

W9x						
Power, cp & ct curves W100 (EU100)						
Doc. No.	Power, cp & ct curves W100 (EU100)					
Dok. Nr.						
Date	12.8.2005	Rev.	1			
Datum		Überarbtg.				

General:

This document contains **power and thrust specific data** for the WTG configuration:

W100 EU100

Additional information:

The power data presented in this document are based on simulation data. That is, the power data are calculated using model information of the WTG. Thus, the presented data are best-knowledge predictions. They can not replace power performance testing. Moreover, the predictions are based on a set of calculation conditions (see page "Calculation conditions"). These conditions emulate the required test site conditions for power performance testing according to IEC 61400-12. The conditions in which the physical WTG is placed may differ from the calculation conditions.

References:

/1/ W0402-G01-TEDE-304-W2E-006-4-E; General Description W100

/2/ W0402-G01-DASH-304-W2E-005-1-E; Technical Data W100

W9x						
Power, cp & ct curves W100 (EU100)						
Doc. No.	Power, cp & ct curves W100 (EU100)					
Dok. Nr.						
Date	12.8.2005	Rev.	1			
Datum		Überarbtg.				

Calculation / prediction conditions

1. Wind turbine generator system

1.1 Rotor diameter	100	m
1.2 Rotor blade	EU100	
1.3 Nominal rotor speed	14.45	rpm
1.4 Controller	W2EC 1.0_1.0.3	
1.5 Losses	acc. to: W0402-N06-TENO-304-W2E-001-1-E	

2. Atmosphere

2.1 Air density	1.225	kg/m3
-----------------	-------	-------

3. Simulation site

3.1 Topographical variations	-5	deg (slope)
3.2 Turbulence intensity	10	% (constant vs. wind speed)
3.3 Wind gradient	0.16	-

4. Simulation procedure

4.1 Wind simulation	4 x 600s	(each wind simulation based on different seed)
	2 x 600s	(each wind simulation based on different seed)
4.2 Simulation intervall	4 - 14 m/s - power	(1 m/s bins)
	4 - 25 m/s - thrust	(1 m/s bins)

5. Derived results

5.1. Determination of the calculated power curve: IEC 61400-12 p.17, eq. (6) (7)

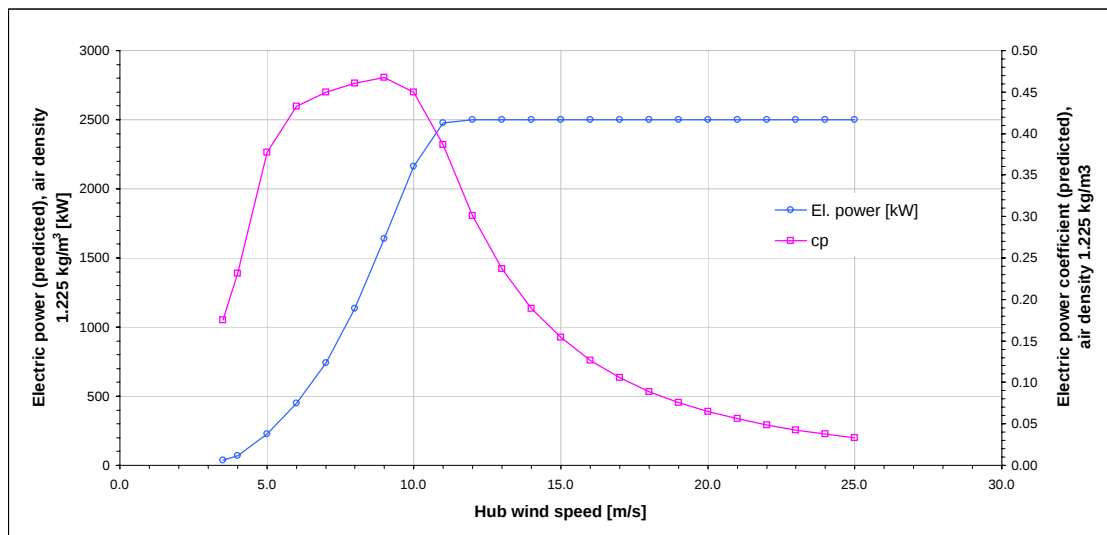
6. Simulation tool Flex5

W9x					
Power, cp & ct curves W100 (EU100)					
Doc. No.	Power, cp & ct curves W100 (EU100)				
Dok. Nr.					
Date	12.8.2005	Rev.	1		
Datum		Überarbtg.			



Power curve & Power coefficient W100 EU100
calculation utilizing Flex5 W2EC 1.0_1.0.3

v_{wind} [m/s]	El. power [kW]	cp
3.5	36.2	0.176
4.0	71.3	0.232
5.0	226.8	0.377
6.0	449.9	0.433
7.0	742.1	0.450
8.0	1133.8	0.460
9.0	1641.0	0.468
10.0	2162.3	0.449
11.0	2477.0	0.387
12.0	2500.0	0.301
13.0	2500.0	0.237
14.0	2500.0	0.189
15.0	2500.0	0.154
16.0	2500.0	0.127
17.0	2500.0	0.106
18.0	2500.0	0.089
19.0	2500.0	0.076
20.0	2500.0	0.065
21.0	2500.0	0.056
22.0	2500.0	0.049
23.0	2500.0	0.043
24.0	2500.0	0.038
25.0	2500.0	0.033

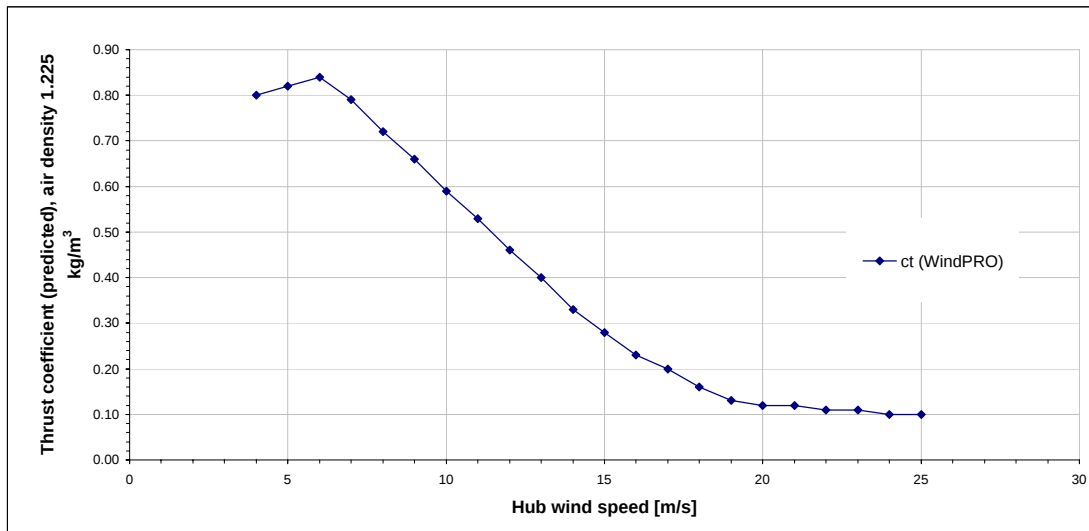


W9x					
Power, cp & ct curves W100 (EU100)					
Doc. No.	Power, cp & ct curves W100 (EU100)				
Dok. Nr.					
Date	12.8.2005	Rev.	1		
Datum		Überarbtg.			



Thrust coefficient W100 EU100, Standard WindPRC

v_{wind} [m/s]	ct (WindPRO)
4	0.800
5	0.820
6	0.840
7	0.790
8	0.720
9	0.660
10	0.590
11	0.530
12	0.460
13	0.400
14	0.330
15	0.280
16	0.230
17	0.200
18	0.160
19	0.130
20	0.120
21	0.120
22	0.110
23	0.110
24	0.100
25	0.100



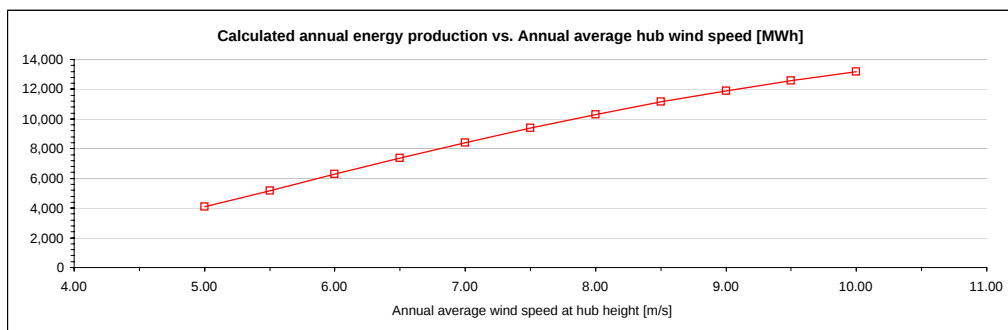
W9x							
Power, cp & ct curves W100 (EU100)							
Doc. No.	Power, cp & ct curves W100 (EU100)						
Dok. Nr.							
Date	12.8.2005	Rev.	1				
Datum		Überarbgt.					

Annual energy production (AEP) (IEC 61400-12, 1998)

Table 1: AEP at selected annual average wind speeds at hub height

Hub wind speed	Calculated annual energy production *	Specific energy production
[m/s]	[MWh]	[kWh/m ² /yr]
5.00	4,080	520
5.50	5,170	658
6.00	6,277	799
6.50	7,365	938
7.00	8,409	1,071
7.50	9,393	1,196
8.00	10,307	1,312
8.50	11,144	1,419
9.00	11,900	1,515
9.50	12,573	1,601
10.00	13,162	1,676

* Standard conditions according to IEC 61400-12



EEG-Referenzertrag

Tabelle 2: Berechneter jährlicher Jahresenergieertrag auf Basis des EEG-Referenzerstandorts ** (Referenzertrag / 5)

Nabenhöhe	Referenzertrag / 5
[m]	[MWh]
60.00	6615
65.00	6785
70.00	6941
75.00	7085
80.00	7220
85.00	7345
90.00	7463
95.00	7574
100.00	7679
105.00	7779
117.00	7997
141.00	8368
160.00	8615

** EEG-Referenzstandort: 5.5m/s Jahresmittel in 30m, 1.225 kg/m³ Luftdichte, 0.1 m Rauigkeitslänge, Rayleigh-Verteilung (k=2)

