

## WINCON 99 21.0 !O!

File C:\Users\NEWM\Documents\WindPRO Data\WTG Data\WINCON 99 21.0 !O!.wtg

Company WINCON  
 Type/Version  
 Rated power 99,0 kW  
 Secondary generator 0,0 kW  
 Rotor diameter 21,0 m  
 Tower Tubular  
 Grid connection 50 Hz  
 Origin country DK  
 Blade type MAT  
 Generator type One generator  
 Rpm, rated power 0,0 rpm  
 Rpm, initial 0,0 rpm  
 Hub height(s) 22,0; 27,0 m  
 Maximum blade width 0,00 m  
 Blade width for 90% radius 0,00 m  
 Valid No  
 Creator EMD  
 Created 15.02.1997 00:00  
 Edited 15.02.1997 00:00



**Power curve:** Fab pba. m#llinger 1.225 25.00 0.00  
 Source Fab pba. m#llinger

Source date	Creator	Created	Edited	Default	Stop windSpeed [m/s]	Air density [kg/m3]	Tip angle [°]	Power control	CT curve type
30.12.1899 00:00	EMD	12.09.1991 00:00	15.11.2000 14:20	No	25,0	1,225	0,0	Stall	Standard stall

### Power curve

Wind speed [m/s]	3,90	4,50	5,00	5,50	6,00	6,50	7,00	7,50	8,00	9,00	10,00	11,00	12,00	12,50	13,00
Power [kW]	0,00	2,10	6,60	12,30	17,70	23,70	30,30	36,60	43,20	57,30	70,20	82,50	92,90	97,00	100,30
Ce	0,000	0,109	0,249	0,348	0,386	0,407	0,416	0,409	0,398	0,371	0,331	0,292	0,253	0,234	0,215

Wind speed [m/s]	13,50	14,00	14,50	15,00	15,50	16,00	18,00
Power [kW]	103,30	105,40	107,30	108,60	109,80	110,50	111,00
Ce	0,198	0,181	0,166	0,152	0,139	0,127	0,090

### Ct curve

Wind speed [m/s]	1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00	9,00	10,00	11,00	12,00	13,00	14,00	15,00	16,00	17,00	18,00	19,00	20,00	21,00	22,00	23,00	24,00	25,00	26,00	27,00	28,00	29,00
Ct	0,10	0,10	0,10	0,80	0,82	0,85	0,82	0,78	0,74	0,68	0,62	0,55	0,49	0,43	0,38	0,32	0,28	0,25	0,21	0,20	0,19	0,17	0,16	0,15	0,14	0,13	0,12	0,11	0,10

### HP curve comparison

Vmean [m/s]	5	6	7	8	9	10
HP value [MWh]	146	221	304	377	425	490
Fab pba. m#llinger 1.225 25.00 0.00 [MWh]	141	224	307	386	456	514
<b>Check value [%]</b>	<b>3</b>	<b>-1</b>	<b>-1</b>	<b>-2</b>	<b>-7</b>	<b>-5</b>

The table shows comparison between annual energy production calculated on basis of simplified "HP-curves" which assume that all WTGs performs quite similar - only specific power loading (kW/m<sup>2</sup>) and single/dual speed or stall/pitch decides the calculated values. Productions are without wake losses. For further details, ask at the Danish Energy Agency for project report J.nr. 51171/00-0016 or see WindPRO manual chapter 3.5.2. The method is refined in EMD report "20 Detailed Case Studies comparing Project Design Calculations and actual Energy Productions for Wind Energy Projects worldwide", jan 2003. Use the table to evaluate if the given power curve is reasonable - if the check value are lower than -5%, the power curve probably is too optimistic due to uncertainty in power curve measurement.

