Design

1 MAIN DATAS

1.1 ENERCON E-66 / 18.70 technical data

The E-66 / 18.70 is a wind energy converter with variable speed and active blade tilt via pitch drives. The generator is connected directly to the hub.

1.1.1 Design

Design to GL Wind class II (Germanischer Lloyd "Richtlinie für die Zertifizierung von Windkraftanlagen, issue March 1998“ [Guidelines for the certification of wind energy turbines]).

1.1.2 Operational data

Nominal output:	1,800 kW*
Output (10 m/s):	approx. 870 kW
Cut-in wind speed:	2.0 m/s
Cut-out wind speed:	25 m/s
Mean wind speed for the specification:	8.5 m/s
Rated wind speed:	12.5 m/s

1.1.3 Generator with drive train

Generator:	ENERCON ring generator (synchronous), directly flanged to the hub
Speed:	variable; 8 –22.5 r/min
Bearing:	1 cylinder roller bearing / 1 two-series tapered roller bearing
Hub:	solid

1.1.4 Rotor

Rotor diameter:	70 m
Rotor area:	3,848 m²
Blade length:	32.8 m
No. of blades:	3
Profiling:	ENERCON
Rotorblade weight:	approx. 4.0 t
Blade material:	GRP / epoxy resin
Speed:	variable; 8 –22.5 r/min
Blade tip speed:	29 m/s – 82.5 m/s

Braking systems:	three self-sufficient blade tilt systems
Direction of rotation:	clockwise
Orientation:	windward

*power reduction possible

1.1.5 Additional converter features

Yaw Control:	active via adjustment gear, damping via friction bearing
Grid power feed:	ENERCON inverters with high clock speed and sinusoidal current.
Braking systems:	- three self-sufficient blade tilt systems with emergency power supply - Rotor stop brake - Rotor lock, 15° latching

1.1.6 Dimensions / weights

Mass, total nacelle:	approx. 100.5 t			
Mass, nacelle:	approx. 19.3 t (without rotor, generator)			
Mass, generator complete:	approx. 50.6 t			
Mass, hub with blades:	approx. 38.8 t			
Tower height:	59 m	63 m	84 m	97 m
Hub height:	60 m	65 m	85 m	98 m
Tower mass:	105 t	134 t	214 t	876 t

1.2 Availability of existing E-66

1.2.1 Availability 2000

The following data show the availability of all ENERCON E-66s connected to the Scada-System.

Month	Number of turbines for evaluation	Availability *
January	265	97.5 %
February	256	97.7 %
March	264	98.0 %
April	268	98.6 %
May	296	98.1 %
June	301	98.4 %
July	306	98.3 %
August	310	97.6 %
September	321	97.8 %
Oktober	324	97.7 %
November	328	98.1 %
December	328	98.2 %

*** maintenance calculated as if not available**

1.2.2 Availability E-66 in 2001

Month	E-66/1500kW	Availbility*	E-66/1800kW	Availability *
January	356	98,12 %	111	97,09 %
February	359	98,40 %	132	97,32 %
March	362	98,55 %	149	97,88 %
April	366	98,53 %	171	98,06 %
May	371	98,26 %	198	97,25 %
June	371	98,38 %	221	97,52 %
July	375	97,97 %	247	97,74 %
August	375	97,85 %	275	97,50 %
September	375	98,21 %	309	97,73 %
Oktober	375	98,42 %	340	97,74 %
November	375	98,10 %	362	97,92 %
December	375	98,16 %	375	98,24 %

*** maintenance calculated as if not available**

1.2.3 Availability E-66 in 2002

Month	E-66/1500kW	Availbility*	E-66/1800kW	Availability *
January	375	97.85 %	445	96.69 %
February	375	98.10 %	465	97.19 %
March	375	98.42 %	510	97.99 %
April	375	98.41 %	542	97.83 %
May	375	98.34 %	570	98.27 %
June	375	97.81 %	598	97.81 %
July	375	97.55 %	637	98.30 %
August	375	97.43 %	668	98.36 %
September	375	97.60 %	692	98.45 %
Oktober	375	96.57 %	709	98.44 %
November	375	97.09 %	725	98.67 %
December	375	98.27 %	738	98.70 %

*** maintenance calculated as if not available**

2 POWER CURVE

Please refer to section "Power Curve".

3 SOUND EMISSIONS

WEC:	ENERCON E-66/18.70 with hub heights of 65, 85 and 98 m	
Windspeed:	8 m/s at 10 m height	10m/s at 10m height
Sound power at hub height of 65 m:	100.5 dB(A)	102.7dB(A)
Sound power at hub height of 85 m:	100.8 dB(A)	102.7 dB(A)
Sound power at hub height of 98 m:	101.0 dB(A)	102.7 dB(A)

Please refer also to section "Sound Power Level".

4 MAIN CERTIFICATES

Please refer also to section "Certificates"

a) Wind Turbine Design Assessment

"Statement of Compliance for the Design Assessment of Wind Energy Conversion System", wind energy converter 00-005A-2000 **E-66/18.70**

Certified by	Germanischer Lloyd
Date of certification	31/03/2000

b) Sound level

Scope of the certificate	Sound power level E-66/18.70
Certification body	Windtest Kaiser-Wilhelm-Koog GmbH
Certification code	measurement report WT1809/01, dated 2001.01.05
Scope of the certificate	Sound power level E-66/18.70
Certification body	Kötter Consulting Engineers
Certification code	measurement report 25597-1.001, dated 20.07.2001

c) Grid compatibility

Scope of the certificate	measurement of the electrical characteristics with regard to utility interconnection of the E-66/18.70
Certification body	WINDTEST, Kaiser-Wilhelm-Koog GmbH
Certification code	Report no.: WT 2009/00, dated 12.05.2001

d) Power Curve

Scope of the certificate	power performance of the E-66/18.70
Certification body	DEWI (Deutsches Windenergie Institut)
Certification code	report: PV 0002-05-16, 12.09.2001

e) Quality

Scope of the certificate	Quality Assurance System ENERCON
Standard	ISO 9001 (rev. 08/1994)
Certification body	Germanischer Lloyd Certification GmbH
Certification code	QS-202 HH, dated 18.10.2002 (valid until 13th of November 2004)