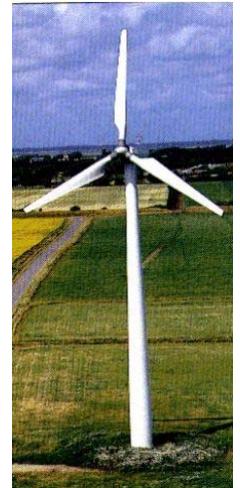


WINCON 200 24.0 !O!

File C:\Users\Newm\Documents\WindPRO Data\WTG Data\WINCON 200 24.0 !O!.wtg

Company WINCON
 Type/Version
 Rated power 200,0 kW
 Secondary generator 0,0 kW
 Rotor diameter 24,0 m
 Tower Tubular
 Grid connection 50 Hz
 Origin country DK
 Blade type LM 11
 Generator type One generator
 Rpm, rated power 0,0 rpm
 Rpm, initial 0,0 rpm
 Hub height(s) 27,0; 28,7 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#ling 1.225 25.00 0.00
 Source Fab pba. m#ling

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	13.09.1991 00:00	15.11.2000 14:21	No	25,0	1,225	0,0	Stall	Standard stall

Power curve

Wind speed [m/s]	3,83	4,00	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
Power [kW]	0,00	1,10	4,30	9,60	17,30	23,60	31,50	41,30	52,00	63,80	88,50	115,70	143,00	168,10	179,10
Ce	0,000	0,062	0,170	0,277	0,375	0,394	0,414	0,435	0,445	0,450	0,438	0,418	0,388	0,351	0,331

Wind speed [m/s]	13,00	13,50	14,00	14,50	15,00	15,50	16,00	18,00	20,00	22,00
Power [kW]	189,60	199,30	207,10	212,80	209,20	206,30	205,20	178,00	172,20	171,00
Ce	0,311	0,292	0,272	0,252	0,224	0,200	0,181	0,110	0,078	0,058

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

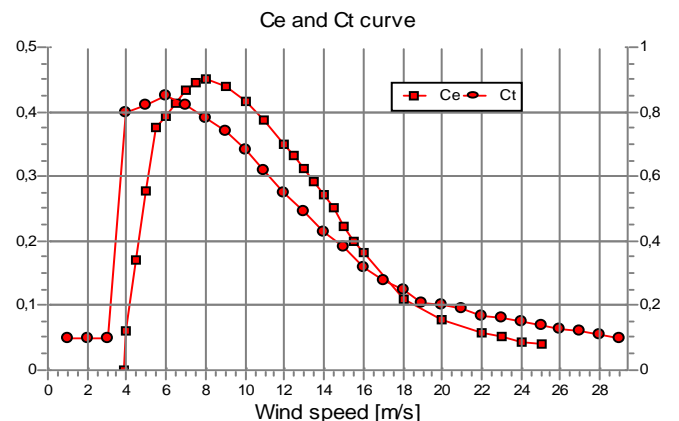
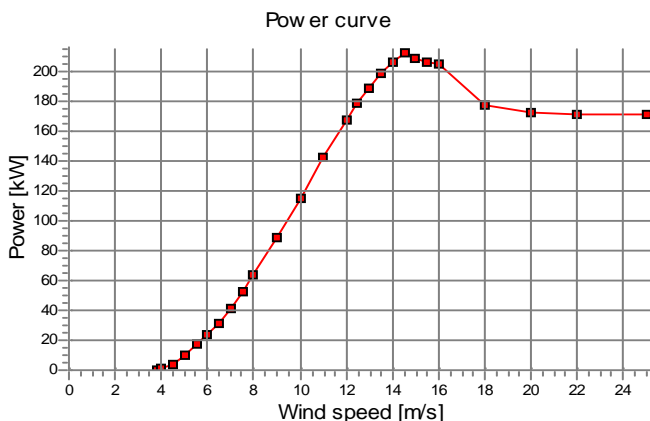
HP curve comparison

Vmean [m/s]	5	6	7	8	9	10
HP value [MWh]	208	342	486	623	748	859

Fab pba. m#ling 1.225 25.00 0.00 [MWh]	216	358	508	650	776	880
Check value [%]	-4	-4	-4	-4	-4	-2

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/m²) 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.



WINCON 200 24.0 !O!

File C:\Users\Newm\Documents\WindPRO Data\WTG Data\WINCON 200 24.0 !O!.wtg

Noise:

Source Abrahamsen & Nielsen

Source date	Creator	Created	Edited	Default
19.06.1992 00:00	User	19.03.1993 00:00	19.03.1993 00:00	No

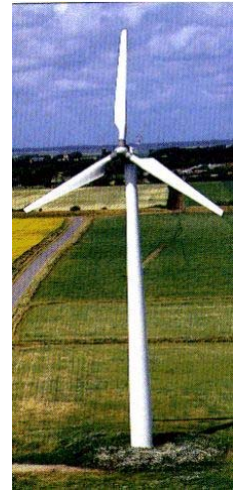
Hub height [m]	Wind speed [m/s]	Lwa,ref [dB(A)]	Wind speed dependency [dB(A)/m/s]	Pure tones	Octave data								
					63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]	A weighted
All	8,0	99,6		1,0 No	105,7	103,5	97,8	97,2	95,1	90,4	84,7	79,9	No

(Memo)

WINCON 200 25.4 !O!

File C:\Users\Newm\Documents\WindPRO Data\WTG Data\WINCON 200 25.4 !O!.wtg

Company	WINCON
Type/Version	
Rated power	200,0 kW
Secondary generator	0,0 kW
Rotor diameter	25,4 m
Tower	Tubular
Grid connection	50 Hz
Origin country	DK
Blade type	LM 12
Generator type	One generator
Rpm, rated power	39,5 rpm
Rpm, initial	0,0 rpm
Hub height(s)	30,0; 0,0 m
Maximum blade width	0,00 m
Blade width for 90% radius	0,00 m
Valid	No
Creator	EMD
Created	07.07.1996 00:00
Edited	07.07.1996 00:00



Power curve: Tripod 5/92 - 10/92 1.225 25.00 0.00

Source Tripod 5/92 - 10/92

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	20.01.1994 00:00	15.11.2000 14:21	No	25,0	1,225	0,0	Stall	Standard stall

Power curve

Wind speed [m/s]	4,75	5,02	5,51	6,02	6,51	6,97	7,50	7,99	8,48	9,00	9,48	10,00	10,49	11,01	11,46
Power [kW]	0,00	2,11	9,28	18,31	29,65	40,25	54,08	67,52	81,35	96,39	109,46	124,90	138,14	151,71	163,48
Ce	0,000	0,054	0,179	0,270	0,346	0,383	0,413	0,427	0,430	0,426	0,414	0,402	0,386	0,366	0,350

Wind speed [m/s]	11,97	12,52	12,92	13,45	14,04	14,31	15,50	16,47	17,49	18,44
Power [kW]	175,20	183,33	192,38	193,50	203,56	201,88	204,62	197,06	200,10	184,49
Ce	0,329	0,301	0,287	0,256	0,237	0,222	0,177	0,142	0,121	0,095

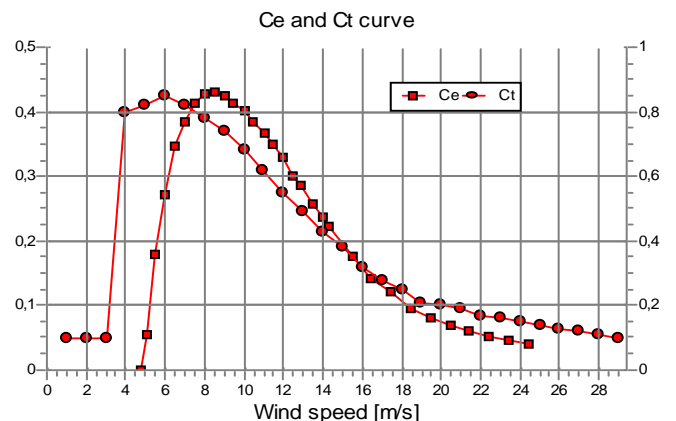
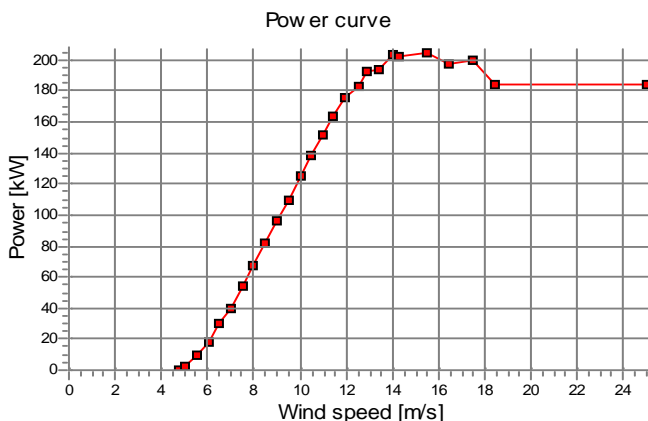
Ct curve

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]	230	373	524	661	787	901
Tripod 5/92 - 10/92 1.225 25.00 0.00 [MWh]	208	357	514	662	793	901
Check value [%]	11	4	2	0	-1	0

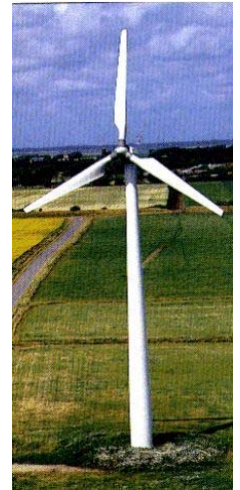
The table shows comparison between annual energy production calculated on basis of simplified "HP-curves" which assume that all WTGs performs quite similar - only specific power loading (kW/m²) and single/dual speed or stall/pitch decides the calculated values. Productions are without wake losses. For 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.



WINCON 200 26.0 !O!

File C:\Users\Newm\Documents\WindPRO Data\WTG Data\WINCON 200 26.0 !O!.wtg

Company	WINCON
Type/Version	
Rated power	200,0 kW
Secondary generator	0,0 kW
Rotor diameter	26,0 m
Tower	Tubular
Grid connection	50 Hz
Origin country	DK
Blade type	LM 12
Generator type	One generator
Rpm, rated power	39,5 rpm
Rpm, initial	0,0 rpm
Hub height(s)	28,7; 28,7; 30,0 m
Maximum blade width	0,00 m
Blade width for 90% radius	0,00 m
Valid	No
Creator	EMD
Created	07.07.1996 00:00
Edited	07.07.1996 00:00



Power curve: Tripod 5/92 - 10/92 1.225 25.00 0.00

Source Tripod 5/92 - 10/92

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	20.01.1994 00:00	15.11.2000 14:21	No	25,0	1,225	0,0	Stall	Standard stall

Power curve

Wind speed [m/s]	4,75	5,02	5,51	6,02	6,51	6,97	7,50	7,99	8,48	9,00	9,48	10,00	10,49	11,01	11,46
Power [kW]	0,00	2,11	9,28	18,31	29,65	40,25	54,08	67,52	81,35	96,39	109,46	124,90	138,14	151,71	163,48
Ce	0,000	0,051	0,171	0,258	0,330	0,366	0,394	0,407	0,410	0,407	0,395	0,384	0,368	0,350	0,334

Wind speed [m/s]	11,97	12,52	12,92	13,45	14,04	14,31	15,50	16,47	17,49	18,44
Power [kW]	175,20	183,33	192,38	193,50	203,56	201,88	204,62	197,06	200,10	184,49
Ce	0,314	0,287	0,274	0,245	0,226	0,212	0,169	0,136	0,115	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]		240	385	540	681	796	921

Tripod 5/92 - 10/92 1.225 25.00 0.00 [MWh]	208	357	514	662	793	901
Check value [%]	15	8	5	3	0	2

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/m²) 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.

