	0.815	0.815	0.814	0.814	0.813	0.812	0.812
6.5	**0.808**	0.814	0.814	0.813	0.813	0.812	0.811	0.811	0.810	0.810	0.809	0.809	0.807	0.807
7.0	**0.807**	0.813	0.813	0.812	0.812	0.811	0.811	0.810	0.810	0.809	0.809	0.808	0.806	0.806
7.5	**0.799**	0.809	0.808	0.807	0.806	0.805	0.804	0.803	0.803	0.802	0.801	0.800	0.798	0.797
8.0	**0.791**	0.804	0.803	0.802	0.801	0.800	0.799	0.798	0.796	0.795	0.793	0.792	0.789	0.787
8.5	**0.764**	0.803	0.800	0.798	0.796	0.793	0.789	0.786	0.782	0.779	0.774	0.769	0.759	0.754
9.0	**0.693**	0.773	0.767	0.761	0.755	0.749	0.741	0.734	0.727	0.720	0.711	0.702	0.683	0.673
9.5	**0.590**	0.710	0.700	0.691	0.681	0.671	0.660	0.649	0.637	0.626	0.614	0.602	0.577	0.565
10.0	**0.492**	0.634	0.621	0.608	0.595	0.582	0.569	0.556	0.542	0.529	0.517	0.505	0.481	0.470
10.5	**0.413**	0.550	0.535	0.521	0.507	0.493	0.480	0.468	0.456	0.444	0.434	0.423	0.404	0.395
11.0	**0.351**	0.470	0.457	0.444	0.431	0.418	0.407	0.397	0.387	0.376	0.368	0.359	0.343	0.335
11.5	**0.301**	0.400	0.389	0.378	0.368	0.357	0.348	0.340	0.331	0.322	0.315	0.308	0.295	0.289
12.0	**0.262**	0.344	0.335	0.326	0.317	0.308	0.301	0.294	0.287	0.280	0.274	0.268	0.257	0.252
12.5	**0.230**	0.300	0.292	0.284	0.277	0.269	0.263	0.257	0.251	0.245	0.240	0.235	0.226	0.221
13.0	**0.203**	0.263	0.257	0.250	0.244	0.237	0.232	0.227	0.222	0.216	0.212	0.208	0.200	0.196
13.5	**0.181**	0.233	0.228	0.222	0.216	0.211	0.206	0.202	0.197	0.193	0.189	0.185	0.178	0.174
14.0	**0.162**	0.208	0.203	0.198	0.193	0.188	0.184	0.180	0.176	0.172	0.169	0.166	0.159	0.156
14.5	**0.146**	0.186	0.182	0.178	0.173	0.169	0.165	0.162	0.158	0.155	0.152	0.149	0.143	0.141
15.0	**0.132**	0.168	0.164	0.160	0.156	0.152	0.149	0.146	0.143	0.140	0.137	0.135	0.130	0.127
15.5	**0.120**	0.152	0.149	0.145	0.142	0.138	0.135	0.133	0.130	0.127	0.125	0.122	0.118	0.116
16.0	**0.109**	0.138	0.135	0.132	0.129	0.126	0.123	0.121	0.118	0.116	0.114	0.111	0.107	0.106
16.5	**0.100**	0.126	0.123	0.121	0.118	0.115	0.113	0.110	0.108	0.106	0.104	0.102	0.098	0.097
17.0	**0.092**	0.116	0.113	0.110	0.108	0.105	0.103	0.101	0.099	0.097	0.095	0.094	0.090	0.089
17.5	**0.085**	0.107	0.104	0.102	0.100	0.097	0.096	0.094	0.092	0.090	0.088	0.087	0.084	0.082
18.0	**0.079**	0.098	0.096	0.094	0.092	0.090	0.088	0.087	0.085	0.083	0.082	0.080	0.078	0.076
18.5	**0.073**	0.091	0.089	0.087	0.085	0.083	0.082	0.080	0.078	0.077	0.076	0.074	0.072	0.071
19.0	**0.067**	0.084	0.082	0.080	0.078	0.077	0.075	0.074	0.072	0.071	0.070	0.069	0.066	0.065
19.5	**0.062**	0.077	0.076	0.074	0.072	0.071	0.069	0.068	0.067	0.065	0.064	0.063	0.061	0.060
20.0	**0.057**	0.071	0.069	0.068	0.066	0.065	0.064	0.062	0.061	0.060	0.059	0.058	0.056	0.055
20.5	**0.051**	0.064	0.063	0.061	0.060	0.059	0.057	0.056	0.055	0.054	0.053	0.052	0.051	0.050
21.0	**0.046**	0.057	0.056	0.055	0.053	0.052	0.051	0.050	0.049	0.048	0.048	0.047	0.045	0.045
21.5	**0.041**	0.050	0.049	0.048	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041	0.040	0.039
22.0	**0.036**	0.044	0.043	0.042	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.035	0.035
22.5	**0.031**	0.038	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.032	0.032	0.031	0.030	0.030
23.0	**0.027**	0.032	0.032	0.031	0.031	0.030	0.029	0.029	0.028	0.028	0.027	0.027	0.026	0.026
23.5	**0.023**	0.027	0.027	0.026	0.026	0.025	0.025	0.025	0.024	0.024	0.023	0.023	0.022	0.022
24.0	**0.019**	0.023	0.023	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.020	0.019	0.019	0.019
24.5	**0.017**	0.020	0.019	0.019	0.019	0.018	0.018	0.018	0.018	0.017	0.017	0.017	0.016	0.016

Table 8-2: C_t values, Load Mode LO1

8.3 Sound Curves, Load Mode LO1

Sound Power Level at Hub Height	
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA] Load Mode LO1 (Blades with serrated trailing edge)**
3	91.1
4	91.3
5	93.2
6	96.4
7	99.9
8	103.3
9	104.9
10	104.9
11	104.9
12	104.9
13	104.9
14	104.9
15	104.9
16	104.9
17	104.9
18	104.9
19	104.9
20	104.9

Table 8-3: Sound curves, Load Mode LO1

9 Power Curves, Ct Values and Sound Curves, Load Mode LO2

9.1 Power Curves, Load Mode LO2

Air density [kg/m³]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	56	59	62	65	67	70	73	75	78	84	86
3.5	**172**	122	127	131	136	140	145	149	154	158	163	167	176	181
4.0	**285**	210	217	223	230	237	244	251	258	264	271	278	291	298
4.5	**424**	317	327	337	346	356	366	375	385	395	404	414	433	443
5.0	**596**	451	464	477	491	504	517	530	543	557	570	583	609	622
5.5	**808**	615	632	650	668	685	703	720	738	755	773	790	825	843
6.0	**1061**	811	834	857	880	902	925	948	970	993	1016	1039	1084	1107
6.5	**1360**	1043	1072	1101	1130	1159	1187	1216	1245	1274	1303	1331	1388	1417
7.0	**1711**	1316	1352	1388	1424	1460	1496	1532	1568	1604	1639	1675	1746	1781
7.5	**2103**	1627	1670	1714	1758	1802	1845	1888	1931	1975	2017	2060	2145	2187
8.0	**2550**	1983	2035	2087	2140	2192	2243	2295	2347	2398	2449	2499	2600	2650
8.5	**3022**	2375	2436	2497	2559	2620	2679	2738	2797	2856	2911	2966	3072	3123
9.0	**3386**	2786	2851	2917	2983	3049	3103	3158	3212	3267	3307	3346	3415	3444
9.5	**3524**	3151	3201	3251	3301	3351	3382	3412	3443	3474	3491	3508	3534	3544
10.0	**3578**	3406	3433	3461	3488	3516	3527	3538	3549	3560	3566	3572	3581	3585
10.5	**3597**	3532	3542	3552	3562	3572	3576	3581	3586	3590	3592	3595	3598	3599
11.0	**3600**	3586	3589	3592	3595	3598	3599	3599	3600	3600	3600	3600	3600	3600
11.5	**3600**	3598	3599	3599	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
12.0	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
12.5	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
13.0	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
13.5	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
14.0	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
14.5	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
15.0	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
15.5	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
16.0	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
16.5	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
17.0	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
17.5	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
18.0	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
18.5	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
19.0	**3600**	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
19.5	**3600**	3599	3599	3599	3599	3599	3599	3599	3599	3600	3600	3600	3599	3599
20.0	**3588**	3588	3588	3588	3588	3588	3588	3588	3588	3588	3588	3588	3588	3588
20.5	**3529**	3529	3529	3529	3529	3529	3529	3529	3529	3529	3529	3529	3529	3529
21.0	**3393**	3393	3393	3393	3393	3393	3393	3393	3393	3393	3393	3393	3393	3393
21.5	**3190**	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190	3190
22.0	**2929**	2930	2930	2930	2930	2930	2930	2930	2930	2930	2929	2929	2929	2929
22.5	**2657**	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657	2657
23.0	**2377**	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377	2377
23.5	**2085**	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085
24.0	**1795**	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795	1795
24.5	**1570**	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570	1570

Table 9-1: Power curve, Load Mode LO2

9.2 Ct Values, Load Mode LO2

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.886**	0.890	0.890	0.890	0.889	0.889	0.888	0.888	0.888	0.887	0.887	0.886	0.886	0.885
3.5	**0.845**	0.851	0.850	0.850	0.849	0.848	0.848	0.847	0.847	0.846	0.846	0.845	0.845	0.845
4.0	**0.828**	0.827	0.827	0.827	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828
4.5	**0.825**	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.826	0.825	0.825	0.825	0.824
5.0	**0.820**	0.824	0.823	0.823	0.823	0.822	0.822	0.822	0.821	0.821	0.821	0.820	0.820	0.819
5.5	**0.817**	0.821	0.820	0.820	0.820	0.819	0.819	0.819	0.818	0.818	0.818	0.817	0.817	0.816
6.0	**0.813**	0.818	0.817	0.817	0.816	0.816	0.816	0.815	0.815	0.814	0.814	0.813	0.812	0.812
6.5	**0.808**	0.814	0.814	0.813	0.813	0.812	0.811	0.811	0.810	0.810	0.809	0.809	0.807	0.807
7.0	**0.807**	0.813	0.813	0.812	0.812	0.811	0.811	0.810	0.810	0.809	0.809	0.808	0.806	0.806
7.5	**0.799**	0.809	0.808	0.807	0.806	0.806	0.805	0.804	0.803	0.802	0.801	0.800	0.798	0.797
8.0	**0.796**	0.809	0.808	0.807	0.806	0.805	0.804	0.803	0.802	0.801	0.799	0.798	0.794	0.793
8.5	**0.768**	0.805	0.803	0.801	0.798	0.796	0.793	0.789	0.786	0.782	0.777	0.772	0.761	0.755
9.0	**0.678**	0.775	0.769	0.762	0.756	0.750	0.741	0.732	0.723	0.714	0.702	0.690	0.665	0.652
9.5	**0.560**	0.705	0.693	0.681	0.669	0.657	0.644	0.630	0.616	0.602	0.588	0.574	0.546	0.533
10.0	**0.462**	0.617	0.602	0.586	0.571	0.556	0.541	0.527	0.513	0.498	0.486	0.474	0.451	0.440
10.5	**0.387**	0.523	0.508	0.493	0.478	0.464	0.452	0.440	0.428	0.416	0.407	0.397	0.378	0.370
11.0	**0.328**	0.441	0.429	0.416	0.404	0.391	0.382	0.372	0.362	0.352	0.344	0.336	0.321	0.314
11.5	**0.283**	0.375	0.365	0.355	0.345	0.334	0.326	0.318	0.310	0.302	0.296	0.289	0.277	0.271
12.0	**0.246**	0.323	0.315	0.306	0.298	0.289	0.283	0.276	0.269	0.263	0.257	0.252	0.241	0.236
12.5	**0.216**	0.282	0.275	0.267	0.260	0.253	0.247	0.242	0.236	0.230	0.226	0.221	0.212	0.208
13.0	**0.191**	0.248	0.242	0.236	0.229	0.223	0.218	0.214	0.209	0.204	0.200	0.196	0.188	0.184
13.5	**0.171**	0.220	0.214	0.209	0.204	0.198	0.194	0.190	0.186	0.181	0.178	0.174	0.167	0.164
14.0	**0.153**	0.196	0.191	0.187	0.182	0.177	0.174	0.170	0.166	0.162	0.159	0.156	0.150	0.147
14.5	**0.138**	0.176	0.172	0.168	0.164	0.159	0.156	0.153	0.149	0.146	0.143	0.140	0.135	0.133
15.0	**0.125**	0.159	0.155	0.151	0.148	0.144	0.141	0.138	0.135	0.132	0.130	0.127	0.122	0.120
15.5	**0.113**	0.144	0.140	0.137	0.134	0.131	0.128	0.125	0.123	0.120	0.118	0.115	0.111	0.109
16.0	**0.103**	0.131	0.128	0.125	0.122	0.119	0.116	0.114	0.112	0.109	0.107	0.105	0.101	0.100
16.5	**0.094**	0.119	0.117	0.114	0.111	0.109	0.106	0.104	0.102	0.100	0.098	0.096	0.093	0.091
17.0	**0.087**	0.109	0.107	0.104	0.102	0.100	0.098	0.096	0.094	0.092	0.090	0.088	0.085	0.084
17.5	**0.080**	0.101	0.099	0.097	0.094	0.092	0.090	0.089	0.087	0.085	0.083	0.082	0.079	0.078
18.0	**0.074**	0.093	0.091	0.089	0.087	0.085	0.083	0.082	0.080	0.079	0.077	0.076	0.073	0.072
18.5	**0.069**	0.086	0.084	0.082	0.081	0.079	0.077	0.076	0.074	0.073	0.072	0.070	0.068	0.067
19.0	**0.064**	0.079	0.078	0.076	0.074	0.073	0.071	0.070	0.069	0.067	0.066	0.065	0.063	0.062
19.5	**0.059**	0.074	0.072	0.071	0.069	0.068	0.066	0.065	0.064	0.063	0.062	0.061	0.059	0.058
20.0	**0.055**	0.068	0.067	0.066	0.064	0.063	0.062	0.060	0.059	0.058	0.057	0.056	0.054	0.053
20.5	**0.051**	0.063	0.062	0.060	0.059	0.058	0.057	0.055	0.054	0.053	0.052	0.052	0.050	0.049
21.0	**0.046**	0.057	0.055	0.054	0.053	0.052	0.051	0.050	0.049	0.048	0.047	0.047	0.045	0.044
21.5	**0.041**	0.050	0.049	0.048	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041	0.040	0.039
22.0	**0.036**	0.044	0.043	0.042	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.035	0.035
22.5	**0.031**	0.038	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.032	0.032	0.031	0.030	0.030
23.0	**0.027**	0.032	0.032	0.031	0.031	0.030	0.029	0.029	0.028	0.028	0.027	0.027	0.026	0.026
23.5	**0.023**	0.027	0.027	0.026	0.026	0.025	0.025	0.025	0.024	0.024	0.023	0.023	0.022	0.022
24.0	**0.019**	0.023	0.023	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.020	0.019	0.019	0.019
24.5	**0.017**	0.020	0.019	0.019	0.019	0.018	0.018	0.018	0.018	0.017	0.017	0.017	0.016	0.016

Table 9-2: C_t values, Load Mode LO2

9.3 Sound Curves, Load Mode LO2

Sound Power Level at Hub Height	
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA] Load Mode LO2 (Blades with serrated trailing edge)**
3	91.1
4	91.3
5	93.2
6	96.4
7	99.9
8	103.1
9	103.7
10	103.7
11	103.7
12	103.7
13	103.7
14	103.7
15	103.7
16	103.7
17	103.7
18	103.7
19	103.7
20	103.7

Table 9-3: Sound curves, Load Mode LO2

10 Power Curves, Ct Values and Sound Curves, Sound Optimized Mode SO1

10.1 Power Curves, Sound Optimized Mode SO1

Air density [kg/m^3]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	56	59	62	65	67	70	73	75	78	83	86
3.5	**172**	122	127	131	136	140	145	149	154	158	163	167	176	181
4.0	**284**	209	216	223	230	237	244	250	257	264	271	277	291	298
4.5	**423**	317	326	336	346	355	365	375	384	394	404	413	432	442
5.0	**595**	450	463	477	490	503	516	529	542	556	569	582	608	621
5.5	**806**	614	631	649	666	684	701	719	736	754	771	789	824	841
6.0	**1059**	810	833	855	878	901	923	946	969	991	1014	1037	1082	1104
6.5	**1358**	1042	1071	1099	1128	1157	1186	1214	1243	1272	1300	1329	1386	1415
7.0	**1708**	1314	1350	1386	1422	1458	1494	1530	1565	1601	1637	1672	1743	1778
7.5	**2103**	1626	1670	1714	1758	1801	1845	1888	1932	1975	2018	2060	2146	2188
8.0	**2548**	1979	2031	2084	2136	2188	2240	2292	2343	2394	2446	2497	2598	2648
8.5	**3021**	2369	2430	2492	2553	2613	2673	2733	2792	2851	2908	2965	3077	3131
9.0	**3454**	2776	2844	2912	2979	3044	3109	3172	3233	3292	3349	3403	3500	3544
9.5	**3698**	3160	3229	3294	3356	3414	3467	3515	3561	3602	3637	3670	3724	3746
10.0	**3814**	3485	3540	3590	3633	3671	3704	3732	3756	3776	3791	3804	3822	3830
10.5	**3853**	3700	3734	3761	3782	3799	3812	3822	3830	3838	3844	3849	3857	3860
11.0	**3869**	3820	3831	3841	3848	3854	3859	3862	3865	3867	3868	3869	3870	3870
11.5	**3864**	3845	3851	3855	3859	3861	3862	3863	3863	3863	3863	3863	3864	3864
12.0	**3849**	3842	3845	3847	3848	3848	3849	3849	3849	3849	3849	3849	3849	3849
12.5	**3832**	3828	3830	3831	3831	3831	3831	3831	3831	3831	3831	3832	3832	3832
13.0	**3816**	3814	3815	3816	3815	3815	3815	3816	3816	3816	3816	3816	3817	3817
13.5	**3804**	3803	3803	3803	3803	3803	3803	3803	3803	3803	3804	3804	3804	3804
14.0	**3794**	3792	3792	3792	3792	3792	3793	3793	3793	3793	3793	3793	3794	3794
14.5	**3783**	3780	3781	3781	3781	3781	3781	3781	3782	3782	3782	3782	3783	3783
15.0	**3768**	3765	3765	3765	3766	3766	3766	3767	3767	3767	3768	3768	3769	3769
15.5	**3749**	3744	3745	3745	3745	3746	3746	3747	3747	3748	3748	3749	3750	3750
16.0	**3725**	3720	3720	3720	3721	3721	3722	3722	3723	3723	3724	3725	3726	3727
16.5	**3699**	3692	3692	3693	3693	3694	3695	3695	3696	3696	3697	3698	3699	3700
17.0	**3670**	3662	3663	3663	3664	3665	3665	3666	3667	3667	3668	3669	3671	3671
17.5	**3639**	3631	3632	3633	3633	3634	3635	3636	3636	3637	3638	3638	3640	3641
18.0	**3608**	3600	3600	3601	3602	3603	3603	3604	3605	3605	3606	3607	3608	3609
18.5	**3577**	3571	3571	3572	3572	3573	3574	3574	3575	3575	3576	3577	3578	3579
19.0	**3552**	3545	3546	3546	3547	3547	3548	3548	3549	3550	3550	3551	3552	3553
19.5	**3528**	3523	3523	3524	3525	3525	3525	3526	3526	3527	3527	3528	3529	3530
20.0	**3509**	3504	3505	3505	3505	3506	3506	3507	3507	3508	3508	3508	3509	3510
20.5	**3464**	3460	3461	3461	3461	3462	3462	3462	3463	3463	3463	3464	3464	3465
21.0	**3352**	3350	3350	3350	3350	3351	3351	3351	3351	3351	3351	3352	3352	3352
21.5	**3170**	3170	3170	3170	3170	3170	3170	3170	3170	3170	3170	3170	3170	3170
22.0	**2917**	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917	2917
22.5	**2645**	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645
23.0	**2363**	2363	2363	2363	2363	2363	2363	2363	2363	2363	2363	2363	2363	2363
23.5	**2070**	2070	2070	2070	2070	2070	2070	2070	2070	2070	2070	2070	2070	2070
24.0	**1782**	1782	1782	1782	1782	1782	1782	1782	1782	1782	1782	1782	1782	1782
24.5	**1561**	1561	1561	1561	1561	1561	1561	1561	1561	1561	1561	1561	1561	1561

Table 10-1: Power curve, Sound Optimized Mode SO1

10.2 Ct Values, Sound Optimized Mode SO1

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.885**	0.890	0.889	0.889	0.888	0.888	0.888	0.887	0.887	0.886	0.886	0.886	0.885	0.884
3.5	**0.845**	0.850	0.849	0.849	0.848	0.848	0.847	0.846	0.846	0.846	0.845	0.845	0.845	0.845
4.0	**0.827**	0.827	0.827	0.826	0.827	0.827	0.827	0.828	0.827	0.827	0.827	0.827	0.827	0.827
4.5	**0.823**	0.825	0.825	0.825	0.825	0.825	0.825	0.824	0.824	0.824	0.824	0.824	0.823	0.823
5.0	**0.818**	0.822	0.822	0.822	0.821	0.821	0.821	0.820	0.820	0.819	0.819	0.819	0.818	0.817
5.5	**0.815**	0.819	0.819	0.818	0.818	0.817	0.817	0.817	0.816	0.816	0.815	0.815	0.814	0.814
6.0	**0.809**	0.815	0.815	0.814	0.814	0.813	0.813	0.812	0.812	0.811	0.811	0.810	0.809	0.808
6.5	**0.805**	0.812	0.812	0.811	0.810	0.810	0.809	0.808	0.808	0.807	0.807	0.806	0.804	0.804
7.0	**0.801**	0.810	0.810	0.809	0.808	0.807	0.806	0.806	0.805	0.804	0.803	0.802	0.800	0.799
7.5	**0.794**	0.806	0.805	0.804	0.803	0.802	0.801	0.800	0.799	0.797	0.796	0.795	0.793	0.792
8.0	**0.787**	0.803	0.802	0.801	0.799	0.798	0.797	0.795	0.794	0.792	0.791	0.789	0.785	0.784
8.5	**0.760**	0.797	0.795	0.793	0.790	0.787	0.784	0.781	0.777	0.773	0.769	0.765	0.756	0.751
9.0	**0.694**	0.766	0.761	0.755	0.750	0.744	0.738	0.731	0.725	0.718	0.710	0.702	0.685	0.675
9.5	**0.595**	0.705	0.698	0.689	0.681	0.671	0.661	0.651	0.640	0.629	0.618	0.606	0.583	0.571
10.0	**0.498**	0.635	0.623	0.612	0.600	0.587	0.574	0.562	0.549	0.536	0.523	0.510	0.487	0.475
10.5	**0.418**	0.556	0.542	0.528	0.514	0.500	0.487	0.474	0.462	0.450	0.439	0.428	0.409	0.400
11.0	**0.354**	0.477	0.463	0.449	0.436	0.424	0.412	0.401	0.391	0.381	0.372	0.363	0.346	0.339
11.5	**0.304**	0.406	0.394	0.382	0.372	0.362	0.352	0.343	0.334	0.326	0.318	0.311	0.297	0.291
12.0	**0.263**	0.348	0.338	0.328	0.319	0.311	0.303	0.295	0.288	0.281	0.275	0.269	0.258	0.253
12.5	**0.230**	0.301	0.293	0.285	0.277	0.270	0.263	0.257	0.251	0.245	0.240	0.235	0.225	0.221
13.0	**0.202**	0.263	0.256	0.249	0.243	0.237	0.231	0.226	0.221	0.216	0.211	0.207	0.198	0.195
13.5	**0.180**	0.233	0.227	0.221	0.215	0.210	0.205	0.200	0.196	0.191	0.187	0.183	0.176	0.173
14.0	**0.160**	0.207	0.201	0.196	0.191	0.187	0.182	0.178	0.174	0.171	0.167	0.164	0.157	0.154
14.5	**0.144**	0.185	0.180	0.175	0.171	0.167	0.163	0.160	0.156	0.153	0.150	0.147	0.141	0.139
15.0	**0.130**	0.166	0.161	0.157	0.154	0.150	0.147	0.143	0.140	0.137	0.135	0.132	0.127	0.125
15.5	**0.117**	0.149	0.145	0.142	0.138	0.135	0.132	0.129	0.127	0.124	0.122	0.119	0.115	0.113
16.0	**0.106**	0.135	0.131	0.128	0.125	0.122	0.120	0.117	0.115	0.112	0.110	0.108	0.104	0.102
16.5	**0.096**	0.122	0.119	0.116	0.113	0.111	0.109	0.106	0.104	0.102	0.100	0.098	0.095	0.093
17.0	**0.088**	0.111	0.108	0.106	0.103	0.101	0.099	0.097	0.095	0.093	0.091	0.089	0.086	0.085
17.5	**0.081**	0.102	0.099	0.097	0.095	0.093	0.091	0.089	0.087	0.085	0.084	0.082	0.079	0.078
18.0	**0.074**	0.093	0.091	0.088	0.086	0.085	0.083	0.081	0.080	0.078	0.077	0.075	0.073	0.071
18.5	**0.068**	0.085	0.083	0.081	0.079	0.078	0.076	0.074	0.073	0.072	0.070	0.069	0.067	0.066
19.0	**0.062**	0.078	0.076	0.074	0.073	0.071	0.070	0.068	0.067	0.066	0.065	0.063	0.061	0.060
19.5	**0.058**	0.072	0.070	0.069	0.067	0.066	0.065	0.063	0.062	0.061	0.060	0.059	0.057	0.056
20.0	**0.054**	0.067	0.065	0.064	0.062	0.061	0.060	0.059	0.058	0.057	0.056	0.055	0.053	0.052
20.5	**0.050**	0.062	0.060	0.059	0.058	0.056	0.055	0.054	0.053	0.052	0.051	0.050	0.049	0.048
21.0	**0.045**	0.056	0.055	0.054	0.052	0.051	0.050	0.049	0.048	0.048	0.047	0.046	0.045	0.044
21.5	**0.041**	0.050	0.049	0.048	0.047	0.046	0.045	0.044	0.043	0.043	0.042	0.041	0.040	0.039
22.0	**0.035**	0.044	0.043	0.042	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.035	0.034
22.5	**0.031**	0.038	0.037	0.036	0.035	0.035	0.034	0.033	0.033	0.032	0.032	0.031	0.030	0.030
23.0	**0.027**	0.032	0.032	0.031	0.030	0.030	0.029	0.029	0.028	0.028	0.027	0.027	0.026	0.026
23.5	**0.023**	0.027	0.027	0.026	0.026	0.025	0.025	0.024	0.024	0.024	0.023	0.023	0.022	0.022
24.0	**0.019**	0.023	0.022	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.020	0.019	0.019	0.019
24.5	**0.017**	0.020	0.019	0.019	0.019	0.018	0.018	0.018	0.017	0.017	0.017	0.017	0.016	0.016

Table 10-2: C_t values, Sound Optimized Mode SO1

10.3 Sound Curves, Sound Optimized Mode SO1

Sound Power Level at Hub Height	
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA]** **Sound Optimized Mode SO1 (Blades with serrated trailing edge)**
3	91.4
4	91.6
5	93.8
6	96.9
7	100.2
8	102.9
9	103.4
10	103.4
11	103.4
12	103.4
13	103.4
14	103.4
15	103.4
16	103.4
17	103.4
18	103.4
19	103.4
20	103.4

Table 10-3: Sound curves, Sound Optimized Mode SO1

11 Power Curves, Ct Values and Sound Curves, Sound Optimized Mode SO2

11.1 Power Curves, Sound Optimized Mode SO2

Air density [kg/m^3]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	56	59	62	65	67	70	73	75	78	84	86
3.5	**172**	122	127	131	136	140	145	149	154	158	163	167	176	181
4.0	**285**	210	217	223	230	237	244	251	258	264	271	278	291	298
4.5	**424**	317	327	337	346	356	366	375	385	395	404	414	433	443
5.0	**596**	451	464	477	491	504	517	530	543	557	570	583	609	622
5.5	**808**	615	632	650	668	685	703	720	738	755	773	790	825	843
6.0	**1061**	811	834	857	880	902	925	948	970	993	1016	1039	1084	1106
6.5	**1360**	1044	1072	1101	1130	1159	1188	1216	1245	1274	1303	1331	1389	1417
7.0	**1711**	1317	1353	1389	1425	1461	1496	1532	1568	1604	1640	1675	1746	1781
7.5	**2106**	1629	1673	1717	1761	1805	1848	1891	1935	1978	2021	2064	2149	2192
8.0	**2549**	1982	2034	2087	2139	2191	2243	2294	2346	2397	2448	2498	2599	2649
8.5	**2911**	2366	2423	2480	2537	2594	2642	2690	2738	2787	2828	2870	2948	2984
9.0	**2844**	2652	2678	2703	2728	2754	2769	2784	2799	2814	2824	2834	2852	2860
9.5	**2719**	2682	2688	2694	2700	2707	2709	2711	2713	2716	2717	2718	2720	2721
10.0	**2642**	2638	2638	2639	2639	2640	2640	2640	2641	2641	2641	2641	2642	2642
10.5	**2574**	2575	2574	2574	2573	2573	2573	2573	2573	2573	2573	2573	2574	2575
11.0	**2513**	2511	2510	2510	2510	2510	2511	2511	2511	2512	2512	2513	2514	2515
11.5	**2462**	2457	2457	2458	2458	2458	2458	2459	2459	2460	2460	2461	2462	2463
12.0	**2419**	2415	2415	2416	2416	2416	2417	2417	2418	2418	2418	2419	2420	2421
12.5	**2387**	2383	2383	2383	2384	2384	2384	2384	2385	2385	2386	2386	2387	2388
13.0	**2362**	2358	2358	2359	2359	2359	2359	2360	2360	2360	2361	2361	2363	2363
13.5	**2341**	2337	2337	2338	2338	2338	2339	2339	2339	2340	2340	2341	2342	2342
14.0	**2321**	2317	2317	2317	2318	2318	2318	2319	2319	2319	2320	2320	2321	2322
14.5	**2301**	2297	2297	2298	2298	2298	2299	2299	2300	2300	2300	2301	2302	2302
15.0	**2282**	2278	2278	2278	2279	2279	2279	2280	2280	2281	2281	2281	2282	2283
15.5	**2264**	2260	2260	2261	2261	2261	2262	2262	2262	2263	2263	2264	2265	2265
16.0	**2248**	2244	2244	2244	2245	2245	2245	2246	2246	2247	2247	2247	2248	2249
16.5	**2233**	2229	2229	2230	2230	2230	2231	2231	2232	2232	2232	2233	2233	2234
17.0	**2219**	2216	2216	2217	2217	2217	2217	2218	2218	2218	2219	2219	2220	2220
17.5	**2208**	2205	2206	2206	2206	2206	2206	2207	2207	2207	2208	2208	2208	2209
18.0	**2199**	2198	2198	2198	2198	2198	2198	2199	2199	2199	2199	2199	2200	2200
18.5	**2194**	2193	2193	2193	2193	2193	2193	2194	2194	2194	2194	2194	2194	2194
19.0	**2191**	2191	2191	2191	2191	2191	2191	2191	2191	2191	2191	2191	2191	2191
19.5	**2190**	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190
20.0	**2189**	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189
20.5	**2189**	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189
21.0	**2190**	2189	2189	2189	2189	2190	2189	2189	2189	2189	2189	2189	2190	2190
21.5	**2189**	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189	2189
22.0	**2190**	2189	2189	2189	2189	2189	2189	2189	2189	2190	2190	2190	2190	2190
22.5	**2187**	2187	2187	2187	2187	2187	2187	2187	2187	2187	2187	2187	2187	2187
23.0	**2133**	2133	2133	2133	2133	2133	2133	2133	2133	2133	2133	2133	2133	2133
23.5	**1989**	1989	1989	1989	1989	1989	1989	1989	1989	1989	1989	1989	1989	1989
24.0	**1771**	1771	1771	1771	1771	1771	1771	1771	1771	1771	1771	1771	1771	1771
24.5	**1561**	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1561	1561

Table 11-1: Power curve, Sound Optimized Mode SO2

11.2 Ct Values, Sound Optimized Mode SO2

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.886**	0.890	0.890	0.890	0.889	0.889	0.888	0.888	0.888	0.887	0.887	0.886	0.886	0.885
3.5	**0.845**	0.851	0.850	0.850	0.849	0.848	0.848	0.847	0.847	0.846	0.846	0.845	0.845	0.845
4.0	**0.828**	0.827	0.827	0.827	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828	0.828
4.5	**0.825**	0.826	0.826	0.826	0.826	0.826	0.826	0.825	0.825	0.825	0.825	0.825	0.824	0.824
5.0	**0.820**	0.824	0.823	0.823	0.823	0.822	0.822	0.822	0.821	0.821	0.821	0.820	0.820	0.819
5.5	**0.817**	0.821	0.820	0.820	0.820	0.819	0.819	0.819	0.818	0.818	0.818	0.817	0.817	0.816
6.0	**0.813**	0.818	0.817	0.817	0.816	0.816	0.816	0.815	0.815	0.814	0.814	0.813	0.812	0.812
6.5	**0.809**	0.815	0.815	0.814	0.814	0.813	0.813	0.812	0.812	0.811	0.811	0.810	0.809	0.808
7.0	**0.806**	0.814	0.813	0.813	0.812	0.811	0.811	0.810	0.809	0.809	0.808	0.807	0.806	0.805
7.5	**0.802**	0.811	0.810	0.809	0.809	0.808	0.807	0.806	0.805	0.804	0.803	0.802	0.801	0.800
8.0	**0.794**	0.809	0.808	0.807	0.806	0.805	0.803	0.802	0.801	0.799	0.798	0.796	0.792	0.791
8.5	**0.717**	0.799	0.793	0.788	0.782	0.777	0.769	0.761	0.752	0.744	0.735	0.726	0.708	0.698
9.0	**0.526**	0.703	0.684	0.665	0.647	0.628	0.612	0.597	0.581	0.565	0.552	0.539	0.515	0.503
9.5	**0.401**	0.550	0.534	0.517	0.501	0.484	0.471	0.458	0.445	0.432	0.422	0.411	0.392	0.383
10.0	**0.322**	0.434	0.422	0.409	0.396	0.384	0.374	0.365	0.355	0.346	0.338	0.330	0.315	0.309
10.5	**0.266**	0.351	0.342	0.332	0.323	0.313	0.306	0.298	0.291	0.284	0.278	0.272	0.260	0.255
11.0	**0.223**	0.289	0.282	0.275	0.268	0.260	0.255	0.249	0.243	0.237	0.232	0.228	0.219	0.214
11.5	**0.190**	0.245	0.239	0.233	0.227	0.221	0.216	0.211	0.207	0.202	0.198	0.194	0.186	0.183
12.0	**0.164**	0.210	0.205	0.200	0.195	0.190	0.186	0.182	0.178	0.174	0.171	0.167	0.161	0.158
12.5	**0.143**	0.182	0.178	0.174	0.169	0.165	0.162	0.158	0.155	0.152	0.149	0.146	0.140	0.138
13.0	**0.126**	0.160	0.156	0.152	0.149	0.145	0.142	0.139	0.136	0.133	0.131	0.128	0.124	0.121
13.5	**0.112**	0.141	0.138	0.135	0.132	0.129	0.126	0.123	0.121	0.118	0.116	0.114	0.110	0.108
14.0	**0.100**	0.126	0.123	0.120	0.117	0.115	0.112	0.110	0.108	0.106	0.104	0.102	0.098	0.096
14.5	**0.089**	0.112	0.110	0.107	0.105	0.103	0.101	0.099	0.097	0.095	0.093	0.091	0.088	0.086
15.0	**0.081**	0.101	0.099	0.097	0.094	0.092	0.090	0.089	0.087	0.085	0.084	0.082	0.079	0.078
15.5	**0.073**	0.091	0.089	0.087	0.085	0.083	0.082	0.080	0.079	0.077	0.076	0.074	0.072	0.071
16.0	**0.066**	0.083	0.081	0.079	0.077	0.076	0.074	0.073	0.071	0.070	0.069	0.068	0.065	0.064
16.5	**0.061**	0.075	0.074	0.072	0.071	0.069	0.068	0.066	0.065	0.064	0.063	0.062	0.060	0.059
17.0	**0.056**	0.069	0.067	0.066	0.065	0.063	0.062	0.061	0.060	0.059	0.058	0.057	0.055	0.054
17.5	**0.052**	0.064	0.062	0.061	0.060	0.058	0.057	0.056	0.055	0.054	0.053	0.053	0.051	0.050
18.0	**0.048**	0.059	0.057	0.056	0.055	0.054	0.053	0.052	0.051	0.050	0.049	0.049	0.047	0.046
18.5	**0.045**	0.054	0.053	0.052	0.051	0.050	0.049	0.048	0.048	0.047	0.046	0.045	0.044	0.043
19.0	**0.041**	0.050	0.049	0.048	0.048	0.047	0.046	0.045	0.044	0.043	0.043	0.042	0.041	0.040
19.5	**0.039**	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041	0.041	0.040	0.039	0.038	0.038
20.0	**0.037**	0.044	0.043	0.042	0.042	0.041	0.040	0.039	0.039	0.038	0.038	0.037	0.036	0.036
20.5	**0.034**	0.041	0.041	0.040	0.039	0.038	0.038	0.037	0.037	0.036	0.035	0.035	0.034	0.033
21.0	**0.032**	0.039	0.038	0.037	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.033	0.032	0.031
21.5	**0.030**	0.036	0.036	0.035	0.034	0.034	0.033	0.033	0.032	0.032	0.031	0.031	0.030	0.030
22.0	**0.028**	0.034	0.034	0.033	0.032	0.032	0.031	0.031	0.030	0.030	0.029	0.029	0.028	0.028
22.5	**0.027**	0.032	0.031	0.031	0.030	0.030	0.029	0.029	0.028	0.028	0.027	0.027	0.026	0.026
23.0	**0.025**	0.030	0.029	0.028	0.028	0.027	0.027	0.027	0.026	0.026	0.025	0.025	0.024	0.024
23.5	**0.022**	0.026	0.026	0.025	0.025	0.024	0.024	0.024	0.023	0.023	0.023	0.022	0.022	0.021
24.0	**0.019**	0.023	0.022	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.020	0.019	0.019	0.019
24.5	**0.017**	0.020	0.019	0.019	0.019	0.018	0.018	0.018	0.017	0.017	0.017	0.017	0.016	0.016

Table 11-2: C_t values, Sound Optimized Mode SO2

11.3 Sound Curves, Sound Optimized Mode SO2

Sound Power Level at Hub Height	
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA]** **Sound Optimized Mode SO2 (Blades with serrated trailing edge)**
3	92.4
4	92.4
5	94.4
6	97.0
7	99.6
8	101.7
9	102.0
10	102.0
11	102.0
12	102.0
13	102.0
14	102.0
15	102.0
16	102.0
17	102.0
18	102.0
19	102.0
20	102.0

Table 11-3: Sound curves, Sound Optimized Mode SO2

12 Power Curves, Ct Values and Sound Curves, Sound Optimized Mode SO3

12.1 Power Curves, Sound Optimized Mode SO3

Air density [kg/m^3]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	57	60	62	65	68	70	73	76	79	84	87
3.5	**172**	123	127	132	136	141	145	150	154	159	163	168	177	181
4.0	**285**	210	217	224	231	238	244	251	258	265	272	278	292	299
4.5	**424**	318	328	337	347	357	366	376	386	395	405	415	434	443
5.0	**597**	452	465	478	491	505	518	531	544	557	571	584	610	623
5.5	**809**	616	633	651	669	686	704	721	739	756	774	792	827	844
6.0	**1062**	813	835	858	881	904	926	949	972	994	1017	1040	1084	1107
6.5	**1338**	1045	1073	1101	1130	1158	1185	1212	1239	1266	1290	1314	1359	1379
7.0	**1517**	1305	1334	1362	1391	1419	1436	1454	1471	1488	1498	1507	1523	1528
7.5	**1546**	1493	1502	1512	1521	1531	1534	1537	1541	1544	1544	1545	1546	1546
8.0	**1546**	1543	1544	1545	1545	1546	1546	1546	1546	1546	1546	1546	1546	1546
8.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
9.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
9.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
10.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
10.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
11.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
11.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
12.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
12.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
13.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
13.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
14.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
14.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
15.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
15.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
16.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
16.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
17.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
17.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
18.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
18.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
19.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
19.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
20.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
20.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
21.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
21.5	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
22.0	**1546**	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546	1546
22.5	**1545**	1545	1545	1545	1545	1545	1545	1545	1545	1545	1545	1545	1545	1545
23.0	**1511**	1511	1511	1511	1511	1510	1511	1511	1511	1511	1511	1511	1511	1511
23.5	**1414**	1415	1415	1415	1415	1415	1415	1415	1415	1414	1414	1414	1414	1414
24.0	**1264**	1264	1264	1264	1264	1264	1264	1264	1264	1264	1264	1264	1264	1264
24.5	**1115**	1115	1115	1115	1115	1115	1115	1115	1115	1115	1115	1115	1115	1115

Table 12-1: Power curve, Sound Optimized Mode SO3

12.2 Ct Values, Sound Optimized Mode SO3

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.888**	0.893	0.893	0.892	0.892	0.891	0.891	0.891	0.890	0.890	0.889	0.889	0.888	0.888
3.5	**0.846**	0.853	0.852	0.851	0.850	0.850	0.849	0.849	0.848	0.848	0.847	0.847	0.846	0.847
4.0	**0.830**	0.830	0.830	0.830	0.830	0.830	0.830	0.830	0.830	0.831	0.830	0.830	0.830	0.830
4.5	**0.828**	0.831	0.831	0.830	0.830	0.830	0.830	0.830	0.830	0.829	0.829	0.829	0.828	0.828
5.0	**0.823**	0.828	0.827	0.827	0.826	0.826	0.826	0.825	0.825	0.824	0.824	0.824	0.823	0.822
5.5	**0.820**	0.824	0.824	0.823	0.823	0.823	0.822	0.822	0.821	0.821	0.821	0.820	0.819	0.819
6.0	**0.814**	0.821	0.820	0.820	0.819	0.819	0.818	0.818	0.817	0.816	0.815	0.815	0.813	0.812
6.5	**0.778**	0.818	0.817	0.815	0.814	0.812	0.809	0.805	0.801	0.798	0.791	0.784	0.768	0.759
7.0	**0.633**	0.799	0.788	0.776	0.765	0.754	0.737	0.719	0.702	0.685	0.668	0.651	0.617	0.601
7.5	**0.476**	0.672	0.651	0.630	0.609	0.588	0.571	0.553	0.536	0.519	0.505	0.490	0.464	0.452
8.0	**0.373**	0.515	0.499	0.482	0.466	0.449	0.437	0.426	0.414	0.402	0.392	0.383	0.365	0.357
8.5	**0.303**	0.404	0.393	0.382	0.370	0.359	0.351	0.342	0.333	0.325	0.318	0.310	0.297	0.291
9.0	**0.252**	0.330	0.321	0.313	0.304	0.296	0.289	0.282	0.275	0.269	0.263	0.257	0.247	0.242
9.5	**0.213**	0.277	0.270	0.263	0.256	0.250	0.244	0.238	0.233	0.227	0.223	0.218	0.209	0.205
10.0	**0.182**	0.235	0.229	0.223	0.218	0.212	0.207	0.203	0.198	0.194	0.190	0.186	0.179	0.175
10.5	**0.157**	0.201	0.197	0.192	0.187	0.182	0.178	0.175	0.171	0.167	0.164	0.160	0.154	0.151
11.0	**0.137**	0.174	0.170	0.166	0.162	0.158	0.155	0.151	0.148	0.145	0.142	0.139	0.134	0.132
11.5	**0.120**	0.152	0.149	0.145	0.142	0.138	0.135	0.133	0.130	0.127	0.124	0.122	0.118	0.115
12.0	**0.106**	0.134	0.131	0.128	0.125	0.122	0.119	0.117	0.114	0.112	0.110	0.108	0.104	0.102
12.5	**0.094**	0.119	0.116	0.113	0.111	0.108	0.106	0.104	0.102	0.099	0.098	0.096	0.092	0.091
13.0	**0.084**	0.106	0.103	0.101	0.099	0.096	0.095	0.093	0.091	0.089	0.087	0.086	0.083	0.081
13.5	**0.076**	0.095	0.093	0.091	0.089	0.087	0.085	0.083	0.082	0.080	0.078	0.077	0.074	0.073
14.0	**0.068**	0.085	0.084	0.082	0.080	0.078	0.077	0.075	0.074	0.072	0.071	0.070	0.067	0.066
14.5	**0.062**	0.077	0.076	0.074	0.072	0.071	0.069	0.068	0.067	0.065	0.064	0.063	0.061	0.060
15.0	**0.057**	0.070	0.069	0.067	0.066	0.064	0.063	0.062	0.061	0.060	0.059	0.058	0.056	0.055
15.5	**0.052**	0.064	0.063	0.061	0.060	0.059	0.058	0.057	0.056	0.055	0.054	0.053	0.051	0.050
16.0	**0.048**	0.059	0.058	0.056	0.055	0.054	0.053	0.052	0.051	0.050	0.049	0.048	0.047	0.046
16.5	**0.044**	0.054	0.053	0.052	0.051	0.050	0.049	0.048	0.047	0.046	0.045	0.045	0.043	0.043
17.0	**0.041**	0.050	0.049	0.048	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041	0.040	0.040
17.5	**0.038**	0.046	0.046	0.045	0.044	0.043	0.042	0.041	0.041	0.040	0.039	0.039	0.038	0.037
18.0	**0.036**	0.043	0.042	0.042	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.035	0.035
18.5	**0.033**	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.032
19.0	**0.031**	0.037	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.032	0.032	0.032	0.031	0.030
19.5	**0.029**	0.035	0.034	0.034	0.033	0.033	0.032	0.032	0.031	0.031	0.030	0.030	0.029	0.028
20.0	**0.028**	0.033	0.032	0.032	0.031	0.031	0.030	0.030	0.029	0.029	0.028	0.028	0.027	0.027
20.5	**0.026**	0.031	0.030	0.030	0.029	0.029	0.028	0.028	0.028	0.027	0.027	0.026	0.026	0.025
21.0	**0.025**	0.029	0.029	0.028	0.028	0.027	0.027	0.026	0.026	0.026	0.025	0.025	0.024	0.024
21.5	**0.023**	0.028	0.027	0.027	0.026	0.026	0.025	0.025	0.025	0.024	0.024	0.024	0.023	0.023
22.0	**0.022**	0.026	0.025	0.025	0.024	0.024	0.024	0.023	0.023	0.023	0.022	0.022	0.021	0.021
22.5	**0.020**	0.024	0.023	0.023	0.023	0.022	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.019
23.0	**0.018**	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.020	0.019	0.019	0.019	0.018	0.018
23.5	**0.017**	0.020	0.020	0.019	0.019	0.019	0.018	0.018	0.018	0.017	0.017	0.017	0.017	0.016
24.0	**0.015**	0.017	0.017	0.017	0.016	0.016	0.016	0.016	0.015	0.015	0.015	0.015	0.014	0.014
24.5	**0.013**	0.015	0.015	0.015	0.014	0.014	0.014	0.014	0.013	0.013	0.013	0.013	0.013	0.012

Table 12-2: C_t values, Sound Optimized Mode SO3

12.3 Sound Curves, Sound Optimized Mode SO3

Sound Power Level at Hub Height	
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA]** **Sound Optimized Mode SO3 (Blades with serrated trailing edge)**
3	91.1
4	91.3
5	93.2
6	96.3
7	99.5
8	99.5
9	99.5
10	99.5
11	99.5
12	99.5
13	99.5
14	99.5
15	99.5
16	99.5
17	99.5
18	99.5
19	99.5
20	99.5

Table 12-3: Sound curves, Sound Optimized Mode SO3

13 Power Curves, Ct Values and Sound Curves, Sound Optimized Mode SO11

13.1 Power Curves, Sound Optimized Mode SO11

Air density [kg/m³]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	57	60	62	65	68	70	73	76	79	84	87
3.5	**172**	123	127	132	136	141	145	150	154	159	163	168	177	181
4.0	**277**	210	217	224	231	237	243	250	256	262	267	272	282	286
4.5	**403**	318	327	337	346	356	363	371	379	387	392	398	406	409
5.0	**579**	452	465	478	491	504	516	528	540	552	561	570	585	590
5.5	**740**	615	632	648	664	681	692	703	713	724	730	735	743	745
6.0	**861**	800	811	822	833	845	848	851	855	858	859	860	861	862
6.5	**982**	966	969	973	976	979	980	980	981	982	982	982	982	982
7.0	**1103**	1103	1103	1103	1103	1103	1103	1103	1103	1103	1103	1103	1103	1103
7.5	**1218**	1218	1218	1218	1218	1218	1218	1218	1218	1218	1218	1218	1218	1218
8.0	**1334**	1334	1334	1334	1334	1334	1334	1334	1334	1334	1334	1334	1334	1334
8.5	**1458**	1458	1458	1458	1458	1458	1458	1458	1458	1458	1458	1458	1458	1458
9.0	**1584**	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584
9.5	**1690**	1690	1690	1690	1690	1690	1690	1690	1690	1690	1690	1690	1690	1690
10.0	**1769**	1769	1769	1769	1769	1769	1769	1769	1769	1769	1769	1769	1769	1769
10.5	**1811**	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
11.0	**1841**	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
11.5	**1873**	1873	1873	1873	1873	1873	1873	1873	1873	1873	1873	1873	1873	1873
12.0	**1902**	1902	1902	1902	1902	1902	1902	1902	1902	1902	1902	1902	1902	1902
12.5	**1921**	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921	1921
13.0	**1933**	1933	1933	1933	1933	1933	1933	1933	1933	1933	1933	1933	1933	1933
13.5	**1944**	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944
14.0	**1952**	1952	1952	1952	1952	1952	1952	1952	1952	1952	1952	1952	1952	1952
14.5	**1960**	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960
15.0	**1972**	1972	1972	1972	1972	1972	1972	1972	1972	1972	1972	1972	1972	1972
15.5	**1984**	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
16.0	**1995**	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995
16.5	**2005**	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
17.0	**2013**	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013
17.5	**2022**	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022
18.0	**2031**	2031	2031	2031	2031	2031	2031	2031	2031	2031	2031	2031	2031	2031
18.5	**2039**	2039	2039	2039	2039	2039	2039	2039	2039	2039	2039	2039	2039	2039
19.0	**2047**	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047
19.5	**2054**	2054	2054	2054	2054	2054	2054	2054	2054	2054	2054	2054	2054	2054
20.0	**2061**	2061	2061	2061	2061	2061	2061	2061	2061	2061	2061	2061	2061	2061
20.5	**2068**	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068
21.0	**2049**	2049	2049	2049	2049	2049	2049	2049	2049	2049	2049	2049	2049	2049
21.5	**1853**	1853	1853	1853	1853	1853	1853	1853	1853	1853	1853	1853	1853	1853
22.0	**1421**	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421
22.5	**950**	950	950	950	950	950	950	950	950	950	950	950	950	950
23.0	**816**	816	816	816	816	816	816	816	816	816	816	816	816	816
23.5	**758**	758	758	758	758	758	758	758	758	758	758	758	758	758
24.0	**683**	683	683	683	683	683	683	683	683	683	683	683	683	683
24.5	**614**	614	614	614	614	614	614	614	614	614	614	614	614	614

Table 13-1: Power curve, Sound Optimized Mode SO11

13.2 Ct Values, Sound Optimized Mode SO11

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.888**	0.893	0.893	0.892	0.892	0.891	0.891	0.891	0.89	0.89	0.889	0.889	0.888	0.888
3.5	**0.846**	0.853	0.852	0.851	0.85	0.85	0.849	0.848	0.848	0.847	0.847	0.846	0.845	0.845
4.0	**0.774**	0.83	0.829	0.828	0.827	0.826	0.82	0.814	0.808	0.802	0.793	0.784	0.76	0.746
4.5	**0.723**	0.831	0.828	0.825	0.822	0.819	0.808	0.797	0.786	0.775	0.758	0.74	0.704	0.686
5.0	**0.755**	0.829	0.827	0.825	0.823	0.822	0.815	0.808	0.802	0.795	0.782	0.768	0.736	0.717
5.5	**0.669**	0.824	0.818	0.811	0.805	0.799	0.782	0.765	0.748	0.731	0.711	0.69	0.649	0.628
6.0	**0.549**	0.782	0.76	0.737	0.715	0.692	0.67	0.647	0.624	0.602	0.584	0.566	0.534	0.519
6.5	**0.468**	0.677	0.652	0.627	0.603	0.578	0.56	0.543	0.525	0.507	0.494	0.481	0.457	0.445
7.0	**0.406**	0.564	0.545	0.527	0.508	0.489	0.476	0.463	0.45	0.437	0.426	0.416	0.397	0.388
7.5	**0.356**	0.481	0.467	0.452	0.438	0.424	0.414	0.403	0.392	0.382	0.373	0.365	0.348	0.341
8.0	**0.316**	0.42	0.409	0.397	0.386	0.374	0.365	0.356	0.347	0.338	0.331	0.323	0.31	0.303
8.5	**0.285**	0.375	0.365	0.355	0.345	0.335	0.327	0.32	0.312	0.304	0.298	0.291	0.279	0.273
9.0	**0.258**	0.337	0.329	0.32	0.311	0.303	0.296	0.289	0.282	0.275	0.269	0.264	0.253	0.248
9.5	**0.234**	0.304	0.296	0.289	0.281	0.273	0.267	0.261	0.255	0.249	0.244	0.239	0.229	0.225
10.0	**0.209**	0.27	0.264	0.257	0.25	0.244	0.238	0.233	0.228	0.222	0.218	0.214	0.205	0.201
10.5	**0.185**	0.237	0.231	0.226	0.22	0.214	0.21	0.205	0.201	0.196	0.192	0.188	0.181	0.178
11.0	**0.163**	0.208	0.204	0.199	0.194	0.189	0.185	0.181	0.177	0.173	0.17	0.166	0.16	0.157
11.5	**0.145**	0.185	0.18	0.176	0.172	0.168	0.164	0.161	0.157	0.154	0.151	0.148	0.142	0.14
12.0	**0.13**	0.165	0.161	0.157	0.153	0.15	0.147	0.144	0.141	0.138	0.135	0.132	0.127	0.125
12.5	**0.116**	0.147	0.144	0.141	0.137	0.134	0.131	0.128	0.126	0.123	0.121	0.119	0.114	0.112
13.0	**0.104**	0.132	0.129	0.126	0.123	0.12	0.118	0.115	0.113	0.11	0.108	0.106	0.103	0.101
13.5	**0.094**	0.119	0.116	0.113	0.111	0.108	0.106	0.104	0.102	0.1	0.098	0.096	0.093	0.091
14.0	**0.085**	0.107	0.105	0.102	0.1	0.098	0.096	0.094	0.092	0.09	0.089	0.087	0.084	0.082
14.5	**0.078**	0.097	0.095	0.093	0.091	0.089	0.087	0.085	0.084	0.082	0.08	0.079	0.076	0.075
15.0	**0.071**	0.088	0.087	0.085	0.083	0.081	0.079	0.078	0.076	0.075	0.074	0.072	0.07	0.069
15.5	**0.065**	0.081	0.079	0.078	0.076	0.074	0.073	0.072	0.07	0.069	0.068	0.066	0.064	0.063
16.0	**0.06**	0.074	0.073	0.071	0.07	0.068	0.067	0.066	0.065	0.063	0.062	0.061	0.059	0.058
16.5	**0.056**	0.069	0.067	0.066	0.064	0.063	0.062	0.061	0.06	0.059	0.058	0.057	0.055	0.054
17.0	**0.052**	0.063	0.062	0.061	0.06	0.058	0.057	0.056	0.055	0.054	0.053	0.053	0.051	0.05
17.5	**0.048**	0.059	0.058	0.057	0.056	0.055	0.054	0.053	0.052	0.051	0.05	0.049	0.048	0.047
18.0	**0.045**	0.055	0.054	0.053	0.052	0.051	0.05	0.049	0.048	0.047	0.047	0.046	0.044	0.044
18.5	**0.042**	0.051	0.05	0.049	0.048	0.047	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041
19.0	**0.04**	0.048	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041	0.041	0.04	0.039	0.038
19.5	**0.037**	0.045	0.044	0.043	0.042	0.042	0.041	0.04	0.04	0.039	0.038	0.038	0.037	0.036
20.0	**0.035**	0.042	0.041	0.041	0.04	0.039	0.039	0.038	0.037	0.037	0.036	0.036	0.035	0.034
20.5	**0.033**	0.04	0.039	0.038	0.038	0.037	0.036	0.036	0.035	0.035	0.034	0.034	0.033	0.032
21.0	**0.031**	0.037	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.032	0.032	0.032	0.031	0.03
21.5	**0.027**	0.032	0.032	0.031	0.031	0.03	0.03	0.029	0.029	0.028	0.028	0.028	0.027	0.026
22.0	**0.021**	0.025	0.024	0.024	0.023	0.023	0.023	0.022	0.022	0.022	0.022	0.021	0.021	0.02
22.5	**0.015**	0.017	0.017	0.017	0.017	0.016	0.016	0.016	0.016	0.016	0.015	0.015	0.015	0.015
23.0	**0.013**	0.015	0.015	0.014	0.014	0.014	0.014	0.014	0.014	0.013	0.013	0.013	0.013	0.013
23.5	**0.012**	0.013	0.013	0.013	0.013	0.013	0.013	0.012	0.012	0.012	0.012	0.012	0.012	0.012
24.0	**0.011**	0.012	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.01	0.01
24.5	**0.009**	0.011	0.011	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.009	0.009

Table 13-2: C_t values, Sound Optimized Mode SO11

13.3 Sound Curves, Sound Optimized Mode SO11

Sound Power Level at Hub Height	
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA]** **Sound Optimized Mode SO11 (Blades with serrated trailing edge)**
3	91.1
4	91.3
5	93.0
6	94.4
7	95.6
8	96.8
9	98.0
10	98.8
11	99.0
12	99.2
13	99.2
14	99.2
15	99.2
16	99.2
17	99.2
18	99.2
19	99.2
20	99.2

Table 13-3: Sound curves, Sound Optimized Mode SO11

14 Power Curves, Ct Values and Sound Curves, Sound Optimized Mode SO12

14.1 Power Curves, Sound Optimized Mode SO12

Air density [kg/m³]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	81	51	54	57	60	62	65	68	70	73	76	79	84	87
3.5	172	123	127	132	136	141	145	150	154	159	163	168	177	181
4.0	278	210	217	224	231	237	243	250	256	262	267	272	282	286
4.5	405	318	327	337	347	356	364	373	381	389	394	400	409	413
5.0	580	452	465	478	491	504	516	528	540	552	562	571	586	592
5.5	766	616	633	650	667	684	698	713	727	741	749	758	771	775
6.0	934	810	829	848	867	886	896	906	916	926	929	931	935	936
6.5	1108	1029	1044	1059	1074	1090	1093	1097	1101	1105	1106	1107	1108	1108
7.0	1301	1270	1278	1285	1293	1300	1300	1301	1301	1301	1301	1301	1301	1301
7.5	1516	1508	1510	1512	1514	1516	1516	1516	1516	1516	1516	1516	1516	1516
8.0	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695
8.5	1810	1810	1810	1810	1810	1810	1810	1810	1810	1810	1810	1810	1809	1809
9.0	1884	1884	1884	1884	1884	1884	1884	1884	1884	1884	1884	1884	1884	1884
9.5	1936	1936	1936	1936	1936	1936	1936	1936	1936	1936	1936	1936	1936	1936
10.0	1976	1976	1976	1976	1976	1976	1976	1976	1976	1976	1976	1976	1976	1976
10.5	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
11.0	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
11.5	2035	2035	2035	2035	2035	2035	2035	2035	2035	2035	2035	2035	2035	2035
12.0	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
12.5	2057	2057	2057	2057	2057	2057	2057	2057	2057	2057	2057	2057	2057	2057
13.0	2066	2066	2066	2066	2066	2066	2066	2066	2066	2066	2066	2066	2066	2066
13.5	2078	2078	2078	2078	2078	2078	2078	2078	2078	2078	2078	2078	2078	2078
14.0	2092	2092	2092	2092	2092	2092	2092	2092	2092	2092	2092	2092	2092	2092
14.5	2108	2108	2108	2108	2108	2108	2108	2108	2108	2108	2108	2108	2108	2108
15.0	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123	2123
15.5	2132	2132	2132	2132	2132	2132	2132	2132	2132	2132	2132	2132	2132	2132
16.0	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140
16.5	2148	2148	2148	2148	2148	2148	2148	2148	2148	2148	2148	2148	2148	2148
17.0	2158	2158	2158	2158	2158	2158	2158	2158	2158	2158	2158	2158	2158	2158
17.5	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168	2168
18.0	2179	2179	2179	2179	2179	2179	2179	2179	2179	2179	2179	2179	2179	2179
18.5	2188	2188	2188	2188	2188	2188	2188	2188	2188	2188	2188	2188	2188	2188
19.0	2197	2197	2197	2197	2197	2197	2197	2197	2197	2197	2197	2197	2197	2197
19.5	2205	2205	2205	2205	2205	2205	2205	2205	2205	2205	2205	2205	2205	2205
20.0	2212	2212	2212	2212	2212	2212	2212	2212	2212	2212	2212	2212	2212	2212
20.5	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220
21.0	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190
21.5	1951	1951	1951	1951	1951	1951	1951	1951	1951	1951	1951	1951	1951	1951
22.0	1460	1460	1460	1460	1460	1460	1460	1460	1460	1460	1460	1460	1460	1460
22.5	951	951	951	951	951	951	951	951	951	951	951	951	951	951
23.0	816	816	816	816	816	816	816	816	816	816	816	816	816	816
23.5	758	758	758	758	758	758	758	758	758	758	758	758	758	758
24.0	683	683	683	683	683	683	683	683	683	683	683	683	683	683
24.5	614	614	614	614	614	614	614	614	614	614	614	614	614	614

Table 14-1: Power curve, Sound Optimized Mode SO12

14.2 Ct Values, Sound Optimized Mode SO12

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.888**	0.893	0.893	0.892	0.892	0.891	0.891	0.891	0.890	0.890	0.889	0.889	0.888	0.888
3.5	**0.846**	0.853	0.852	0.851	0.850	0.850	0.849	0.848	0.848	0.847	0.847	0.846	0.845	0.845
4.0	**0.776**	0.830	0.829	0.828	0.827	0.826	0.820	0.814	0.809	0.803	0.794	0.785	0.762	0.747
4.5	**0.732**	0.831	0.829	0.827	0.825	0.823	0.813	0.803	0.793	0.783	0.766	0.749	0.713	0.695
5.0	**0.760**	0.829	0.827	0.826	0.824	0.823	0.816	0.810	0.804	0.798	0.785	0.772	0.741	0.722
5.5	**0.712**	0.825	0.822	0.819	0.816	0.813	0.802	0.792	0.782	0.771	0.751	0.732	0.691	0.670
6.0	**0.618**	0.815	0.805	0.794	0.783	0.773	0.751	0.729	0.707	0.685	0.663	0.640	0.600	0.583
6.5	**0.548**	0.785	0.762	0.740	0.717	0.695	0.671	0.648	0.624	0.601	0.583	0.565	0.533	0.518
7.0	**0.495**	0.738	0.709	0.679	0.650	0.620	0.600	0.579	0.559	0.538	0.524	0.509	0.483	0.471
7.5	**0.459**	0.669	0.643	0.616	0.590	0.564	0.547	0.530	0.514	0.497	0.484	0.472	0.448	0.438
8.0	**0.414**	0.580	0.560	0.540	0.520	0.500	0.487	0.473	0.460	0.446	0.436	0.425	0.405	0.396
8.5	**0.362**	0.489	0.475	0.460	0.446	0.431	0.420	0.409	0.399	0.388	0.379	0.370	0.354	0.346
9.0	**0.312**	0.414	0.403	0.391	0.380	0.369	0.360	0.351	0.342	0.334	0.326	0.319	0.306	0.299
9.5	**0.271**	0.355	0.346	0.337	0.327	0.318	0.311	0.304	0.296	0.289	0.283	0.277	0.266	0.260
10.0	**0.235**	0.305	0.298	0.290	0.282	0.275	0.269	0.263	0.256	0.250	0.245	0.240	0.231	0.226
10.5	**0.205**	0.264	0.257	0.251	0.245	0.238	0.233	0.228	0.223	0.217	0.213	0.209	0.201	0.197
11.0	**0.179**	0.230	0.224	0.219	0.213	0.208	0.203	0.199	0.194	0.190	0.186	0.183	0.176	0.172
11.5	**0.158**	0.201	0.196	0.192	0.187	0.182	0.179	0.175	0.171	0.167	0.164	0.161	0.155	0.152
12.0	**0.140**	0.178	0.173	0.169	0.165	0.161	0.158	0.155	0.151	0.148	0.145	0.142	0.137	0.135
12.5	**0.124**	0.158	0.154	0.150	0.147	0.143	0.140	0.138	0.135	0.132	0.129	0.127	0.122	0.120
13.0	**0.111**	0.141	0.138	0.134	0.131	0.128	0.126	0.123	0.120	0.118	0.116	0.114	0.109	0.107
13.5	**0.100**	0.126	0.124	0.121	0.118	0.115	0.113	0.111	0.108	0.106	0.104	0.102	0.099	0.097
14.0	**0.091**	0.114	0.112	0.109	0.107	0.104	0.102	0.100	0.098	0.096	0.095	0.093	0.090	0.088
14.5	**0.083**	0.104	0.102	0.100	0.097	0.095	0.093	0.091	0.090	0.088	0.086	0.085	0.082	0.080
15.0	**0.076**	0.095	0.093	0.091	0.089	0.087	0.085	0.084	0.082	0.080	0.079	0.077	0.075	0.074
15.5	**0.070**	0.087	0.085	0.083	0.081	0.080	0.078	0.077	0.075	0.074	0.072	0.071	0.069	0.068
16.0	**0.064**	0.080	0.078	0.076	0.075	0.073	0.072	0.070	0.069	0.068	0.066	0.065	0.063	0.062
16.5	**0.059**	0.073	0.072	0.070	0.069	0.067	0.066	0.065	0.064	0.062	0.061	0.060	0.058	0.057
17.0	**0.055**	0.068	0.066	0.065	0.064	0.062	0.061	0.060	0.059	0.058	0.057	0.056	0.054	0.053
17.5	**0.051**	0.063	0.062	0.061	0.059	0.058	0.057	0.056	0.055	0.054	0.053	0.052	0.051	0.050
18.0	**0.048**	0.059	0.058	0.056	0.055	0.054	0.053	0.052	0.051	0.050	0.050	0.049	0.047	0.047
18.5	**0.045**	0.055	0.054	0.053	0.052	0.051	0.050	0.049	0.048	0.047	0.046	0.046	0.044	0.044
19.0	**0.042**	0.051	0.050	0.049	0.048	0.047	0.046	0.046	0.045	0.044	0.043	0.043	0.041	0.041
19.5	**0.040**	0.048	0.047	0.046	0.045	0.044	0.044	0.043	0.042	0.041	0.041	0.040	0.039	0.038
20.0	**0.037**	0.045	0.044	0.043	0.042	0.042	0.041	0.040	0.040	0.039	0.038	0.038	0.037	0.036
20.5	**0.035**	0.042	0.042	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.036	0.035	0.034
21.0	**0.033**	0.039	0.039	0.038	0.037	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.032	0.032
21.5	**0.028**	0.034	0.033	0.033	0.032	0.031	0.031	0.030	0.030	0.029	0.029	0.029	0.028	0.028
22.0	**0.021**	0.025	0.025	0.024	0.024	0.024	0.023	0.023	0.023	0.022	0.022	0.022	0.021	0.021
22.5	**0.015**	0.017	0.017	0.017	0.017	0.016	0.016	0.016	0.016	0.016	0.015	0.015	0.015	0.015
23.0	**0.013**	0.015	0.015	0.014	0.014	0.014	0.014	0.014	0.014	0.013	0.013	0.013	0.013	0.013
23.5	**0.012**	0.013	0.013	0.013	0.013	0.013	0.013	0.012	0.012	0.012	0.012	0.012	0.012	0.012
24.0	**0.011**	0.012	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.010	0.010
24.5	**0.009**	0.011	0.011	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.009

Table 14-2: C_t values, Sound Optimized Mode SO12

14.3 Sound Curves, Sound Optimized Mode SO12

Sound Power Level at Hub Height	
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA]** **Sound Optimized Mode SO12 (Blades with serrated trailing edge)**
3	91.1
4	91.3
5	93.0
6	94.9
7	96.9
8	98.9
9	99.6
10	99.9
11	99.9
12	99.9
13	99.9
14	99.9
15	99.9
16	99.9
17	99.9
18	99.9
19	99.9
20	99.9

Table 14-3: Sound curves, Sound Optimized Mode SO12

15 Power Curves, Ct Values and Sound Curves, Sound Optimized Mode SO13

15.1 Power Curves, Sound Optimized Mode SO13

Air density [kg/m³]														
Wind speed [m/s]	**1.225**	**0.95**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**81**	51	54	57	60	62	65	68	70	73	76	79	84	87
3.5	**172**	123	127	132	136	141	145	150	154	159	163	168	177	181
4.0	**277**	210	217	224	231	237	244	250	256	262	267	272	281	286
4.5	**378**	317	326	334	342	351	356	362	367	373	374	376	378	379
5.0	**440**	426	429	432	436	439	439	439	439	440	440	440	440	440
5.5	**465**	464	464	464	465	465	465	465	465	465	465	465	465	465
6.0	**506**	506	506	506	506	506	506	506	506	506	506	506	506	506
6.5	**597**	597	597	597	597	597	597	597	597	597	597	597	597	597
7.0	**705**	705	705	705	705	705	705	705	705	705	705	705	705	705
7.5	**804**	804	804	804	804	804	804	804	804	804	804	804	804	804
8.0	**923**	923	923	923	923	923	923	923	923	923	923	923	923	923
8.5	**1069**	1069	1069	1069	1069	1069	1069	1069	1069	1069	1069	1069	1069	1069
9.0	**1200**	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
9.5	**1290**	1290	1290	1290	1290	1290	1290	1290	1290	1290	1290	1290	1290	1290
10.0	**1355**	1355	1355	1355	1355	1355	1355	1355	1355	1355	1355	1355	1355	1355
10.5	**1409**	1409	1409	1409	1409	1409	1409	1409	1409	1409	1409	1409	1409	1409
11.0	**1455**	1455	1455	1455	1455	1455	1455	1455	1455	1455	1455	1455	1455	1455
11.5	**1480**	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480	1480
12.0	**1492**	1492	1492	1492	1492	1492	1492	1492	1492	1492	1492	1492	1492	1492
12.5	**1499**	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1499
13.0	**1505**	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505
13.5	**1512**	1512	1512	1512	1512	1512	1512	1512	1512	1512	1512	1512	1512	1512
14.0	**1522**	1522	1522	1522	1522	1522	1522	1522	1522	1522	1522	1522	1522	1522
14.5	**1535**	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535	1535
15.0	**1547**	1547	1547	1547	1547	1547	1547	1547	1547	1547	1547	1547	1547	1547
15.5	**1555**	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555	1555
16.0	**1560**	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560
16.5	**1568**	1568	1568	1568	1568	1568	1568	1568	1568	1568	1568	1568	1568	1568
17.0	**1577**	1577	1577	1577	1577	1577	1577	1577	1577	1577	1577	1577	1577	1577
17.5	**1587**	1587	1587	1587	1587	1587	1587	1587	1587	1587	1587	1587	1587	1587
18.0	**1595**	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595	1595
18.5	**1599**	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599
19.0	**1603**	1603	1603	1603	1603	1603	1603	1603	1603	1603	1603	1603	1603	1603
19.5	**1610**	1610	1610	1610	1610	1610	1610	1610	1610	1610	1610	1610	1610	1610
20.0	**1618**	1618	1618	1618	1618	1618	1618	1618	1618	1618	1618	1618	1618	1618
20.5	**1629**	1629	1629	1629	1629	1629	1629	1629	1629	1629	1629	1629	1629	1629
21.0	**1636**	1636	1636	1636	1636	1636	1636	1636	1636	1636	1636	1636	1636	1636
21.5	**1550**	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550
22.0	**1276**	1276	1276	1276	1276	1276	1276	1276	1276	1276	1276	1276	1276	1276
22.5	**941**	941	941	941	941	941	941	941	941	941	941	941	941	941
23.0	**816**	816	816	816	816	816	816	816	816	816	816	816	816	816
23.5	**758**	758	758	758	758	758	758	758	758	758	758	758	758	758
24.0	**683**	683	683	683	683	683	683	683	683	683	683	683	683	683
24.5	**614**	614	614	614	614	614	614	614	614	614	614	614	614	614

Table 15-1: Power curve, Sound Optimized Mode SO13

15.2 Ct Values, Sound Optimized Mode SO13

Air density kg/m³														
Wind speed [m/s]	**1.225**	**0.950**	**0.975**	**1.0**	**1.025**	**1.05**	**1.075**	**1.1**	**1.125**	**1.15**	**1.175**	**1.2**	**1.25**	**1.275**
3.0	**0.888**	0.893	0.893	0.892	0.892	0.891	0.891	0.891	0.890	0.890	0.889	0.889	0.888	0.888
3.5	**0.846**	0.853	0.852	0.851	0.850	0.850	0.849	0.848	0.848	0.847	0.847	0.846	0.845	0.845
4.0	**0.774**	0.830	0.829	0.828	0.827	0.826	0.820	0.814	0.809	0.803	0.793	0.783	0.759	0.745
4.5	**0.642**	0.825	0.816	0.808	0.799	0.791	0.772	0.753	0.734	0.715	0.690	0.666	0.622	0.602
5.0	**0.490**	0.724	0.698	0.671	0.644	0.618	0.597	0.576	0.555	0.534	0.519	0.505	0.479	0.467
5.5	**0.369**	0.505	0.490	0.474	0.458	0.442	0.431	0.419	0.408	0.396	0.387	0.378	0.361	0.353
6.0	**0.298**	0.395	0.384	0.373	0.363	0.352	0.344	0.336	0.327	0.319	0.312	0.305	0.292	0.286
6.5	**0.270**	0.355	0.345	0.336	0.327	0.317	0.310	0.303	0.296	0.288	0.282	0.276	0.265	0.259
7.0	**0.251**	0.328	0.319	0.311	0.303	0.294	0.288	0.281	0.274	0.268	0.262	0.256	0.246	0.241
7.5	**0.230**	0.299	0.291	0.284	0.276	0.269	0.263	0.257	0.251	0.245	0.240	0.235	0.225	0.221
8.0	**0.215**	0.279	0.272	0.265	0.258	0.251	0.246	0.240	0.235	0.229	0.224	0.220	0.211	0.207
8.5	**0.206**	0.267	0.260	0.254	0.247	0.240	0.235	0.230	0.225	0.219	0.215	0.211	0.202	0.198
9.0	**0.194**	0.250	0.244	0.238	0.232	0.226	0.221	0.216	0.211	0.206	0.202	0.198	0.190	0.187
9.5	**0.178**	0.229	0.223	0.218	0.212	0.207	0.202	0.198	0.194	0.189	0.185	0.182	0.175	0.171
10.0	**0.160**	0.205	0.200	0.195	0.190	0.186	0.182	0.178	0.174	0.170	0.167	0.163	0.157	0.154
10.5	**0.144**	0.183	0.179	0.175	0.171	0.166	0.163	0.159	0.156	0.152	0.150	0.147	0.141	0.139
11.0	**0.129**	0.164	0.161	0.157	0.153	0.149	0.146	0.143	0.140	0.137	0.134	0.132	0.127	0.125
11.5	**0.115**	0.146	0.143	0.140	0.136	0.133	0.130	0.128	0.125	0.122	0.120	0.118	0.113	0.111
12.0	**0.103**	0.130	0.127	0.124	0.121	0.118	0.116	0.113	0.111	0.109	0.107	0.105	0.101	0.099
12.5	**0.092**	0.116	0.113	0.111	0.108	0.105	0.103	0.101	0.099	0.097	0.095	0.094	0.090	0.089
13.0	**0.082**	0.103	0.101	0.099	0.097	0.094	0.093	0.091	0.089	0.087	0.085	0.084	0.081	0.080
13.5	**0.074**	0.093	0.091	0.089	0.087	0.085	0.084	0.082	0.080	0.079	0.077	0.076	0.073	0.072
14.0	**0.068**	0.084	0.083	0.081	0.079	0.077	0.076	0.074	0.073	0.071	0.070	0.069	0.067	0.066
14.5	**0.062**	0.077	0.075	0.074	0.072	0.071	0.069	0.068	0.067	0.065	0.064	0.063	0.061	0.060
15.0	**0.057**	0.071	0.069	0.068	0.066	0.065	0.064	0.062	0.061	0.060	0.059	0.058	0.056	0.055
15.5	**0.052**	0.065	0.063	0.062	0.061	0.059	0.058	0.057	0.056	0.055	0.054	0.053	0.052	0.051
16.0	**0.048**	0.059	0.058	0.057	0.056	0.055	0.054	0.053	0.052	0.051	0.050	0.049	0.048	0.047
16.5	**0.045**	0.055	0.054	0.053	0.052	0.051	0.050	0.049	0.048	0.047	0.046	0.046	0.044	0.044
17.0	**0.042**	0.051	0.050	0.049	0.048	0.047	0.046	0.045	0.045	0.044	0.043	0.042	0.041	0.041
17.5	**0.039**	0.048	0.047	0.046	0.045	0.044	0.043	0.043	0.042	0.041	0.041	0.040	0.039	0.038
18.0	**0.037**	0.045	0.044	0.043	0.042	0.041	0.041	0.040	0.039	0.038	0.038	0.037	0.036	0.036
18.5	**0.034**	0.042	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.036	0.035	0.034	0.034
19.0	**0.032**	0.039	0.038	0.037	0.037	0.036	0.035	0.035	0.034	0.034	0.033	0.033	0.032	0.031
19.5	**0.030**	0.037	0.036	0.035	0.035	0.034	0.033	0.033	0.032	0.032	0.031	0.031	0.030	0.030
20.0	**0.029**	0.034	0.034	0.033	0.033	0.032	0.032	0.031	0.031	0.030	0.030	0.029	0.028	0.028
20.5	**0.027**	0.033	0.032	0.031	0.031	0.030	0.030	0.029	0.029	0.029	0.028	0.028	0.027	0.027
21.0	**0.026**	0.031	0.030	0.030	0.029	0.029	0.028	0.028	0.027	0.027	0.027	0.026	0.026	0.025
21.5	**0.024**	0.028	0.027	0.027	0.027	0.026	0.026	0.025	0.025	0.025	0.024	0.024	0.023	0.023
22.0	**0.019**	0.023	0.022	0.022	0.022	0.021	0.021	0.021	0.020	0.020	0.020	0.020	0.019	0.019
22.5	**0.015**	0.017	0.017	0.017	0.016	0.016	0.016	0.016	0.016	0.015	0.015	0.015	0.015	0.015
23.0	**0.013**	0.015	0.015	0.014	0.014	0.014	0.014	0.014	0.014	0.013	0.013	0.013	0.013	0.013
23.5	**0.012**	0.013	0.013	0.013	0.013	0.013	0.013	0.012	0.012	0.012	0.012	0.012	0.012	0.012
24.0	**0.011**	0.012	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.010	0.010
24.5	**0.009**	0.011	0.011	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.009

Table 15-2: C_t values, Sound Optimized Mode SO13

15.3 Sound Curves, Sound Optimized Mode SO13

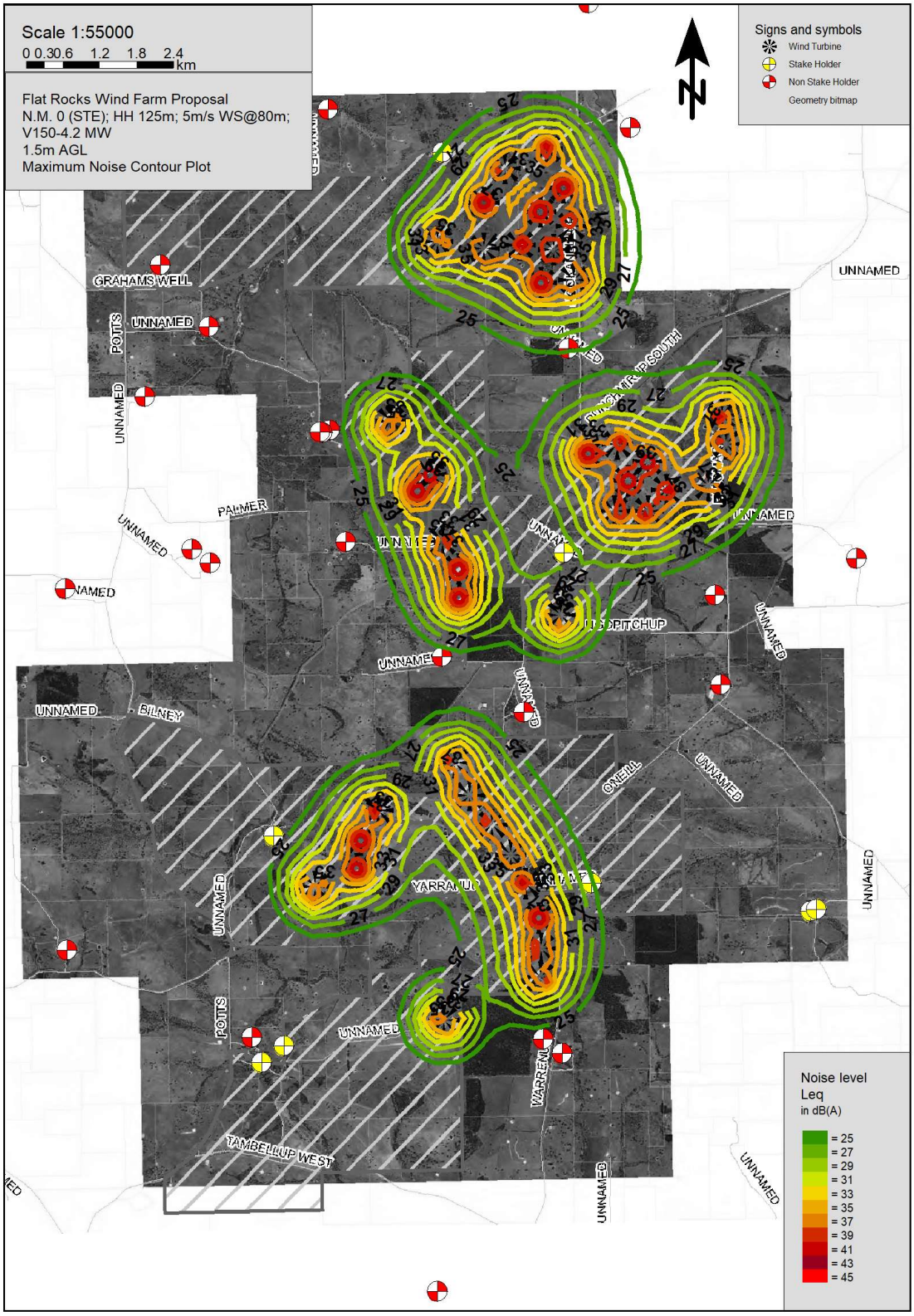
Sound Power Level at Hub Height	
Conditions for Sound Power Level:	**Measurement standard IEC 61400-11 ed. 3** **Maximum turbulence at hub height: 30%** **Inflow angle (vertical): 0 ±2°** **Air density: 1.225 kg/m^3**
Wind speed at hub height [m/s]	**Sound Power Level at Hub Height [dBA]** **Sound Optimized Mode SO13 (Blades with serrated trailing edge)**
3	91.1
4	91.3
5	91.9
6	92.1
7	93.1
8	94.2
9	95.8
10	96.5
11	96.9
12	97.0
13	97.0
14	97.0
15	97.0
16	97.0
17	97.0
18	97.0
19	97.0
20	97.0

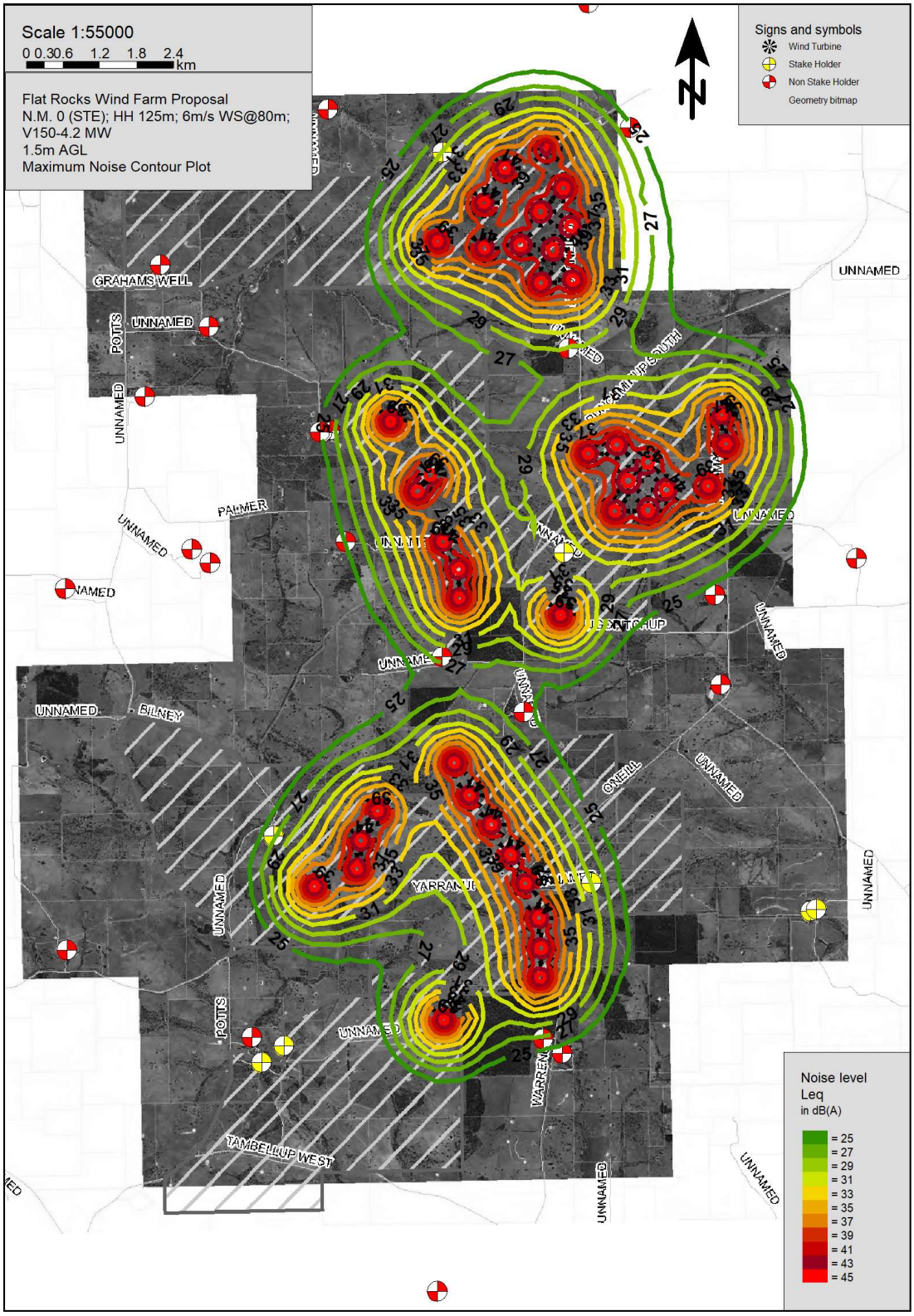
Table 15-3: Sound curves, Sound Optimized Mode SO13

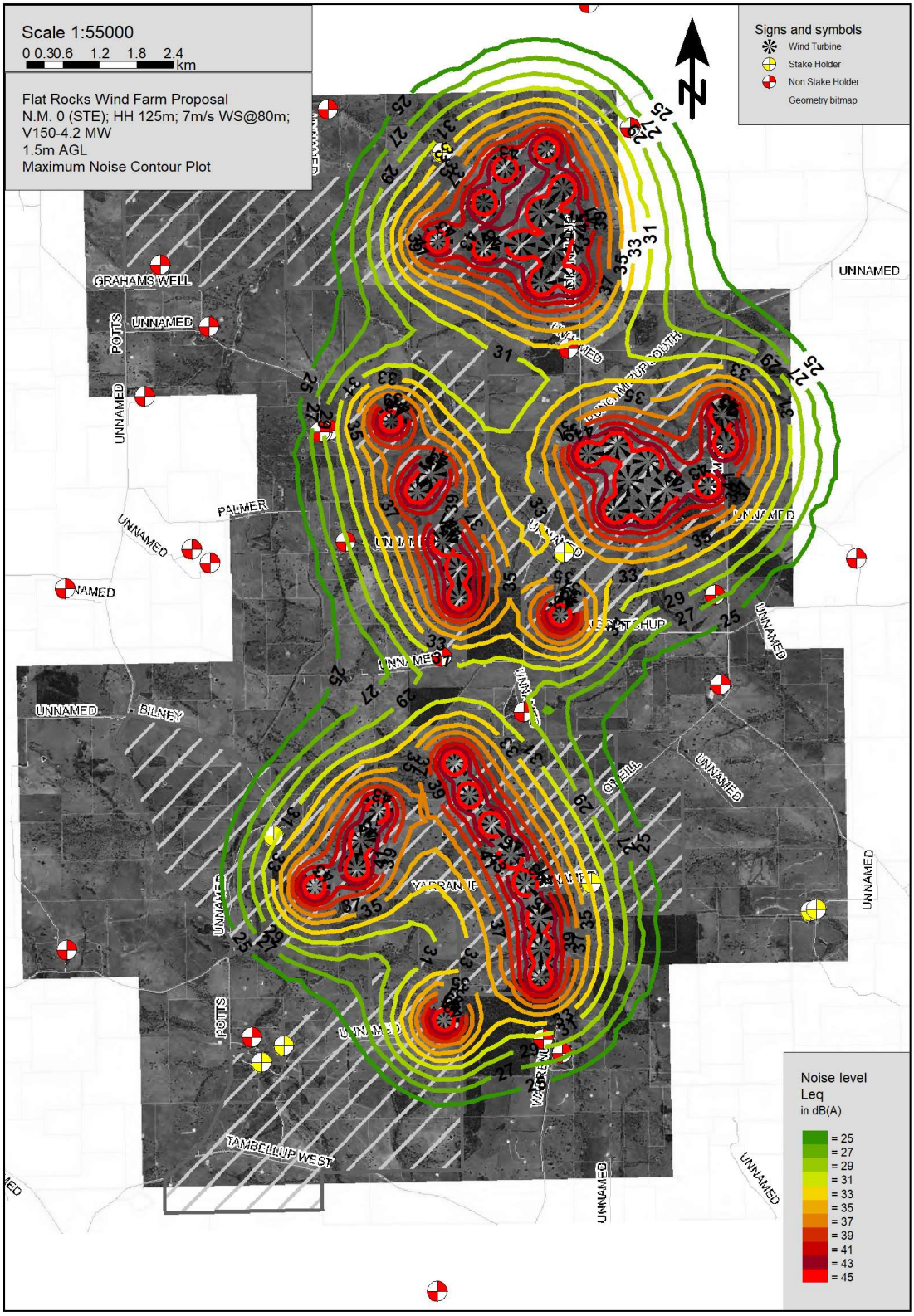
APPENDIX C

PREDICTED NOISE LEVEL CONTOURS


Scale 1:55000
0 0.30.6 1.2 1.8 2.4
km
Flat Rocks Wind Farm Proposal
N.M. 0 (STE); HH 125m; 4m/s WS@80m;
V150-4.2 MW
1.5m AGL
Maximum Noise Contour Plot
Signs and symbols
Wind Turbine
Stake Holder
Non Stake Holder
Geometry bitmap
N
GRAHAMS WELL
UNNAMED
POTTS
PALMER
BYLNEY
ONEILL
WARRENUP
TAMBELUP WEST
Noise level
Leq
in dB(A)
= 25
= 27
= 29
= 31
= 33
= 35
= 37
= 39
= 41
= 43
= 45


Scale 1:55000
0 0.30.6 1.2 1.8 2.4
km
Flat Rocks Wind Farm Proposal
N.M. 0 (STE); HH 125m; 5m/s WS@80m;
V150-4.2 MW
1.5m AGL
Maximum Noise Contour Plot
Signs and symbols
Wind Turbine
Stake Holder
Non Stake Holder
Geometry bitmap
N
GRAHAMS WELL
POTTS
UNNAMED
PALMER
BYLNEY
O'NEILL
WARRENUP
TAMBELUP WEST
Noise level
Leq
in dB(A)
= 25
= 27
= 29
= 31
= 33
= 35
= 37
= 39
= 41
= 43
= 45


Scale 1:55000
0 0.30.6 1.2 1.8 2.4
km
Flat Rocks Wind Farm Proposal
N.M. 0 (STE); HH 125m; 6m/s WS@80m;
V150-4.2 MW
1.5m AGL
Maximum Noise Contour Plot
Signs and symbols
Wind Turbine
Stake Holder
Non Stake Holder
Geometry bitmap
N
GRAHAMS WELL
POTTS
UNNAMED
PALMER
BILNEY
O'NEILL
YARRANUP
TAMBELUP WEST
WARREN
Noise level
Leq
in dB(A)
= 25
= 27
= 29
= 31
= 33
= 35
= 37
= 39
= 41
= 43
= 45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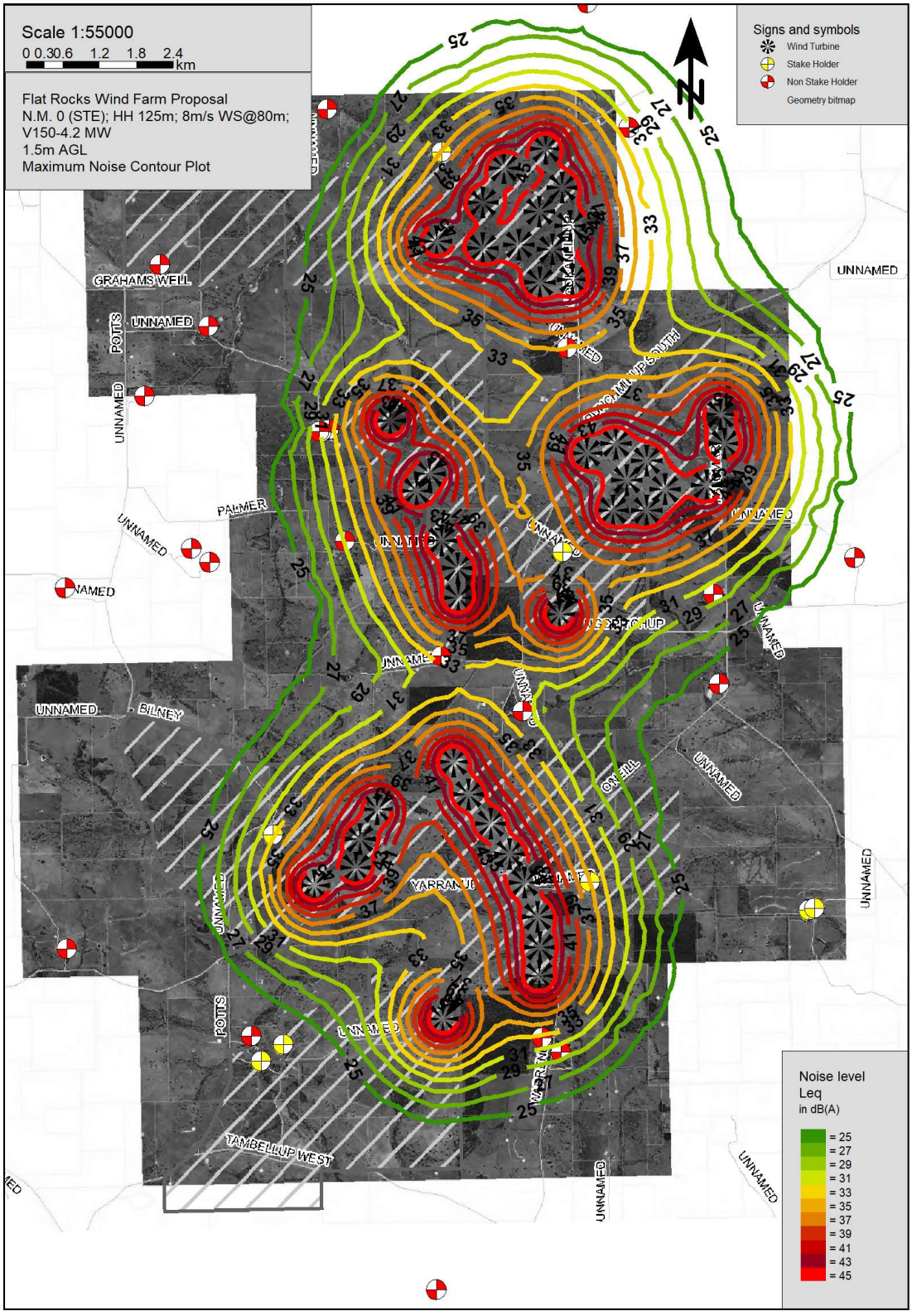
km
Flat Rocks Wind Farm Proposal
N.M. 0 (STE); HH 125m; 7m/s WS@80m;
V150-4.2 MW
1.5m AGL
Maximum Noise Contour Plot
Signs and symbols
Wind Turbine
Stake Holder
Non Stake Holder
Geometry bitmap
N
GRAHAMS WELL
POTTS
UNNAMED
PALMER
BILNEY
TAMBELUP WEST
Noise level
Leq
in dB(A)
= 25
= 27
= 29
= 31
= 33
= 35
= 37
= 39
= 41
= 43
= 45


Scale 1:55000
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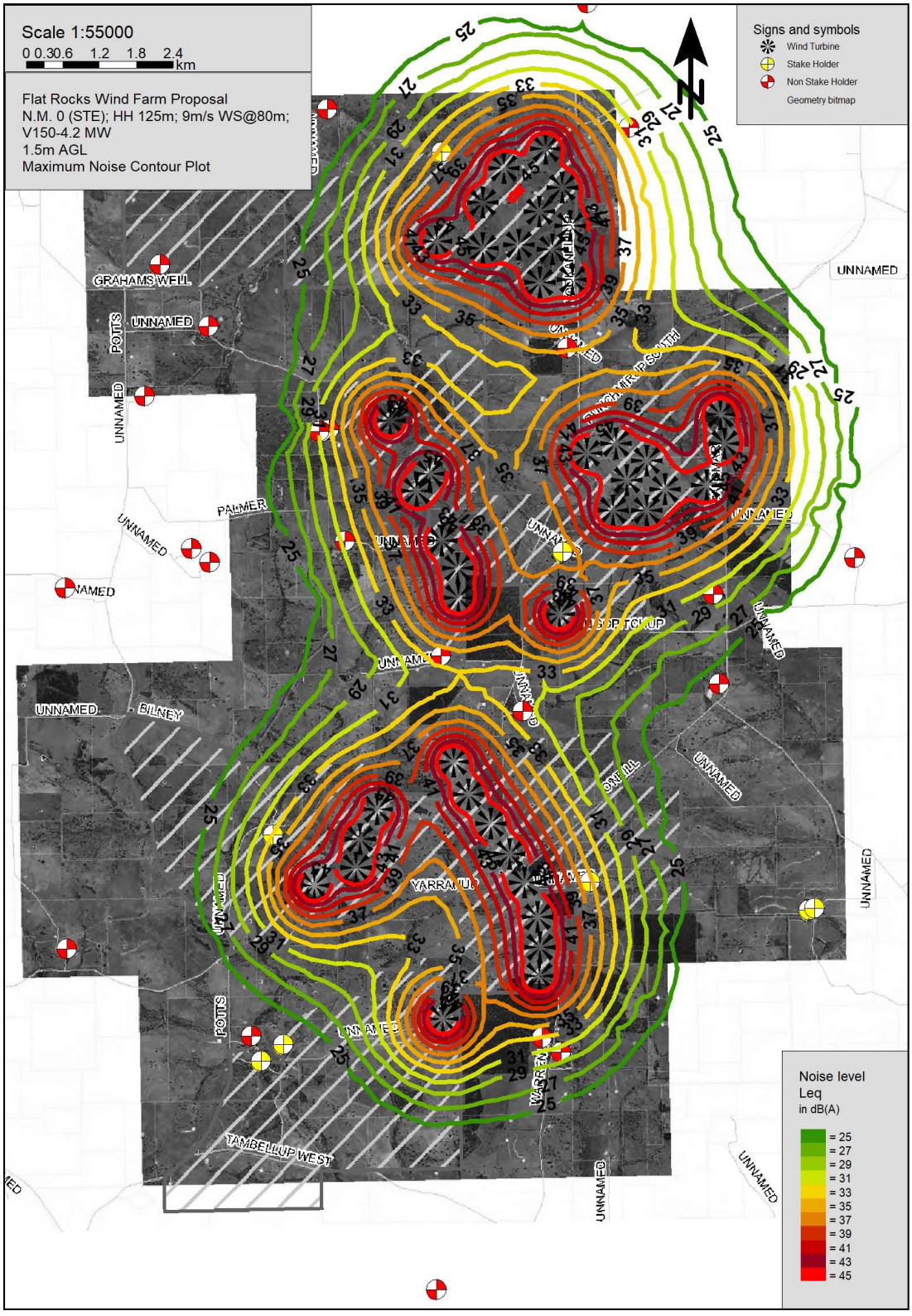
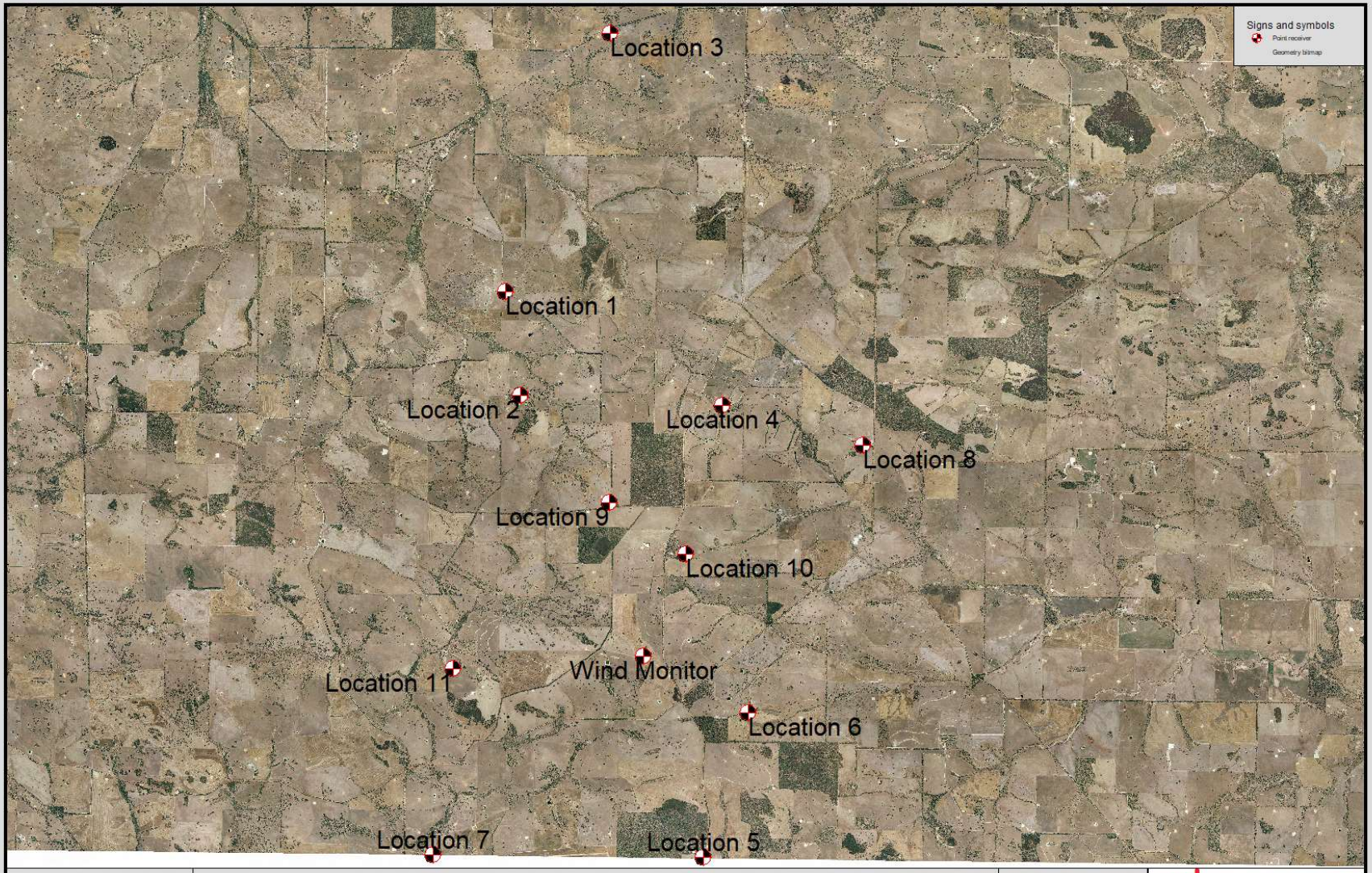
km
Flat Rocks Wind Farm Proposal
N.M. 0 (STE); HH 125m; 8m/s WS@80m;
V150-4.2 MW
1.5m AGL
Maximum Noise Contour Plot
Signs and symbols
Wind Turbine
Stake Holder
Non Stake Holder
Geometry bitmap
N
GRAHAMS WELL
UNNAMED
POTTS
PALMER
BILNEY
YARRANUP
TAMBELUP WEST
Noise level
Leq
in dB(A)
= 25
= 27
= 29
= 31
= 33
= 35
= 37
= 39
= 41
= 43
= 45


Scale 1:55000
0 0.30.6 1.2 1.8 2.4
km
Flat Rocks Wind Farm Proposal
N.M. 0 (STE); HH 125m; 9m/s WS@80m;
V150-4.2 MW
1.5m AGL
Maximum Noise Contour Plot
Signs and symbols
Wind Turbine
Stake Holder
Non Stake Holder
Geometry bitmap
N
GRAHAMS WELL
POTTS
UNNAMED
PALMER
BILNEY
YARRANUP
TAMBELUP WEST
WARREN
Noise level
Leq
in dB(A)
= 25
= 27
= 29
= 31
= 33
= 35
= 37
= 39
= 41
= 43
= 45

APPENDIX D

BACKGROUND MONITORING LOCATIONS



Herring Storer Acoustics Job No. 10226-04	Moonies Hill Energy Flat Rocks Wind Farm Background Noise Monitoring	Appendix C Location Map	HERRING STORER ACOUSTICS