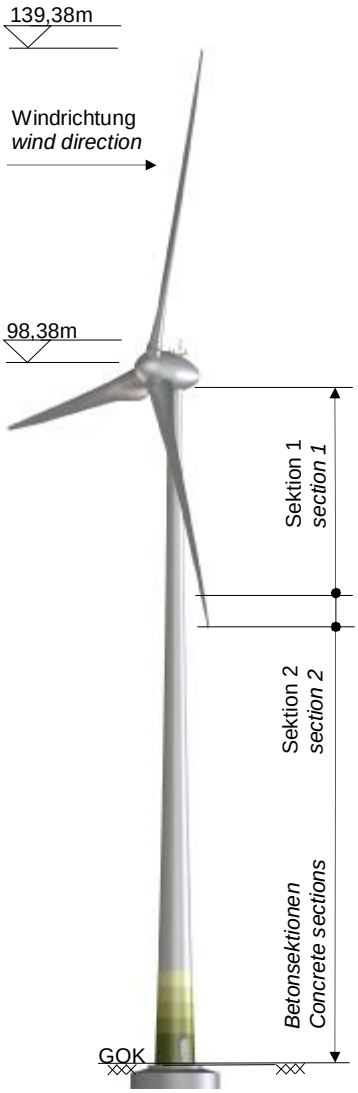
ANNEXE C

Documents techniques concernant l'éolienne Enercon E82

ENERCON ENERGY FOR THE WORLD	Gewichte und Abmessungen *Weights and Dimensions* E-82 E2/BF/97/20/01	Page 1 of 1



Gesamthöhe ab Gelände *Total height from territory*	139,38m
Nabenhöhe ab Gelände *Hub height above ground*	98,38m
Turmlänge ab Fundamentoberkante *Tower height above upper foundation edge*	96,78m
Bauart / *Design*	Stahl / Betonfertigteilturm Steel / precast concrete tower
Windzone WZ (DIBt/DIN1055-4)	WZIII/WZ 4 GK I[1]
WTGS Class (IEC 61400-1)	WTC IIA[1]
Anzahl der Sektionen / *Number of sections*	2 Stahl / steel *18 Beton / concrete*

	Länge *length*	D_{oben} *diamt$_{op}$*	D_{unten} *diam$_{bottom}$*	Gewicht weight
	m	m	m	to
Sektion 1 / *section 1*	24,912	2,190/ 2,422[3]	2,91	ca.39
Sektion 2 / *section 2*	3,00	2,91	3,019	ca. 13
Betonsektionen/ concrete sections	68,868	3,019	6,369	ca.727
Gesamtgewicht Turm / *total weight tower*				ca.779

[1] Typenprüfung vorhanden /*Certification Report available*
[2] Typenprüfung in Arbeit/ *Certification report in process*
[3] Flanschaußendurchmesser / *outside flange diameter*

Document information:			
Author/ date:	DBO /21.08.09		
Department:	WRD	Translator / date:	-
Approved / date:	MKR /21.08.09	Revisor / date:	
Revision / date:	0	Reference:	WRD-K-04-GuA.E82.E2.BF.97.20.01-Rev0_0-ger-eng Arbeit

WIND ENERGY CONVERTER CHARACTERISTICS

E-82 E2 2.3MW

Rotor	
Type	E82 E2
Rotor diameter	82 m
Swept area	5281 m^2
Power regulation	Pitch
RPM	6 –18 min^{-1}
Cut in wind	2,5 m/s
Cut out wind	28 – 34 m/s
Survival wind speed	59,5 m/s

Gear Box	
Not applicable	No gearbox

Blades	
Manufacturer	ENERCON
Blade length	38,8 m
Material	GRP (Epoxy)
Lightning protection	included

Generator	
Manufacturer	ENERCON
Nominal Power	2300 kW
Type (model)	Synchronous, direct-drive ringgenerator
Protection classification	IP 23
Insulation class	F

Yaw System	
Type	6 electrical motors
Yaw control	Active (based on wind vane signal)
Yaw rate	0,5°/sec

Controller	
Manufacturer	ENERCON
Type	microprocessor
Grid connection	Via ENERCON inverter
Remote communication	ENERCON Remote Monitoring System
UPS	included

Braking System	
Aerodynamic brake	- three independent blade pitch systems with emergency supply - rotor brake - rotor lock, locking at 30°

Tower					
Hub heights	78 m	85 m	98 m	108 m	138 m
Tower	Steel (4 + FS)	Steel + Prefab concrete (2 + 15)	Steel + Prefab concrete (2 + 18)	Steel + Prefab concrete (2 + 21)	Steel + Prefab concrete (2 + 21)
Design Wind Class	II	II	II	II	II

Weights	
Nacelle, excl. Rotor and hub	Approx. 18 to
Rotor incl. Hub/Main pin	Approx. 55 to
Generator	Approx. 62 to
Total Weight	**Approx. 135 to**

Sources: Design Assessment, Manufacturers Certificate

WIND ENERGY CONVERTER CHARACTERISTICS

E-82 E2 2MW

Rotor	
Type	E82 E2
Rotor diameter	82 m
Swept area	5281 m^2
Power regulation	Pitch
RPM	6 –18 min^{-1}
Cut in wind	2,5 m/s
Cut out wind	28 – 34 m/s
Survival wind speed	59,5 m/s

Gear Box	
Not applicable	No gearbox

Blades	
Manufacturer	ENERCON
Blade length	38,8 m
Material	GRP (Epoxy)
Lightning protection	included

Generator	
Manufacturer	ENERCON
Nominal Power	2000 kW
Type (model)	Synchronous, direct-drive ringgenerator
Protection classification	IP 23
Insulation class	F

Yaw System	
Type	6 electrical motors
Yaw control	Active (based on wind vane signal)
Yaw rate	0,5°/sec

Controller	
Manufacturer	ENERCON
Type	microprocessor
Grid connection	Via ENERCON inverter
Remote communication	ENERCON Remote Monitoring System
UPS	included

Braking System	
Aerodynamic brake	- three independent blade pitch systems with emergency supply - rotor brake - rotor lock, locking at 30°

Tower					
Hub heights	78 m	85 m	98 m	108 m	138 m
Tower	Steel (4 + FS)	Steel + Prefab concrete (2 + 15)	Steel + Prefab concrete (2 + 18)	Steel + Prefab concrete (2 + 21)	Steel + Prefab concrete (2 + 21)
Design Wind Class	II	II	II	II	II

Weights	
Nacelle, excl. Rotor and hub	Approx. 18 to
Rotor incl. Hub/Main pin	Approx. 55 to
Generator	Approx. 62 to
Total Weight	**Approx. 135 to**

Sources: Design Assessment

Sound Power Level

of the

ENERCON E-82 E2

Operational Mode I

(Data Sheet)

Imprint

Editor: ENERCON GmbH • Dreekamp 5 • 26605 Aurich • Germany

Telephone: 04941-927-0
Fax: 04941-927-109

Revision

Revision: 1.0

Department: ENERCON GmbH / Site Assessment

Glossary

WEC means an ENERCON wind energy converter.

WECs means more than one ENERCON wind energy converter.

Sound Power Level for the E-82 E2 with 2300 kW rated power

in relation to wind speed at 10 m height					
hub height / V_s in 10 m height	78 m	85 m	98 m	108 m	138 m
5 m/s	96,3 dB(A)	96.6 dB(A)	97.2 dB(A)	97.5 dB(A)	98.2 dB(A)
6 m/s	100.7 dB(A)	101.0 dB(A)	101.6 dB(A)	101.9 dB(A)	102.6 dB(A)
7 m/s	103.3 dB(A)	103.5 dB(A)	103.6 dB(A)	103.6 dB(A)	103.8 dB(A)
8 m/s	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)
9 m/s	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)
10 m/s	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)
95% rated power	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)

Measured value at 95% rated power				*103,4 dB(A)* *KCE 209244-03.03*	

in relation to wind speed in hub height									
wind speed at hub height [m/s]	7	8	9	10	11	12	13	14	15
Sound Power Level [dB(A)]	96.6	99.9	102.6	103.5	104.0	104.0	104.0	104.0	104.0

1. The relation between the sound power level and the standardized wind speed in 10 m height as shown above is valid on the premise of a logarithmic wind profile with a roughness length of 0.05 m. The relation between the sound power level and the wind speed at hub height applies for all hub heights. During the sound measurements the wind speeds are derived from the power output and the power curve of the WEC.

2. A tonal audibility of $\Delta L_{a,k} \leq 2$ dB can be expected over the whole operational range (valid in the near vicinity of the turbine according to IEC 61 400 -11 ed. 2).

3. The sound power level values given in the table are valid for the **Operational Mode I** (defined via the rotational speed range of 6 – 18 rpm). The respective power curve is the calculated power curve E-82 E2 dated November 2009 (Rev. 3.x).

4. The values displayed in the tables above are based on official and internal measurements of the sound power level. If available the official measured values are given in this document as a

reference (in italic print). The extracts of the official measurements can be made available upon request. The values given in the measurement extracts do not replace the values given in this document. All measurements have been carried out according to the recommended German and international standards and guidelines as defined in the measurement reports, respectively.

5. Due to the typical measurement uncertainties, if the sound power level is measured according to one of the accepted methods the measured values can differ from the values shown in this document in the range of +/- 1 dB.

   Accepted measurement methods are:

   a) IEC 61400-11 ed. 2 („Wind turbine generator systems – Part 11: Acoustic noise measurement techniques; Second edition, 2002-12"), and

   b) the FGW-Guidelines („Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte", published by the association "Fördergesellschaft für Windenergie e.V.", 18th revision).

   If the difference between total noise and background noise during a measurement is less than 6 dB a higher uncertainty must be considered.

6. For noise-sensitive sites it is possible to operate the E-82 E2 with reduced rotational speed and reduced rated power during night time. The sound power levels resulting from such operational mode can be provided in a separate document upon request.

7. The sound power level of a wind turbine depends on several factors such as but not limited to regular maintenance and day-to-day operation in compliance with the manufacturer's operating instructions. Therefore, this data sheet can not, and is not intended to, constitute an express or implied warranty towards the customer that the E-82 E2 WEC will meet the exact sound power level values as shown in this document at any project specific site.

Sound Power Level

of the

ENERCON E-82 E2

Operational Mode 2000 kW

(Data Sheet)

Imprint

Editor: ENERCON GmbH • Dreekamp 5 • 26605 Aurich • Germany

Telephone: 04941-927-0
Fax: 04941-927-109

Updates: ENERCON GmbH reserves the right to continuously update and modify this document and the items described therein at any time without prior notice.

Revision

Revision: 1.0

Department: ENERCON GmbH / Site Assessment

Glossary

WEC means an ENERCON wind energy converter.

WECs means more than one ENERCON wind energy converter.

Sound Power Level for the E-82 E2 with 2000 kW rated power

in relation to wind speed at 10 m height					
hub height / V_s in 10 m height	78 m	85 m	98 m	108 m	138 m
5 m/s	96,3 dB(A)	96.6 dB(A)	97.2 dB(A)	97.5 dB(A)	98.2 dB(A)
6 m/s	100.7 dB(A)	101.0 dB(A)	101.6 dB(A)	101.9 dB(A)	102.6 dB(A)
7 m/s	103.3 dB(A)	103.5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)
8 m/s	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)
9 m/s	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)
10 m/s	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)
95% rated power	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)	103,5 dB(A)

Measured value at 95% rated power				*102,5 dB(A)* *KCE 209244-03.04*	

in relation to wind speed in hub height									
wind speed at hub height [m/s]	7	8	9	10	11	12	13	14	15
Sound Power Level [dB(A)]	96.6	99.9	102.6	103.5	103.5	103.5	103.5	103.5	103.5

1. The relation between the sound power level and the standardized wind speed in 10 m height as shown above is valid on the premise of a logarithmic wind profile with a roughness length of 0.05 m. The relation between the sound power level and the wind speed at hub height applies for all hub heights. During the sound measurements the wind speeds are derived from the power output and the power curve of the WEC.

2. A tonal audibility of $\Delta L_{a,k} \leq 2$ dB can be expected over the whole operational range (valid in the near vicinity of the turbine according to IEC 61 400 -11 ed. 2).

3. The sound power level values given in the table are valid for the **Operational Mode 2000 kW** (defined via the rotational speed range of 6 – 17,5 rpm). The respective power curve is the calculated power curve E-82 E2 2MW dated November 2009 (Rev. 3.x).

4. The values displayed in the tables above are based on official and internal measurements of the sound power level. If available the official measured values are given in this document as a

reference (in italic print). The extracts of the official measurements can be made available upon request. The values given in the measurement extracts do not replace the values given in this document. All measurements have been carried out according to the recommended German and international standards and guidelines as defined in the measurement reports, respectively.

5. Due to the typical measurement uncertainties, if the sound power level is measured according to one of the accepted methods the measured values can differ from the values shown in this document in the range of +/- 1 dB.

   Accepted measurement methods are:

   a) IEC 61400-11 ed. 2 („Wind turbine generator systems – Part 11: Acoustic noise measurement techniques; Second edition, 2002-12"), and

   b) the FGW-Guidelines („Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte", published by the association "Fördergesellschaft für Windenergie e.V.", 18th revision).

   If the difference between total noise and background noise during a measurement is less than 6 dB a higher uncertainty must be considered.

6. For noise-sensitive sites it is possible to operate the E-82 E2 with reduced rotational speed and reduced rated power during night time. The sound power levels resulting from such operational mode can be provided in a separate document upon request.

7. The sound power level of a wind turbine depends on several factors such as but not limited to regular maintenance and day-to-day operation in compliance with the manufacturer's operating instructions. Therefore, this data sheet can not, and is not intended to, constitute an express or implied warranty towards the customer that the E-82 E2 WEC will meet the exact sound power level values as shown in this document at any project specific site.

KÖTTER CONSULTING ENGINEERS

Summary of Test Report
(Conversion of hub height of 108 m to 98 m) /1/

Basic sheet "Geräusche" (*Noise*), according to the
"Technische Richtlinien für Windenergieanlagen, Teil 1: Bestimmung der Schallemissionswerte"
(Technical Guidelines for Wind Energy Converters, Part 1: Determination of sound emission values)

Rev. 18 of February 1, 2008 (Editor: Fördergesellschaft Windenergie e.V. Stresemannplatz 4, D-24103 Kiel)

Extract of Test Report 209244-04.01 IEC
on noise emission of wind energy converter of type E-82 E2

General Data		Technical Data (manufacturer's specifications)	
Manufacturer of WEC:	Enercon GmbH	Rated power (generator):	2.300 kW
Serial number:	82679	Diameter of rotor:	82 m
Location of WEC (ca.):	26629 Großefehn	Hub height above ground:	98 m ***
Geographic co-ordinates:	GK longitude: 34.15.287	Type of tower:	conical tube tower
	GK latitude: 59.14.701	Power control:	Pitch
Complementary rotor data (manufacturer's specifications)		**Complementary data of gear unit and generator (manufacturer's specifications)**	
Manufacturer of rotor blade:	Enercon	Manufacturer of gear unit:	not applicable
Type of rotor blade:	E-82 E2	Type of gear unit:	not applicable
Blade setting angle:	variable	Manufacturer of generator:	Enercon
Number of rotor blades:	3	Type of generator:	E-82 E2
Rotor speed range:	6 to 18 r.p.m. (mode OM I)	Generator speed range:	6 to 18 r.p.m. (mode OM I)

Calculated Performance Chart ENERCON E-82 E2; calculated by ENERCON (Rev. 3.0)

	Reference Point		Noise emission parameters	Observations
	standardized wind speed in 10 m height	true electrical power		
sound power level $L_{WA,P}$	5 ms^{-1}	553 kW	96.0 dB(A)	(*)
	6 ms^{-1}	1,049 kW	100.4 dB(A)	
	7 ms^{-1}	1,567 kW	102.4 dB(A)	
	8 ms^{-1}	2,001 kW	103.2 dB(A)	
	9 ms^{-1}	2,235 kW	103.4 dB(A)	
	10 ms^{-1}	2,300 kW	103.0 dB(A)	
tonal audibility $\Delta L_{a,k}$	5 ms^{-1}	kW	- 2.7 dB	
	6 ms^{-1}	kW	<- 3.0 dB	
	7 ms^{-1}	kW	- 1.8 dB	
	8 ms^{-1}	kW	- 0.7 dB	
	9 ms^{-1}	kW	0.2 dB	
	10 ms^{-1}	kW	- 0.4 dB	
impulse adjustment for small distances K_{IN}	5 ms^{-1}	kW	0 dB	
	6 ms^{-1}	kW	0 dB	
	7 ms^{-1}	kW	0 dB	
	8 ms^{-1}	kW	0 dB	
	9 ms^{-1}	kW	0 dB	
	10 ms^{-1}	kW	0 dB	

Third-octave band sound power level for v_s = 5 ms^{-1} in dB(A)

Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	73.7	76.1*	79.6	85.2	81.8	81.3	81.5	83.3	85.2	84.7	85.1	87.2
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	86.5	85.8	84.4	82.0	78.4	74.9	70.2	65.1	59.9*	59.9*	62.6	69.9

Octave band sound power level for v_s = 5 ms^{-1} in dB(A)

Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	81.9	87.9	88.4	90.6	90.4	84.1	71.7	71.0

Third-octave band sound power level for v_s = 6 ms^{-1} in dB(A)

Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	78.0**	78.9*	82.0	85.0	87.2	84.1	84.8	87.1	88.5	88.3*	89.3*	93.0
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	91.5	91.3	89.7	86.9	82.8	79.2	74.2	68.8	63.3	64.2	67.2	74.1

Octave band sound power level	for v_s = 6 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	84.7*	90.4	91.8	95.5	95.7	88.8	75.6	75.2

Third-octave band sound power level	for v_s = 7 ms^{-1} in dB(A)											
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	78.5**	79.7	82.6	84.7	90.7	86.1	85.9	89.6	90.9	92.4	91.6	93.8
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	93.3	93.2	91.7	89.1	85.7	81.8	76.9	72.1	66.0	65.2	66.7	72.7

Octave band sound power level	for v_s = 7 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	85.4*	92.7	94.1	97.5	97.6	91.3	78.4	74.3

Third-octave band sound power level	for v_s = 8 ms^{-1} in dB(A)											
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	77.4*	80.4	83.1	84.9	91.2	86.6	86.3	90.4	91.4	92.9	92.1*	94.8
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	94.2	94.1	92.6	90.1	86.7	82.7	77.8	73.3	67.7	65.8	66.6	71.4

Octave band sound power level	for v_s = 8 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	85.6	93.2	94.6	98.2	98.5	92.2	79.4	73.4

Third-octave band sound power level	for v_s = 9 ms^{-1} in dB(A)											
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	78.6	81.5	84.0	85.8	92.7	88.3	86.5	90.3	90.8	91.9	91.6*	94.0
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	94.1	94.5	93.5	91.6	88.5	84.7	80.0	75.5	69.4	65.6*	66.5	71.6

Octave band sound power level	for v_s = 9 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	86.7	94.7	94.4	97.4*	98.8	93.9	81.6	73.5

Third-octave band sound power level	for v_s = 10 ms^{-1} in dB(A)											
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	78.9	81.8	84.6	86.4	92.5	88.6	86.5	89.9	90.1*	91.3	91.0*	92.8*
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	93.4	94.0	93.4	91.6	88.9	85.3	80.8	76.6	72.0	70.5	68.6	71.9

Octave band sound power level	for v_s = 10 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	87.1	94.7	93.8	96.6*	98.4	94.1	82.6	75.3

This summary of the test report is valid only in combination with the certification of the manufacturer of 03/05/2010.

These specifications do not replace the test report mentioned above (particularly for noise immission predictions).

Observations: * Difference between working and background noise < 6 dB, correction by 1.3 dB

** Difference between working and background noise < 3 dB, values shall not be presented

*** Conversion of hub height of 108 m to 98 m

/1/ Wind turbine generator systems – Part 11: Acoustic noise; measurement techniques (IEC 61400-11:2002 and A1:2006); German version DIN EN 61400-11:2007

Measured by: KÖTTER Consulting Engineers
- Rheine -

Date: 08/02/2010 i. V. Dipl.-Ing. O. Bunk i. A. Dipl.-Ing. J. Weinheimer

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KÖTTER CONSULTING ENGINEERS

Summary of Test Report
(Conversion of hub height of 108 m to 98 m) /1/

Basic sheet "Geräusche" (*Noise*), according to the
"Technische Richtlinien für Windenergieanlagen, Teil 1: Bestimmung der Schallemissionswerte"
(Technical Guidelines for Wind Energy Converters, Part 1: Determination of sound emission values)

Rev. 18 of February 1, 2008 (Editor: Fördergesellschaft Windenergie e.V. Stresemannplatz 4, D-24103 Kiel)

Extract of Test Report 209244-04.02 IEC
on noise emission of wind energy converter of type E-82 E2

General Data		Technical Data (manufacturer's specifications)	
Manufacturer of WEC:	Enercon GmbH	Rated power (generator):	2.000 kW (reduced)
Serial number:	82679	Diameter of rotor:	82 m
Location of WEC (ca.):	26629 Großefehn	Hub height above ground:	98 m ***
Geographic co-ordinates:	GK longitude: 34.15.287	Type of tower:	conical tube tower
	GK latitude: 59.14.701	Power control:	Pitch

Complementary rotor data (manufacturer's specifications)		Complementary data of gear unit and generator (manufacturer's specifications)	
Manufacturer of rotor blade:	Enercon	Manufacturer of gear unit:	not applicable
Type of rotor blade:	E-82 E2	Type of gear unit:	not applicable
Blade setting angle:	variable	Manufacturer of generator:	Enercon
Number of rotor blades:	3	Type of generator:	E-82 E2
Rotor speed range:	6 to 18 r.p.m. (mode OM I)	Generator speed range:	6 to 18 r.p.m. (mode OM I)

Calculated Performance Chart ENERCON E-82 E2; 2,000 kW; calculated by ENERCON (Rev. 3.0)

	Reference Point		Noise emission parameters	Observations
	standardized wind speed in 10 m height	true electrical power		
sound power level $L_{WA,P}$	5 ms^{-1}	563 kW	--	(1)
	6 ms^{-1}	1,038 kW	100.0 dB(A)	
	7 ms^{-1}	1,561 kW	101.8 dB(A)	
	8 ms^{-1}	1,904 kW	102.5 dB(A)	
	9 ms^{-1}	2,000 kW	102.5 dB(A)	
	10 ms^{-1}	2,000 kW	102.0 dB(A)	
tonal audibility $\Delta L_{a,k}$	5 ms^{-1}	563 kW	--	(1)
	6 ms^{-1}	1,038 kW	< - 3.0 dB	
	7 ms^{-1}	1,561 kW	- 2.8 dB	
	8 ms^{-1}	1,904 kW	- 2.8 dB	
	9 ms^{-1}	2,000 kW	0.0 dB	
	10 ms^{-1}	2,000 kW	- 0.2 dB	
impulse adjustment for small distances K_{IN}	5 ms^{-1}	563 kW	--	(1)
	6 ms^{-1}	1,038 kW	0 dB	
	7 ms^{-1}	1,561 kW	0 dB	
	8 ms^{-1}	1,904 kW	0 dB	
	9 ms^{-1}	2,000 kW	0 dB	
	10 ms^{-1}	2,000 kW	0 dB	

Third-octave band sound power level for v_s = 5 ms^{-1} in dB(A)

Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	--	--	--	--	--	--	--	--	--	--	--	--
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	--	--	--	--	--	--	--	--	--	--	--	--

Octave band sound power level for v_s = 5 ms^{-1} in dB(A)

Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	--	--	--	--	--	--	--	--

Third-octave band sound power level for v_s = 6 ms^{-1} in dB(A)

Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	78.6**	80.1	82.9	85.3	87.7	84.6	85.3	87.4	88.5	87.9*	88.6*	91.4
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	90.9	90.5	89.3	86.8	82.9	79.1	74.2	69.4	64.4	63.5	66.6	74.9

Octave band sound power level	for v_s = 6 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	85.7*	90.9	92.0	94.4	95.1	88.8	75.8	75.8

Third-octave band sound power level	for v_s = 7 ms^{-1} in dB(A)											
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	79.8**	80.3	82.8	84.9	89.6	85.1*	85.5*	89.1	89.9*	90.5*	90.8*	93.3
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	92.8	92.5	91.6	89.2	85.8	81.4	76.4	71.6	66.0	66.2	69.6	75.9

Octave band sound power level	for v_s = 7 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	85.9*	91.9	93.3	96.5	97.1	91.3	78.0	77.2

Third-octave band sound power level	for v_s = 8 ms^{-1} in dB(A)											
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	78.0	79.9	82.7	84.7	90.4	86.7	86.4	90.2	91.1	92.2	91.5*	93.7
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	93.2	93.0	92.0	90.0	87.0	82.7	77.9	73.7	67.9	65.6	67.1	72.0

Octave band sound power level	for v_s = 8 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	85.4	92.7	94.4	97.3	97.5	92.3	79.6	73.9

Third-octave band sound power level	for v_s = 9 ms^{-1} in dB(A)											
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	78.3	79.9	82.7	84.8	91.6	86.6	86.1	89.8	90.5	91.9	91.5*	93.2
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	93.1	93.1	92.1	89.9	87.1	83.2	78.5	74.5	68.8	66.0	66.7	71.5

Octave band sound power level	for v_s = 9 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	85.4	93.4	93.9	97.0	97.5	92.3	80.3	73.6

Third-octave band sound power level	for v_s = 10 ms^{-1} in dB(A)											
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
$L_{WA,P}$	77.8	79.6	82.5	84.4	91.4	86.4	85.1*	88.9	89.0*	90.3*	90.5*	92.4*
Frequency	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
$L_{WA,P}$	92.3	92.8	92.5	90.7	88.3	84.6	80.1	76.0	70.5	67.7	67.2	71.5

Octave band sound power level	for v_s = 10 ms^{-1} in dB(A)							
Frequency	63	125	250	500	1,000	2,000	4,000	8,000
$L_{WA,P}$	85.2	93.2	92.8*	95.9*	97.3	93.3	81.9	74.0

This summary of the test report is valid only in combination with the certification of the manufacturer of 03/05/2010.

These specifications do not replace the test report mentioned above (particularly for noise immission predictions).

Observations:
(1) No values available due to meteorological conditions
* Difference between working and background noise < 6 dB, correction by 1.3 dB
** Difference between working and background noise < 3 dB, values shall not be presented
*** Conversion of hub height of 108 m to 98 m

/1/ Wind turbine generator systems – Part 11: Acoustic noise; measurement techniques (IEC 61400-11:2002 and A1:2006); German version DIN EN 61400-11:2007

Measured by: KÖTTER Consulting Engineers
- Rheine -

Date: 8/06/2010

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