



# Noise level, Power curves, Thrust curves

Nordex N90/2500 HS

Operational modes

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**Noise level - Nordex N90/2500 HS****Standard mode**

Basis: The specified sound power level is an expected value in terms of statistics. Results of single measurements will be within the confidence interval according to IEC 61400-14 [4].

Wind turbine data:

Operational mode: Standard mode

Rotor diameter: 90 m

Remarks:

Verification according to: Measurements are to be carried out by a measuring institute accredited for noise emission measurements at wind turbines according to ISO/IEC 17025 [3] at the reference position as defined in IEC 61400-11 [1]. The data analysis must be carried out according to the preferred method 1 of IEC 61400-11 [1]. The tonal penalties in the vicinity of wind turbines  $K_{TN}$  based on these measurements are to be determined according to „Technische Richtlinien für Windenergieanlagen“ [2].

Tonality: The noise can be tonal in the vicinity of wind turbines. The specified sound power level includes potential tonal penalties according to „Technische Richtlinien für Windenergieanlagen“ [2], without taking account any tonality  $K_{TN} \leq 2$  dB.

[1] IEC 61400-11 ed. 2: Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques; 2002-12

[2] Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte, Revision 18; FGW 2008-02

[3] ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories; 2005-08

[4] IEC 61400-14, Wind turbines – Part 14: Declaration of apparent sound power level and tonality values, first edition, 2005-03

## Noise level - Nordex N90/2500 HS

### Standard mode

Maximum sound power level $L_{WA}$ [dB(A)] over the complete operating range of the turbine
105.5

## Power curves - Nordex N90/2500 HS

### Standard mode

Basis: These power curve values according to IEC 61400-12-1 are based on aerodynamic calculations by Nordex Energy GmbH.

Wind turbine data:

Operational mode: Standard mode

Rotor diameter: 90 m

Determinations for the power curve verification:

Verification according to:	IEC 61400-12-1:2005
Type of anemometer:	Thies First Class (Advanced), Risø P2546A or Vector A100
Measurement of power:	low voltage side, 660 VAC
Air density:	normalization to the nearest air density shown in the table
Filter of turbulence:	$9 \% \leq TI \leq 15 \%$
Filter of wind shear:	$a \leq 0.2$ (Hellman exponent) Wind shear measurement and determination according to the requirements of MEASNET power performance measurement procedure, Version 5, December – 2009, chapter 3.3 and 3.8
Filter of temperature:	$2\text{ °C} \leq \theta \leq 25\text{ °C}$
Status signal:	Ready for operation without consideration of the cut-out hysteresis (IEC 61400-12-1:2005, database B)

## Power curves - Nordex N90/2500 HS

## Standard mode

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	1	1	2	2	3	4	4	5	6
3.5	26	27	28	30	31	33	34	35	37
4.0	58	61	63	65	67	70	72	74	76
4.5	99	103	106	109	112	115	119	122	125
5.0	149	153	158	163	167	171	176	180	185
5.5	209	215	222	228	234	241	247	253	260
6.0	280	289	297	306	314	323	331	340	348
6.5	364	374	385	396	407	418	428	439	450
7.0	460	474	487	501	514	528	541	555	568
7.5	572	588	605	621	638	654	671	688	704
8.0	697	717	737	757	777	798	818	838	858
8.5	836	859	883	907	931	955	979	1003	1027
9.0	983	1011	1039	1067	1095	1124	1153	1181	1210
9.5	1135	1167	1199	1233	1266	1300	1335	1369	1404
10.0	1289	1325	1363	1402	1442	1482	1523	1565	1607
10.5	1444	1485	1529	1575	1621	1669	1717	1766	1815
11.0	1600	1646	1696	1749	1803	1858	1914	1972	2029
11.5	1756	1808	1865	1925	1986	2049	2110	2161	2212
12.0	1913	1970	2034	2101	2161	2215	2267	2306	2345
12.5	2069	2131	2192	2248	2297	2339	2379	2407	2435
13.0	2213	2264	2313	2358	2395	2425	2453	2469	2485
13.5	2324	2365	2402	2434	2459	2477	2493	2496	2500
14.0	2406	2435	2461	2480	2493	2498	2500	2500	2500
14.5	2460	2479	2492	2498	2500	2500	2500	2500	2500
15.0	2491	2498	2500	2500	2500	2500	2500	2500	2500
15.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
16.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
16.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
17.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
17.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
18.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
18.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
19.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
19.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
20.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
20.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
21.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
21.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
22.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
22.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
23.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
23.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
24.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
24.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
25.0	2500	2500	2500	2500	2500	2500	2500	2500	2500

## Power curves - Nordex N90/2500 HS

## Standard mode

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	6	7	8	9	<b>9</b>	10	11	11
3.5	38	39	41	42	<b>43</b>	45	46	47
4.0	78	80	83	85	<b>87</b>	89	91	93
4.5	128	131	134	137	<b>140</b>	144	147	150
5.0	190	194	199	203	<b>208</b>	213	217	222
5.5	266	273	279	285	<b>292</b>	298	304	311
6.0	356	365	373	382	<b>390</b>	398	407	415
6.5	461	471	482	493	<b>504</b>	514	525	536
7.0	581	595	608	622	<b>635</b>	649	662	676
7.5	721	737	754	770	<b>787</b>	803	820	836
8.0	878	898	918	938	<b>958</b>	978	998	1018
8.5	1051	1075	1099	1123	<b>1147</b>	1171	1195	1219
9.0	1239	1268	1296	1324	<b>1353</b>	1381	1409	1438
9.5	1439	1473	1506	1539	<b>1572</b>	1604	1637	1670
10.0	1649	1688	1725	1763	<b>1802</b>	1840	1879	1918
10.5	1865	1911	1954	1998	<b>2038</b>	2073	2109	2145
11.0	2082	2122	2161	2200	<b>2232</b>	2259	2286	2312
11.5	2255	2286	2316	2345	<b>2369</b>	2387	2406	2424
12.0	2377	2399	2420	2440	<b>2455</b>	2465	2474	2484
12.5	2456	2468	2479	2490	<b>2496</b>	2497	2498	2499
13.0	2495	2497	2498	2500	<b>2500</b>	2500	2500	2500
13.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
14.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
14.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
15.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
15.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
16.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
16.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
17.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
17.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
18.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
18.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
19.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
19.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
20.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
20.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
21.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
21.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
22.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
22.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
23.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
23.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
24.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
24.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
25.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500

## Thrust curves - Nordex N90/2500 HS

### Standard mode

Basis:

The represented thrust coefficients are based on aerodynamical calculations of the Nordex Energy GmbH. The thrust curves are only for information and will not be warranted.

Wind turbine data:

Operational mode:

Standard mode

Blade regulation:

Pitch

Air density:

to the nearest air density shown in the table

## Thrust curves - Nordex N90/2500 HS

## Standard mode

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	0.891	0.893	0.895	0.897	0.899	0.901	0.903	0.905	0.907
3.5	0.907	0.910	0.913	0.916	0.919	0.922	0.925	0.929	0.931
4.0	0.918	0.922	0.926	0.930	0.934	0.939	0.943	0.947	0.951
4.5	0.928	0.933	0.938	0.943	0.948	0.953	0.958	0.963	0.968
5.0	0.936	0.942	0.948	0.954	0.960	0.966	0.972	0.976	0.977
5.5	0.917	0.918	0.919	0.920	0.922	0.923	0.924	0.925	0.926
6.0	0.883	0.882	0.881	0.881	0.880	0.879	0.879	0.878	0.879
6.5	0.877	0.876	0.876	0.875	0.875	0.874	0.874	0.873	0.873
7.0	0.872	0.872	0.871	0.871	0.870	0.870	0.870	0.869	0.869
7.5	0.869	0.869	0.868	0.868	0.868	0.867	0.867	0.867	0.866
8.0	0.864	0.864	0.865	0.865	0.865	0.865	0.865	0.864	0.864
8.5	0.825	0.826	0.826	0.827	0.827	0.828	0.828	0.828	0.828
9.0	0.789	0.787	0.785	0.784	0.784	0.784	0.785	0.787	0.790
9.5	0.738	0.736	0.736	0.737	0.739	0.741	0.745	0.749	0.753
10.0	0.691	0.690	0.691	0.694	0.697	0.701	0.706	0.711	0.718
10.5	0.647	0.647	0.650	0.654	0.658	0.663	0.670	0.677	0.685
11.0	0.608	0.609	0.612	0.617	0.622	0.628	0.636	0.644	0.652
11.5	0.572	0.573	0.577	0.583	0.589	0.596	0.603	0.612	0.621
12.0	0.539	0.540	0.545	0.551	0.557	0.565	0.573	0.581	0.590
12.5	0.508	0.510	0.515	0.521	0.528	0.536	0.536	0.515	0.497
13.0	0.480	0.482	0.487	0.494	0.486	0.469	0.452	0.438	0.425
13.5	0.455	0.457	0.449	0.433	0.418	0.405	0.393	0.382	0.371
14.0	0.420	0.404	0.390	0.378	0.366	0.356	0.346	0.336	0.328
14.5	0.368	0.356	0.345	0.334	0.325	0.315	0.307	0.299	0.292
15.0	0.327	0.317	0.307	0.298	0.290	0.282	0.275	0.268	0.261
15.5	0.293	0.284	0.276	0.268	0.261	0.254	0.248	0.242	0.236
16.0	0.264	0.256	0.249	0.242	0.236	0.230	0.224	0.219	0.214
16.5	0.239	0.233	0.226	0.220	0.214	0.209	0.204	0.199	0.195
17.0	0.218	0.212	0.206	0.201	0.196	0.191	0.186	0.182	0.178
17.5	0.199	0.194	0.189	0.184	0.179	0.175	0.171	0.167	0.163
18.0	0.183	0.178	0.173	0.169	0.165	0.161	0.157	0.153	0.150
18.5	0.169	0.164	0.160	0.156	0.152	0.148	0.145	0.142	0.139
19.0	0.156	0.152	0.148	0.144	0.141	0.137	0.134	0.131	0.128
19.5	0.144	0.140	0.137	0.134	0.130	0.127	0.124	0.122	0.119
20.0	0.134	0.130	0.127	0.124	0.121	0.118	0.116	0.113	0.111
20.5	0.125	0.121	0.118	0.116	0.113	0.110	0.108	0.106	0.103
21.0	0.116	0.113	0.111	0.108	0.105	0.103	0.101	0.099	0.097
21.5	0.109	0.106	0.104	0.101	0.099	0.097	0.094	0.092	0.091
22.0	0.102	0.099	0.097	0.095	0.093	0.091	0.089	0.087	0.085
22.5	0.096	0.093	0.091	0.089	0.087	0.085	0.083	0.082	0.080
23.0	0.090	0.088	0.086	0.084	0.082	0.080	0.078	0.077	0.075
23.5	0.085	0.083	0.081	0.079	0.077	0.076	0.074	0.073	0.071
24.0	0.080	0.078	0.076	0.075	0.073	0.071	0.070	0.069	0.067
24.5	0.076	0.074	0.072	0.071	0.069	0.068	0.066	0.065	0.064
25.0	0.072	0.070	0.068	0.067	0.065	0.064	0.063	0.061	0.060



## Thrust curves - Nordex N90/2500 HS

## Standard mode

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	0.909	0.910	0.912	0.914	<b>0.916</b>	0.918	0.920	0.922
3.5	0.934	0.937	0.940	0.943	<b>0.946</b>	0.949	0.952	0.955
4.0	0.955	0.959	0.962	0.966	<b>0.970</b>	0.974	0.978	0.981
4.5	0.973	0.977	0.982	0.987	<b>0.991</b>	0.996	1.000	1.000
5.0	0.977	0.978	0.979	0.980	<b>0.981</b>	0.982	0.982	0.983
5.5	0.927	0.928	0.929	0.930	<b>0.931</b>	0.932	0.933	0.934
6.0	0.881	0.882	0.884	0.885	<b>0.886</b>	0.888	0.889	0.891
6.5	0.872	0.872	0.872	0.871	<b>0.871</b>	0.870	0.870	0.870
7.0	0.869	0.868	0.868	0.868	<b>0.868</b>	0.867	0.867	0.867
7.5	0.866	0.866	0.866	0.865	<b>0.865</b>	0.865	0.865	0.865
8.0	0.864	0.864	0.864	0.863	<b>0.863</b>	0.863	0.863	0.863
8.5	0.829	0.830	0.831	0.831	<b>0.831</b>	0.832	0.832	0.833
9.0	0.793	0.795	0.795	0.796	<b>0.796</b>	0.797	0.797	0.798
9.5	0.759	0.760	0.761	0.762	<b>0.763</b>	0.763	0.764	0.765
10.0	0.725	0.727	0.728	0.729	<b>0.730</b>	0.730	0.731	0.732
10.5	0.693	0.696	0.697	0.698	<b>0.699</b>	0.700	0.700	0.701
11.0	0.662	0.665	0.666	0.667	<b>0.668</b>	0.669	0.670	0.671
11.5	0.630	0.633	0.634	0.635	<b>0.618</b>	0.593	0.572	0.554
12.0	0.580	0.556	0.537	0.519	<b>0.503</b>	0.489	0.476	0.464
12.5	0.480	0.466	0.453	0.441	<b>0.429</b>	0.419	0.409	0.399
13.0	0.413	0.402	0.392	0.382	<b>0.373</b>	0.364	0.356	0.348
13.5	0.361	0.352	0.344	0.335	<b>0.328</b>	0.321	0.314	0.307
14.0	0.319	0.312	0.304	0.297	<b>0.291</b>	0.285	0.279	0.273
14.5	0.285	0.278	0.272	0.266	<b>0.260</b>	0.254	0.249	0.244
15.0	0.255	0.249	0.244	0.239	<b>0.234</b>	0.229	0.224	0.220
15.5	0.230	0.225	0.220	0.216	<b>0.211</b>	0.207	0.203	0.199
16.0	0.209	0.204	0.200	0.196	<b>0.192</b>	0.188	0.184	0.181
16.5	0.190	0.186	0.182	0.178	<b>0.175</b>	0.171	0.168	0.165
17.0	0.174	0.170	0.167	0.163	<b>0.160</b>	0.157	0.154	0.151
17.5	0.160	0.156	0.153	0.150	<b>0.147</b>	0.144	0.142	0.139
18.0	0.147	0.144	0.141	0.138	<b>0.135</b>	0.133	0.130	0.128
18.5	0.136	0.133	0.130	0.128	<b>0.125</b>	0.123	0.121	0.119
19.0	0.126	0.123	0.121	0.118	<b>0.116</b>	0.114	0.112	0.110
19.5	0.117	0.114	0.112	0.110	<b>0.108</b>	0.106	0.104	0.102
20.0	0.109	0.106	0.104	0.102	<b>0.101</b>	0.099	0.097	0.095
20.5	0.101	0.099	0.097	0.096	<b>0.094</b>	0.092	0.091	0.089
21.0	0.095	0.093	0.091	0.089	<b>0.088</b>	0.086	0.085	0.083
21.5	0.089	0.087	0.085	0.084	<b>0.082</b>	0.081	0.080	0.078
22.0	0.083	0.082	0.080	0.079	<b>0.077</b>	0.076	0.075	0.074
22.5	0.078	0.077	0.076	0.074	<b>0.073</b>	0.072	0.070	0.069
23.0	0.074	0.073	0.071	0.070	<b>0.069</b>	0.068	0.066	0.065
23.5	0.070	0.068	0.067	0.066	<b>0.065</b>	0.064	0.063	0.062
24.0	0.066	0.065	0.064	0.062	<b>0.061</b>	0.060	0.059	0.058
24.5	0.062	0.061	0.060	0.059	<b>0.058</b>	0.057	0.056	0.055
25.0	0.059	0.058	0.057	0.056	<b>0.055</b>	0.054	0.053	0.053

**Noise level - Nordex N90/2500 HS****Mode 1 / Sound optimized mode - 105.0 dB(A)**

Basis: The specified sound power level is an expected value in terms of statistics. Results of single measurements will be within the confidence interval according to IEC 61400-14 [4].

Wind turbine data:

Operational mode: Mode 1 / Sound optimized mode - 105.0 dB(A)

Rotor diameter: 90 m

Remarks:

Verification according to: Measurements are to be carried out by a measuring institute accredited for noise emission measurements at wind turbines according to ISO/IEC 17025 [3] at the reference position as defined in IEC 61400-11 [1]. The data analysis must be carried out according to the preferred method 1 of IEC 61400-11 [1]. The tonal penalties in the vicinity of wind turbines  $K_{TN}$  based on these measurements are to be determined according to „Technische Richtlinien für Windenergieanlagen“ [2].

Tonality: The noise can be tonal in the vicinity of wind turbines. The specified sound power level includes potential tonal penalties according to „Technische Richtlinien für Windenergieanlagen“ [2], without taking account any tonality  $K_{TN} \leq 2$  dB.

[1] IEC 61400-11 ed. 2: Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques; 2002-12

[2] Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte, Revision 18; FGW 2008-02

[3] ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories; 2005-08

[4] IEC 61400-14, Wind turbines – Part 14: Declaration of apparent sound power level and tonality values, first edition, 2005-03

## Noise level - Nordex N90/2500 HS

Mode 1 / Sound optimized mode - 105.0 dB(A)

Maximum sound power level $L_{WA}$ [dB(A)] over the complete operating range of the turbine
105.0

**Power curves - Nordex N90/2500 HS****Mode 1 / Sound optimized mode - 105.0 dB(A)**

Basis: These power curve values according to IEC 61400-12-1 are based on aerodynamic calculations by Nordex Energy GmbH.

Wind turbine data:

Operational mode: Mode 1 / Sound optimized mode - 105.0 dB(A)

Rotor diameter: 90 m

Determinations for the power curve verification:

Verification according to: IEC 61400-12-1:2005

Type of anemometer: Thies First Class (Advanced), Risø P2546A or Vector A100

Measurement of power: low voltage side, 660 VAC

Air density: normalization to the nearest air density shown in the table

Filter of turbulence:  $9 \% \leq TI \leq 15 \%$

Filter of wind shear:  $a \leq 0.2$  (Hellman exponent)  
Wind shear measurement and determination according to the requirements of MEASNET power performance measurement procedure, Version 5, December – 2009, chapter 3.3 and 3.8

Filter of temperature:  $2\text{ °C} \leq \theta \leq 25\text{ °C}$

Status signal: Ready for operation without consideration of the cut-out hysteresis  
(IEC 61400-12-1:2005, database B)

## Power curves - Nordex N90/2500 HS

## Mode 1 / Sound optimized mode - 105.0 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	1	1	2	2	3	4	4	5	6
3.5	26	27	28	30	31	33	34	35	37
4.0	58	61	63	65	67	70	72	74	76
4.5	99	103	106	109	112	115	119	122	125
5.0	149	153	158	163	167	171	176	180	185
5.5	209	215	222	228	234	241	247	253	260
6.0	280	289	297	306	314	323	331	339	348
6.5	363	374	385	396	407	417	428	439	450
7.0	460	474	487	501	514	528	541	554	568
7.5	571	587	604	621	637	654	670	687	703
8.0	695	715	735	755	775	795	815	835	855
8.5	829	853	877	901	924	948	972	996	1020
9.0	971	999	1027	1055	1083	1111	1140	1168	1197
9.5	1117	1149	1182	1215	1248	1281	1314	1348	1382
10.0	1265	1303	1341	1378	1417	1455	1494	1534	1574
10.5	1415	1459	1502	1545	1589	1633	1678	1724	1770
11.0	1567	1616	1665	1714	1764	1814	1865	1917	1970
11.5	1719	1775	1830	1884	1940	1997	2054	2106	2152
12.0	1872	1934	1995	2055	2115	2163	2212	2254	2290
12.5	2026	2092	2153	2203	2253	2291	2329	2360	2385
13.0	2171	2226	2276	2315	2354	2381	2407	2428	2443
13.5	2284	2327	2366	2394	2422	2438	2454	2464	2467
14.0	2368	2399	2426	2443	2461	2465	2469	2470	2470
14.5	2425	2445	2460	2466	2470	2470	2470	2470	2470
15.0	2459	2466	2470	2470	2470	2470	2470	2470	2470
15.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
16.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
16.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
17.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
17.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
18.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
18.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
19.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
19.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
20.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
20.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
21.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
21.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
22.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
22.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
23.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
23.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
24.0	2470	2470	2470	2470	2470	2470	2470	2470	2470
24.5	2470	2470	2470	2470	2470	2470	2470	2470	2470
25.0	2470	2470	2470	2470	2470	2470	2470	2470	2470

## Power curves - Nordex N90/2500 HS

## Mode 1 / Sound optimized mode - 105.0 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	6	7	8	9	<b>9</b>	10	11	11
3.5	38	39	41	42	<b>43</b>	45	46	47
4.0	78	80	83	85	<b>87</b>	89	91	93
4.5	128	131	134	137	<b>140</b>	143	147	150
5.0	190	194	199	203	<b>208</b>	213	217	222
5.5	266	273	279	285	<b>292</b>	298	304	311
6.0	356	365	373	382	<b>390</b>	398	407	415
6.5	461	471	482	493	<b>504</b>	514	525	536
7.0	581	595	608	622	<b>635</b>	649	662	676
7.5	720	736	753	769	<b>786</b>	802	819	836
8.0	875	895	915	935	<b>955</b>	975	995	1015
8.5	1044	1068	1092	1116	<b>1140</b>	1163	1187	1211
9.0	1226	1254	1282	1310	<b>1338</b>	1365	1393	1421
9.5	1416	1449	1481	1514	<b>1546</b>	1578	1611	1643
10.0	1614	1652	1689	1726	<b>1762</b>	1800	1837	1875
10.5	1816	1860	1902	1945	<b>1988</b>	2026	2061	2095
11.0	2024	2067	2105	2143	<b>2181</b>	2213	2239	2264
11.5	2199	2235	2263	2292	<b>2320</b>	2344	2361	2379
12.0	2325	2352	2372	2392	<b>2412</b>	2426	2436	2445
12.5	2410	2427	2438	2449	<b>2460</b>	2466	2467	2468
13.0	2457	2465	2467	2468	<b>2470</b>	2470	2470	2470
13.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
14.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
14.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
15.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
15.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
16.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
16.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
17.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
17.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
18.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
18.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
19.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
19.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
20.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
20.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
21.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
21.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
22.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
22.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
23.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
23.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
24.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
24.5	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470
25.0	2470	2470	2470	2470	<b>2470</b>	2470	2470	2470

## Thrust curves - Nordex N90/2500 HS

### Mode 1 / Sound optimized mode - 105.0 dB(A)

Basis:

The represented thrust coefficients are based on aerodynamical calculations of the Nordex Energy GmbH. The thrust curves are only for information and will not be warranted.

Wind turbine data:

Operational mode:

Mode 1 / Sound optimized mode - 105.0 dB(A)

Blade regulation:

Pitch

Air density:

to the nearest air density shown in the table

**Thrust curves - Nordex N90/2500 HS****Mode 1 / Sound optimized mode - 105.0 dB(A)**

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	0.891	0.893	0.895	0.897	0.899	0.901	0.903	0.905	0.907
3.5	0.907	0.910	0.913	0.916	0.919	0.922	0.925	0.929	0.931
4.0	0.918	0.922	0.926	0.930	0.934	0.939	0.943	0.947	0.951
4.5	0.928	0.933	0.938	0.943	0.948	0.953	0.958	0.963	0.968
5.0	0.936	0.942	0.948	0.954	0.960	0.966	0.972	0.976	0.977
5.5	0.917	0.918	0.919	0.920	0.922	0.923	0.924	0.925	0.926
6.0	0.883	0.882	0.881	0.881	0.880	0.879	0.879	0.878	0.879
6.5	0.877	0.876	0.876	0.875	0.874	0.874	0.874	0.873	0.873
7.0	0.872	0.872	0.871	0.871	0.870	0.870	0.870	0.869	0.869
7.5	0.869	0.869	0.868	0.868	0.867	0.867	0.867	0.867	0.866
8.0	0.840	0.840	0.841	0.841	0.842	0.842	0.843	0.843	0.844
8.5	0.802	0.802	0.803	0.802	0.801	0.801	0.801	0.801	0.802
9.0	0.757	0.756	0.756	0.756	0.756	0.757	0.758	0.760	0.762
9.5	0.710	0.711	0.712	0.713	0.714	0.716	0.718	0.721	0.724
10.0	0.667	0.669	0.671	0.673	0.675	0.677	0.680	0.684	0.688
10.5	0.628	0.631	0.633	0.636	0.638	0.642	0.645	0.649	0.654
11.0	0.592	0.595	0.598	0.601	0.604	0.608	0.612	0.616	0.621
11.5	0.558	0.562	0.565	0.568	0.572	0.576	0.580	0.585	0.590
12.0	0.527	0.531	0.534	0.538	0.541	0.546	0.550	0.555	0.560
12.5	0.498	0.502	0.506	0.509	0.513	0.517	0.522	0.511	0.492
13.0	0.471	0.476	0.479	0.483	0.486	0.464	0.448	0.433	0.420
13.5	0.447	0.451	0.447	0.429	0.413	0.400	0.388	0.377	0.367
14.0	0.419	0.401	0.386	0.374	0.362	0.351	0.342	0.332	0.324
14.5	0.364	0.352	0.341	0.330	0.321	0.312	0.303	0.296	0.288
15.0	0.323	0.313	0.304	0.295	0.287	0.279	0.272	0.265	0.258
15.5	0.290	0.281	0.273	0.265	0.258	0.251	0.245	0.239	0.233
16.0	0.261	0.253	0.246	0.239	0.233	0.227	0.221	0.216	0.211
16.5	0.237	0.230	0.223	0.217	0.212	0.206	0.201	0.197	0.192
17.0	0.216	0.209	0.204	0.198	0.193	0.189	0.184	0.180	0.176
17.5	0.197	0.192	0.187	0.182	0.177	0.173	0.169	0.165	0.161
18.0	0.181	0.176	0.171	0.167	0.163	0.159	0.155	0.152	0.148
18.5	0.167	0.162	0.158	0.154	0.150	0.147	0.143	0.140	0.137
19.0	0.154	0.150	0.146	0.142	0.139	0.136	0.132	0.130	0.127
19.5	0.143	0.139	0.135	0.132	0.129	0.126	0.123	0.120	0.118
20.0	0.132	0.129	0.126	0.123	0.120	0.117	0.114	0.112	0.110
20.5	0.123	0.120	0.117	0.114	0.112	0.109	0.107	0.104	0.102
21.0	0.115	0.112	0.109	0.107	0.104	0.102	0.100	0.098	0.096
21.5	0.108	0.105	0.102	0.100	0.098	0.095	0.093	0.091	0.089
22.0	0.101	0.098	0.096	0.094	0.092	0.089	0.088	0.086	0.084
22.5	0.095	0.092	0.090	0.088	0.086	0.084	0.082	0.081	0.079
23.0	0.089	0.087	0.085	0.083	0.081	0.079	0.078	0.076	0.074
23.5	0.084	0.082	0.080	0.078	0.076	0.075	0.073	0.072	0.070
24.0	0.079	0.077	0.075	0.074	0.072	0.071	0.069	0.068	0.066
24.5	0.075	0.073	0.071	0.070	0.068	0.067	0.065	0.064	0.063
25.0	0.071	0.069	0.067	0.066	0.065	0.063	0.062	0.061	0.060



## Thrust curves - Nordex N90/2500 HS

## Mode 1 / Sound optimized mode - 105.0 dB(A)

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	0.909	0.910	0.912	0.914	<b>0.916</b>	0.918	0.920	0.922
3.5	0.934	0.937	0.940	0.943	<b>0.946</b>	0.949	0.952	0.955
4.0	0.955	0.959	0.962	0.966	<b>0.970</b>	0.974	0.978	0.981
4.5	0.973	0.977	0.982	0.987	<b>0.991</b>	0.996	1.000	1.000
5.0	0.977	0.978	0.979	0.980	<b>0.981</b>	0.982	0.982	0.983
5.5	0.927	0.928	0.929	0.930	<b>0.931</b>	0.932	0.933	0.934
6.0	0.881	0.882	0.884	0.885	<b>0.886</b>	0.888	0.889	0.891
6.5	0.872	0.872	0.871	0.871	<b>0.871</b>	0.870	0.870	0.870
7.0	0.869	0.868	0.868	0.868	<b>0.868</b>	0.867	0.867	0.867
7.5	0.866	0.866	0.866	0.865	<b>0.865</b>	0.865	0.865	0.864
8.0	0.844	0.844	0.844	0.844	<b>0.844</b>	0.844	0.845	0.845
8.5	0.803	0.803	0.803	0.803	<b>0.803</b>	0.804	0.804	0.804
9.0	0.764	0.765	0.765	0.765	<b>0.766</b>	0.766	0.766	0.766
9.5	0.727	0.728	0.728	0.729	<b>0.729</b>	0.729	0.729	0.730
10.0	0.692	0.693	0.693	0.694	<b>0.694</b>	0.694	0.695	0.695
10.5	0.659	0.660	0.661	0.661	<b>0.662</b>	0.662	0.662	0.663
11.0	0.626	0.628	0.629	0.629	<b>0.630</b>	0.631	0.631	0.632
11.5	0.595	0.597	0.598	0.598	<b>0.599</b>	0.587	0.565	0.547
12.0	0.565	0.552	0.531	0.513	<b>0.498</b>	0.483	0.470	0.458
12.5	0.476	0.461	0.447	0.435	<b>0.424</b>	0.413	0.403	0.394
13.0	0.408	0.397	0.387	0.377	<b>0.368</b>	0.360	0.351	0.344
13.5	0.357	0.348	0.339	0.331	<b>0.324</b>	0.316	0.310	0.303
14.0	0.315	0.308	0.301	0.294	<b>0.287</b>	0.281	0.275	0.269
14.5	0.281	0.274	0.268	0.262	<b>0.257</b>	0.251	0.246	0.241
15.0	0.252	0.246	0.241	0.236	<b>0.231</b>	0.226	0.221	0.217
15.5	0.228	0.222	0.218	0.213	<b>0.209</b>	0.204	0.200	0.196
16.0	0.206	0.202	0.197	0.193	<b>0.189</b>	0.186	0.182	0.179
16.5	0.188	0.184	0.180	0.176	<b>0.173</b>	0.169	0.166	0.163
17.0	0.172	0.168	0.165	0.161	<b>0.158</b>	0.155	0.152	0.149
17.5	0.158	0.154	0.151	0.148	<b>0.145</b>	0.142	0.140	0.137
18.0	0.145	0.142	0.139	0.136	<b>0.134</b>	0.131	0.129	0.127
18.5	0.134	0.131	0.129	0.126	<b>0.124</b>	0.121	0.119	0.117
19.0	0.124	0.122	0.119	0.117	<b>0.115</b>	0.113	0.111	0.109
19.5	0.115	0.113	0.111	0.109	<b>0.107</b>	0.105	0.103	0.101
20.0	0.107	0.105	0.103	0.101	<b>0.099</b>	0.097	0.096	0.094
20.5	0.100	0.098	0.096	0.094	<b>0.093</b>	0.091	0.089	0.088
21.0	0.094	0.092	0.090	0.088	<b>0.087</b>	0.085	0.084	0.082
21.5	0.088	0.086	0.084	0.083	<b>0.081</b>	0.080	0.079	0.077
22.0	0.082	0.081	0.079	0.078	<b>0.076</b>	0.075	0.074	0.073
22.5	0.077	0.076	0.075	0.073	<b>0.072</b>	0.071	0.070	0.068
23.0	0.073	0.072	0.070	0.069	<b>0.068</b>	0.067	0.066	0.065
23.5	0.069	0.068	0.066	0.065	<b>0.064</b>	0.063	0.062	0.061
24.0	0.065	0.064	0.063	0.062	<b>0.061</b>	0.060	0.059	0.058
24.5	0.062	0.060	0.059	0.058	<b>0.057</b>	0.056	0.056	0.055
25.0	0.058	0.057	0.056	0.055	<b>0.054</b>	0.054	0.053	0.052

**Noise level - Nordex N90/2500 HS****Mode 2 / Sound optimized mode - 104.5 dB(A)**

Basis: The specified sound power level is an expected value in terms of statistics. Results of single measurements will be within the confidence interval according to IEC 61400-14 [4].

Wind turbine data:

Operational mode: Mode 2 / Sound optimized mode - 104.5 dB(A)

Rotor diameter: 90 m

Remarks:

Verification according to: Measurements are to be carried out by a measuring institute accredited for noise emission measurements at wind turbines according to ISO/IEC 17025 [3] at the reference position as defined in IEC 61400-11 [1]. The data analysis must be carried out according to the preferred method 1 of IEC 61400-11 [1]. The tonal penalties in the vicinity of wind turbines  $K_{TN}$  based on these measurements are to be determined according to „Technische Richtlinien für Windenergieanlagen“ [2].

Tonality: The noise can be tonal in the vicinity of wind turbines. The specified sound power level includes potential tonal penalties according to „Technische Richtlinien für Windenergieanlagen“ [2], without taking account any tonality  $K_{TN} \leq 2$  dB.

[1] IEC 61400-11 ed. 2: Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques; 2002-12

[2] Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte, Revision 18; FGW 2008-02

[3] ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories; 2005-08

[4] IEC 61400-14, Wind turbines – Part 14: Declaration of apparent sound power level and tonality values, first edition, 2005-03

## Noise level - Nordex N90/2500 HS

Mode 2 / Sound optimized mode - 104.5 dB(A)

Maximum sound power level $L_{WA}$ [dB(A)] over the complete operating range of the turbine
104.5

**Power curves - Nordex N90/2500 HS****Mode 2 / Sound optimized mode - 104.5 dB(A)**

Basis: These power curve values according to IEC 61400-12-1 are based on aerodynamic calculations by Nordex Energy GmbH.

Wind turbine data:

Operational mode: Mode 2 / Sound optimized mode - 104.5 dB(A)

Rotor diameter: 90 m

Determinations for the power curve verification:

Verification according to: IEC 61400-12-1:2005

Type of anemometer: Thies First Class (Advanced), Risø P2546A or Vector A100

Measurement of power: low voltage side, 660 VAC

Air density: normalization to the nearest air density shown in the table

Filter of turbulence:  $9 \% \leq TI \leq 15 \%$

Filter of wind shear:  $a \leq 0.2$  (Hellman exponent)  
Wind shear measurement and determination according to the requirements of MEASNET power performance measurement procedure, Version 5, December – 2009, chapter 3.3 and 3.8

Filter of temperature:  $2\text{ °C} \leq \theta \leq 25\text{ °C}$

Status signal: Ready for operation without consideration of the cut-out hysteresis  
(IEC 61400-12-1:2005, database B)

## Power curves - Nordex N90/2500 HS

## Mode 2 / Sound optimized mode - 104.5 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	1	1	2	2	3	4	4	5	6
3.5	26	27	28	30	31	33	34	35	37
4.0	58	61	63	65	67	70	72	74	76
4.5	99	103	106	109	112	115	119	122	125
5.0	149	153	158	162	167	171	176	180	185
5.5	209	215	222	228	234	241	247	253	260
6.0	280	289	297	306	314	322	331	339	348
6.5	363	374	385	396	407	417	428	439	450
7.0	460	473	487	500	514	527	541	554	568
7.5	570	587	603	620	636	653	669	686	702
8.0	692	712	732	752	771	791	811	831	851
8.5	822	846	869	893	917	940	964	988	1012
9.0	957	985	1012	1040	1068	1096	1124	1153	1181
9.5	1095	1127	1159	1191	1224	1257	1290	1324	1357
10.0	1234	1271	1308	1345	1383	1421	1459	1499	1538
10.5	1375	1417	1459	1501	1544	1588	1632	1677	1722
11.0	1516	1564	1611	1659	1707	1756	1806	1857	1909
11.5	1658	1712	1764	1817	1871	1926	1982	2038	2083
12.0	1800	1860	1918	1976	2035	2088	2135	2183	2217
12.5	1943	2007	2069	2122	2171	2213	2250	2287	2311
13.0	2082	2140	2191	2233	2271	2303	2329	2355	2369
13.5	2196	2242	2282	2313	2341	2362	2378	2393	2396
14.0	2281	2316	2346	2366	2383	2393	2397	2400	2400
14.5	2342	2366	2384	2393	2399	2400	2400	2400	2400
15.0	2380	2392	2399	2400	2400	2400	2400	2400	2400
15.5	2398	2400	2400	2400	2400	2400	2400	2400	2400
16.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
16.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
17.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
17.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
18.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
18.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
19.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
19.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
20.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
20.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
21.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
21.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
22.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
22.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
23.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
23.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
24.0	2400	2400	2400	2400	2400	2400	2400	2400	2400
24.5	2400	2400	2400	2400	2400	2400	2400	2400	2400
25.0	2400	2400	2400	2400	2400	2400	2400	2400	2400

## Power curves - Nordex N90/2500 HS

## Mode 2 / Sound optimized mode - 104.5 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	6	7	8	9	<b>9</b>	10	11	11
3.5	38	39	41	42	<b>43</b>	45	46	47
4.0	78	80	82	85	<b>87</b>	89	91	93
4.5	128	131	134	137	<b>140</b>	143	146	149
5.0	190	194	199	203	<b>208</b>	212	217	222
5.5	266	272	279	285	<b>292</b>	298	304	311
6.0	356	365	373	381	<b>390</b>	398	407	415
6.5	460	471	482	493	<b>503</b>	514	525	536
7.0	581	595	608	621	<b>635</b>	648	662	675
7.5	719	735	752	768	<b>785</b>	801	818	834
8.0	871	891	911	931	<b>951</b>	971	991	1011
8.5	1036	1060	1084	1107	<b>1131</b>	1154	1178	1201
9.0	1210	1238	1266	1293	<b>1321</b>	1348	1376	1403
9.5	1392	1424	1456	1487	<b>1519</b>	1550	1582	1613
10.0	1578	1615	1651	1687	<b>1723</b>	1759	1795	1832
10.5	1768	1810	1851	1892	<b>1934</b>	1973	2007	2040
11.0	1962	2008	2044	2081	<b>2117</b>	2151	2176	2201
11.5	2129	2169	2196	2224	<b>2251</b>	2277	2294	2311
12.0	2252	2282	2301	2320	<b>2339</b>	2356	2365	2374
12.5	2335	2356	2367	2377	<b>2388</b>	2396	2397	2398
13.0	2383	2394	2396	2398	<b>2400</b>	2400	2400	2400
13.5	2399	2400	2400	2400	<b>2400</b>	2400	2400	2400
14.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
14.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
15.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
15.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
16.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
16.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
17.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
17.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
18.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
18.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
19.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
19.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
20.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
20.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
21.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
21.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
22.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
22.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
23.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
23.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
24.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
24.5	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400
25.0	2400	2400	2400	2400	<b>2400</b>	2400	2400	2400

## Thrust curves - Nordex N90/2500 HS

### Mode 2 / Sound optimized mode - 104.5 dB(A)

Basis:

The represented thrust coefficients are based on aerodynamical calculations of the Nordex Energy GmbH. The thrust curves are only for information and will not be warranted.

Wind turbine data:

Operational mode:

Mode 2 / Sound optimized mode - 104.5 dB(A)

Blade regulation:

Pitch

Air density:

to the nearest air density shown in the table

**Thrust curves - Nordex N90/2500 HS****Mode 2 / Sound optimized mode - 104.5 dB(A)**

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	0.891	0.893	0.895	0.897	0.899	0.901	0.903	0.905	0.907
3.5	0.907	0.910	0.913	0.916	0.919	0.922	0.925	0.928	0.931
4.0	0.918	0.922	0.926	0.930	0.934	0.938	0.943	0.947	0.951
4.5	0.928	0.933	0.938	0.943	0.948	0.953	0.958	0.963	0.968
5.0	0.936	0.942	0.948	0.954	0.960	0.966	0.972	0.976	0.977
5.5	0.917	0.918	0.919	0.920	0.922	0.923	0.924	0.925	0.926
6.0	0.882	0.882	0.881	0.880	0.880	0.879	0.879	0.878	0.879
6.5	0.877	0.876	0.875	0.875	0.874	0.874	0.873	0.873	0.873
7.0	0.872	0.872	0.871	0.871	0.870	0.870	0.870	0.869	0.869
7.5	0.863	0.864	0.864	0.864	0.865	0.866	0.866	0.866	0.866
8.0	0.822	0.822	0.823	0.823	0.824	0.825	0.824	0.824	0.823
8.5	0.781	0.779	0.778	0.777	0.777	0.777	0.777	0.778	0.779
9.0	0.730	0.730	0.730	0.730	0.730	0.731	0.733	0.735	0.737
9.5	0.683	0.684	0.684	0.686	0.687	0.689	0.691	0.694	0.697
10.0	0.640	0.642	0.643	0.645	0.647	0.649	0.653	0.656	0.660
10.5	0.601	0.603	0.605	0.608	0.610	0.613	0.617	0.621	0.625
11.0	0.564	0.567	0.570	0.573	0.576	0.579	0.583	0.587	0.592
11.5	0.531	0.534	0.537	0.540	0.543	0.547	0.551	0.556	0.560
12.0	0.500	0.504	0.507	0.510	0.514	0.517	0.522	0.526	0.531
12.5	0.472	0.476	0.479	0.482	0.486	0.490	0.494	0.497	0.476
13.0	0.446	0.450	0.454	0.457	0.460	0.450	0.434	0.420	0.407
13.5	0.423	0.427	0.430	0.416	0.401	0.388	0.376	0.366	0.356
14.0	0.401	0.390	0.375	0.362	0.351	0.341	0.331	0.322	0.314
14.5	0.354	0.342	0.331	0.321	0.311	0.303	0.295	0.287	0.280
15.0	0.314	0.304	0.295	0.286	0.278	0.271	0.264	0.257	0.251
15.5	0.281	0.273	0.265	0.257	0.250	0.244	0.238	0.232	0.226
16.0	0.254	0.246	0.239	0.233	0.227	0.221	0.215	0.210	0.205
16.5	0.230	0.223	0.217	0.211	0.206	0.201	0.196	0.191	0.187
17.0	0.210	0.204	0.198	0.193	0.188	0.183	0.179	0.175	0.171
17.5	0.192	0.186	0.181	0.177	0.172	0.168	0.164	0.160	0.157
18.0	0.176	0.171	0.167	0.162	0.158	0.155	0.151	0.147	0.144
18.5	0.162	0.158	0.154	0.150	0.146	0.143	0.139	0.136	0.133
19.0	0.150	0.146	0.142	0.138	0.135	0.132	0.129	0.126	0.123
19.5	0.139	0.135	0.132	0.128	0.125	0.122	0.120	0.117	0.115
20.0	0.129	0.125	0.122	0.119	0.116	0.114	0.111	0.109	0.107
20.5	0.120	0.117	0.114	0.111	0.109	0.106	0.104	0.102	0.099
21.0	0.112	0.109	0.106	0.104	0.101	0.099	0.097	0.095	0.093
21.5	0.105	0.102	0.100	0.097	0.095	0.093	0.091	0.089	0.087
22.0	0.098	0.096	0.093	0.091	0.089	0.087	0.085	0.083	0.082
22.5	0.092	0.090	0.088	0.086	0.084	0.082	0.080	0.078	0.077
23.0	0.087	0.085	0.083	0.081	0.079	0.077	0.075	0.074	0.072
23.5	0.082	0.080	0.078	0.076	0.074	0.073	0.071	0.070	0.068
24.0	0.077	0.075	0.073	0.072	0.070	0.069	0.067	0.066	0.065
24.5	0.073	0.071	0.069	0.068	0.066	0.065	0.064	0.062	0.061
25.0	0.069	0.067	0.066	0.064	0.063	0.062	0.060	0.059	0.058



## Thrust curves - Nordex N90/2500 HS

## Mode 2 / Sound optimized mode - 104.5 dB(A)

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	0.909	0.910	0.912	0.914	<b>0.916</b>	0.918	0.920	0.922
3.5	0.934	0.937	0.940	0.943	<b>0.946</b>	0.949	0.952	0.955
4.0	0.954	0.959	0.962	0.966	<b>0.970</b>	0.974	0.978	0.981
4.5	0.973	0.977	0.982	0.987	<b>0.991</b>	0.996	1.000	1.000
5.0	0.977	0.978	0.979	0.980	<b>0.981</b>	0.982	0.982	0.983
5.5	0.927	0.928	0.929	0.930	<b>0.931</b>	0.932	0.933	0.934
6.0	0.881	0.882	0.884	0.885	<b>0.886</b>	0.888	0.889	0.891
6.5	0.872	0.872	0.871	0.871	<b>0.871</b>	0.870	0.870	0.870
7.0	0.869	0.868	0.868	0.868	<b>0.867</b>	0.867	0.867	0.867
7.5	0.866	0.866	0.865	0.865	<b>0.865</b>	0.865	0.865	0.864
8.0	0.824	0.824	0.823	0.823	<b>0.823</b>	0.822	0.822	0.822
8.5	0.780	0.781	0.780	0.780	<b>0.780</b>	0.780	0.779	0.779
9.0	0.739	0.740	0.740	0.740	<b>0.739</b>	0.739	0.739	0.739
9.5	0.700	0.701	0.701	0.701	<b>0.701</b>	0.701	0.701	0.701
10.0	0.664	0.665	0.665	0.665	<b>0.665</b>	0.665	0.665	0.665
10.5	0.630	0.631	0.631	0.631	<b>0.632</b>	0.632	0.632	0.632
11.0	0.597	0.598	0.599	0.599	<b>0.599</b>	0.599	0.600	0.600
11.5	0.565	0.567	0.568	0.568	<b>0.568</b>	0.564	0.544	0.527
12.0	0.536	0.534	0.512	0.496	<b>0.481</b>	0.467	0.454	0.443
12.5	0.460	0.446	0.433	0.421	<b>0.410</b>	0.400	0.390	0.381
13.0	0.396	0.385	0.375	0.366	<b>0.357</b>	0.349	0.341	0.333
13.5	0.346	0.337	0.329	0.321	<b>0.314</b>	0.307	0.300	0.294
14.0	0.306	0.299	0.292	0.285	<b>0.279</b>	0.273	0.267	0.262
14.5	0.273	0.266	0.260	0.255	<b>0.249</b>	0.244	0.239	0.234
15.0	0.245	0.239	0.234	0.229	<b>0.224</b>	0.220	0.215	0.211
15.5	0.221	0.216	0.211	0.207	<b>0.203</b>	0.199	0.195	0.191
16.0	0.201	0.196	0.192	0.188	<b>0.184</b>	0.180	0.177	0.174
16.5	0.183	0.179	0.175	0.171	<b>0.168</b>	0.165	0.161	0.158
17.0	0.167	0.163	0.160	0.157	<b>0.154</b>	0.151	0.148	0.145
17.5	0.153	0.150	0.147	0.144	<b>0.141</b>	0.138	0.136	0.133
18.0	0.141	0.138	0.135	0.133	<b>0.130</b>	0.128	0.125	0.123
18.5	0.130	0.128	0.125	0.123	<b>0.120</b>	0.118	0.116	0.114
19.0	0.121	0.118	0.116	0.114	<b>0.112</b>	0.109	0.108	0.106
19.5	0.112	0.110	0.108	0.106	<b>0.104</b>	0.102	0.100	0.098
20.0	0.104	0.102	0.100	0.098	<b>0.097</b>	0.095	0.093	0.092
20.5	0.097	0.095	0.094	0.092	<b>0.090</b>	0.089	0.087	0.086
21.0	0.091	0.089	0.088	0.086	<b>0.084</b>	0.083	0.082	0.080
21.5	0.085	0.084	0.082	0.081	<b>0.079</b>	0.078	0.076	0.075
22.0	0.080	0.079	0.077	0.076	<b>0.074</b>	0.073	0.072	0.071
22.5	0.075	0.074	0.073	0.071	<b>0.070</b>	0.069	0.068	0.067
23.0	0.071	0.070	0.068	0.067	<b>0.066</b>	0.065	0.064	0.063
23.5	0.067	0.066	0.065	0.063	<b>0.062</b>	0.061	0.060	0.059
24.0	0.063	0.062	0.061	0.060	<b>0.059</b>	0.058	0.057	0.056
24.5	0.060	0.059	0.058	0.057	<b>0.056</b>	0.055	0.054	0.053
25.0	0.057	0.056	0.055	0.054	<b>0.053</b>	0.052	0.051	0.050

**Noise level - Nordex N90/2500 HS****Mode 3 / Sound optimized mode - 103.5 dB(A)**

Basis: The specified sound power level is an expected value in terms of statistics. Results of single measurements will be within the confidence interval according to IEC 61400-14 [4].

Wind turbine data:

Operational mode: Mode 3 / Sound optimized mode - 103.5 dB(A)

Rotor diameter: 90 m

Remarks:

Verification according to: Measurements are to be carried out by a measuring institute accredited for noise emission measurements at wind turbines according to ISO/IEC 17025 [3] at the reference position as defined in IEC 61400-11 [1]. The data analysis must be carried out according to the preferred method 1 of IEC 61400-11 [1]. The tonal penalties in the vicinity of wind turbines  $K_{TN}$  based on these measurements are to be determined according to „Technische Richtlinien für Windenergieanlagen“ [2].

Tonality: The noise can be tonal in the vicinity of wind turbines. The specified sound power level includes potential tonal penalties according to „Technische Richtlinien für Windenergieanlagen“ [2], without taking account any tonality  $K_{TN} \leq 2$  dB.

[1] IEC 61400-11 ed. 2: Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques; 2002-12

[2] Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte, Revision 18; FGW 2008-02

[3] ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories; 2005-08

[4] IEC 61400-14, Wind turbines – Part 14: Declaration of apparent sound power level and tonality values, first edition, 2005-03

**Noise level - Nordex N90/2500 HS**

**Mode 3 / Sound optimized mode - 103.5 dB(A)**

Maximum sound power level $L_{WA}$ [dB(A)] over the complete operating range of the turbine
103.5

**Power curves - Nordex N90/2500 HS****Mode 3 / Sound optimized mode - 103.5 dB(A)**

Basis: These power curve values according to IEC 61400-12-1 are based on aerodynamic calculations by Nordex Energy GmbH.

Wind turbine data:

Operational mode: Mode 3 / Sound optimized mode - 103.5 dB(A)  
Rotor diameter: 90 m

Determinations for the power curve verification:

Verification according to: IEC 61400-12-1:2005  
Type of anemometer: Thies First Class (Advanced), Risø P2546A or Vector A100  
Measurement of power: low voltage side, 660 VAC  
Air density: normalization to the nearest air density shown in the table  
Filter of turbulence:  $9 \% \leq TI \leq 15 \%$   
Filter of wind shear:  $a \leq 0.2$  (Hellman exponent)  
Wind shear measurement and determination according to the requirements of MEASNET power performance measurement procedure, Version 5, December – 2009, chapter 3.3 and 3.8  
Filter of temperature:  $2\text{ }^{\circ}\text{C} \leq \theta \leq 25\text{ }^{\circ}\text{C}$   
Status signal: Ready for operation without consideration of the cut-out hysteresis  
(IEC 61400-12-1:2005, database B)

## Power curves - Nordex N90/2500 HS

## Mode 3 / Sound optimized mode - 103.5 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	1	1	2	2	3	4	4	5	6
3.5	26	27	28	30	31	33	34	35	37
4.0	58	61	63	65	67	70	72	74	76
4.5	99	103	106	109	112	115	119	122	125
5.0	149	153	158	162	167	171	176	180	185
5.5	209	215	222	228	234	241	247	253	260
6.0	280	288	297	305	314	322	331	339	348
6.5	363	374	385	396	406	417	428	439	450
7.0	459	473	486	500	513	527	540	554	567
7.5	568	585	601	618	634	650	667	683	700
8.0	687	707	727	746	766	786	806	826	846
8.5	812	835	859	882	905	929	953	977	1001
9.0	940	967	994	1022	1049	1077	1105	1133	1162
9.5	1070	1101	1132	1164	1196	1228	1261	1294	1328
10.0	1200	1235	1271	1307	1344	1382	1420	1459	1498
10.5	1331	1371	1411	1453	1495	1537	1581	1625	1670
11.0	1462	1507	1553	1599	1646	1694	1744	1793	1844
11.5	1594	1644	1695	1746	1799	1852	1907	1962	2012
12.0	1726	1781	1837	1894	1951	2009	2056	2102	2142
12.5	1859	1919	1979	2037	2085	2133	2170	2206	2235
13.0	1990	2052	2101	2149	2186	2224	2250	2275	2295
13.5	2105	2155	2194	2232	2258	2285	2301	2316	2325
14.0	2193	2233	2261	2288	2304	2321	2325	2329	2330
14.5	2257	2286	2304	2320	2326	2330	2330	2330	2330
15.0	2300	2319	2325	2330	2330	2330	2330	2330	2330
15.5	2323	2330	2330	2330	2330	2330	2330	2330	2330
16.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
16.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
17.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
17.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
18.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
18.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
19.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
19.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
20.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
20.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
21.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
21.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
22.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
22.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
23.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
23.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
24.0	2330	2330	2330	2330	2330	2330	2330	2330	2330
24.5	2330	2330	2330	2330	2330	2330	2330	2330	2330
25.0	2330	2330	2330	2330	2330	2330	2330	2330	2330

## Power curves - Nordex N90/2500 HS

## Mode 3 / Sound optimized mode - 103.5 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	6	7	8	9	<b>9</b>	10	11	11
3.5	38	39	41	42	<b>43</b>	45	46	47
4.0	78	80	82	85	<b>87</b>	89	91	93
4.5	128	131	134	137	<b>140</b>	143	146	149
5.0	190	194	199	203	<b>208</b>	212	217	221
5.5	266	272	279	285	<b>291</b>	298	304	311
6.0	356	365	373	381	<b>390</b>	398	407	415
6.5	460	471	482	493	<b>503</b>	514	525	536
7.0	581	594	607	621	<b>634</b>	648	661	675
7.5	716	733	749	766	<b>782</b>	799	815	831
8.0	866	885	905	925	<b>945</b>	964	984	1004
8.5	1025	1048	1071	1095	<b>1118</b>	1141	1164	1187
9.0	1191	1218	1245	1272	<b>1299</b>	1326	1353	1379
9.5	1362	1394	1425	1456	<b>1486</b>	1517	1547	1578
10.0	1538	1574	1609	1643	<b>1678</b>	1712	1747	1782
10.5	1716	1756	1796	1835	<b>1875</b>	1914	1948	1980
11.0	1896	1942	1980	2015	<b>2050</b>	2085	2111	2134
11.5	2056	2096	2126	2153	<b>2179</b>	2205	2224	2240
12.0	2176	2207	2229	2247	<b>2265</b>	2284	2294	2303
12.5	2259	2280	2294	2304	<b>2314</b>	2324	2327	2328
13.0	2308	2320	2326	2327	<b>2329</b>	2330	2330	2330
13.5	2328	2330	2330	2330	<b>2330</b>	2330	2330	2330
14.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
14.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
15.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
15.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
16.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
16.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
17.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
17.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
18.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
18.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
19.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
19.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
20.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
20.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
21.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
21.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
22.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
22.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
23.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
23.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
24.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
24.5	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330
25.0	2330	2330	2330	2330	<b>2330</b>	2330	2330	2330

## Thrust curves - Nordex N90/2500 HS

### Mode 3 / Sound optimized mode - 103.5 dB(A)

Basis:

The represented thrust coefficients are based on aerodynamical calculations of the Nordex Energy GmbH. The thrust curves are only for information and will not be warranted.

Wind turbine data:

Operational mode:

Mode 3 / Sound optimized mode - 103.5 dB(A)

Blade regulation:

Pitch

Air density:

to the nearest air density shown in the table

**Thrust curves - Nordex N90/2500 HS****Mode 3 / Sound optimized mode - 103.5 dB(A)**

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	0.891	0.893	0.895	0.897	0.899	0.901	0.903	0.905	0.907
3.5	0.907	0.910	0.913	0.916	0.919	0.922	0.925	0.928	0.931
4.0	0.918	0.922	0.926	0.930	0.934	0.938	0.943	0.947	0.951
4.5	0.928	0.933	0.938	0.943	0.948	0.953	0.958	0.963	0.968
5.0	0.936	0.942	0.948	0.954	0.960	0.966	0.972	0.976	0.977
5.5	0.917	0.918	0.919	0.920	0.922	0.923	0.924	0.925	0.926
6.0	0.882	0.882	0.881	0.880	0.880	0.879	0.879	0.878	0.879
6.5	0.877	0.876	0.875	0.875	0.874	0.874	0.873	0.873	0.873
7.0	0.872	0.872	0.871	0.871	0.870	0.870	0.870	0.869	0.869
7.5	0.844	0.845	0.845	0.846	0.846	0.847	0.847	0.847	0.848
8.0	0.803	0.804	0.804	0.803	0.801	0.800	0.800	0.800	0.800
8.5	0.753	0.752	0.751	0.750	0.750	0.750	0.751	0.752	0.754
9.0	0.701	0.701	0.701	0.702	0.702	0.704	0.705	0.707	0.710
9.5	0.654	0.655	0.656	0.657	0.658	0.660	0.663	0.666	0.669
10.0	0.612	0.613	0.614	0.616	0.618	0.621	0.624	0.628	0.632
10.5	0.573	0.575	0.576	0.579	0.581	0.584	0.588	0.592	0.596
11.0	0.537	0.539	0.541	0.544	0.547	0.550	0.554	0.558	0.563
11.5	0.504	0.507	0.509	0.512	0.515	0.519	0.523	0.527	0.532
12.0	0.475	0.477	0.480	0.483	0.486	0.490	0.494	0.498	0.503
12.5	0.447	0.450	0.453	0.456	0.459	0.463	0.467	0.471	0.461
13.0	0.422	0.425	0.428	0.431	0.435	0.438	0.421	0.407	0.394
13.5	0.400	0.402	0.405	0.406	0.389	0.377	0.365	0.354	0.345
14.0	0.379	0.381	0.365	0.352	0.341	0.331	0.321	0.313	0.305
14.5	0.345	0.332	0.321	0.311	0.302	0.294	0.286	0.278	0.271
15.0	0.305	0.295	0.286	0.278	0.270	0.263	0.256	0.250	0.244
15.5	0.273	0.265	0.257	0.250	0.243	0.237	0.231	0.225	0.220
16.0	0.246	0.239	0.232	0.226	0.220	0.214	0.209	0.204	0.199
16.5	0.223	0.217	0.211	0.205	0.200	0.195	0.190	0.186	0.182
17.0	0.204	0.198	0.192	0.187	0.183	0.178	0.174	0.170	0.166
17.5	0.186	0.181	0.176	0.172	0.167	0.163	0.159	0.156	0.152
18.0	0.171	0.166	0.162	0.158	0.154	0.150	0.147	0.143	0.140
18.5	0.158	0.153	0.149	0.146	0.142	0.139	0.135	0.132	0.129
19.0	0.146	0.142	0.138	0.135	0.131	0.128	0.125	0.123	0.120
19.5	0.135	0.131	0.128	0.125	0.122	0.119	0.116	0.114	0.111
20.0	0.125	0.122	0.119	0.116	0.113	0.111	0.108	0.106	0.104
20.5	0.117	0.114	0.111	0.108	0.106	0.103	0.101	0.099	0.097
21.0	0.109	0.106	0.104	0.101	0.099	0.096	0.094	0.092	0.090
21.5	0.102	0.099	0.097	0.095	0.092	0.090	0.088	0.086	0.085
22.0	0.095	0.093	0.091	0.089	0.087	0.085	0.083	0.081	0.080
22.5	0.090	0.087	0.085	0.083	0.081	0.080	0.078	0.076	0.075
23.0	0.084	0.082	0.080	0.078	0.077	0.075	0.073	0.072	0.070
23.5	0.079	0.078	0.076	0.074	0.072	0.071	0.069	0.068	0.067
24.0	0.075	0.073	0.071	0.070	0.068	0.067	0.065	0.064	0.063
24.5	0.071	0.069	0.068	0.066	0.065	0.063	0.062	0.061	0.059
25.0	0.067	0.065	0.064	0.063	0.061	0.060	0.059	0.057	0.056



## Thrust curves - Nordex N90/2500 HS

## Mode 3 / Sound optimized mode - 103.5 dB(A)

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	0.909	0.910	0.912	0.914	<b>0.916</b>	0.918	0.920	0.922
3.5	0.934	0.937	0.940	0.943	<b>0.946</b>	0.949	0.952	0.955
4.0	0.954	0.959	0.962	0.966	<b>0.970</b>	0.974	0.978	0.981
4.5	0.973	0.977	0.982	0.987	<b>0.991</b>	0.996	1.000	1.000
5.0	0.977	0.978	0.979	0.980	<b>0.981</b>	0.982	0.982	0.983
5.5	0.927	0.928	0.929	0.930	<b>0.931</b>	0.932	0.933	0.934
6.0	0.881	0.882	0.884	0.885	<b>0.886</b>	0.888	0.889	0.891
6.5	0.872	0.872	0.871	0.871	<b>0.871</b>	0.870	0.870	0.870
7.0	0.869	0.868	0.868	0.868	<b>0.867</b>	0.867	0.867	0.867
7.5	0.848	0.849	0.848	0.848	<b>0.847</b>	0.847	0.846	0.845
8.0	0.800	0.800	0.800	0.799	<b>0.798</b>	0.798	0.797	0.797
8.5	0.756	0.756	0.755	0.755	<b>0.754</b>	0.754	0.753	0.753
9.0	0.713	0.713	0.713	0.712	<b>0.712</b>	0.712	0.711	0.711
9.5	0.673	0.674	0.673	0.673	<b>0.672</b>	0.672	0.672	0.671
10.0	0.636	0.637	0.637	0.636	<b>0.636</b>	0.636	0.635	0.635
10.5	0.601	0.602	0.602	0.602	<b>0.602</b>	0.602	0.602	0.601
11.0	0.568	0.569	0.569	0.569	<b>0.569</b>	0.569	0.569	0.569
11.5	0.537	0.538	0.539	0.539	<b>0.539</b>	0.539	0.524	0.508
12.0	0.508	0.509	0.495	0.479	<b>0.464</b>	0.451	0.439	0.428
12.5	0.445	0.432	0.419	0.408	<b>0.397</b>	0.387	0.378	0.369
13.0	0.383	0.373	0.363	0.354	<b>0.346</b>	0.338	0.330	0.323
13.5	0.336	0.327	0.319	0.312	<b>0.304</b>	0.298	0.291	0.285
14.0	0.297	0.290	0.283	0.276	<b>0.270</b>	0.264	0.259	0.254
14.5	0.265	0.259	0.253	0.247	<b>0.242</b>	0.237	0.232	0.227
15.0	0.238	0.232	0.227	0.222	<b>0.218</b>	0.213	0.209	0.205
15.5	0.215	0.210	0.205	0.201	<b>0.197</b>	0.193	0.189	0.185
16.0	0.195	0.190	0.186	0.182	<b>0.179</b>	0.175	0.172	0.169
16.5	0.177	0.174	0.170	0.166	<b>0.163</b>	0.160	0.157	0.154
17.0	0.162	0.159	0.156	0.152	<b>0.149</b>	0.146	0.144	0.141
17.5	0.149	0.146	0.143	0.140	<b>0.137</b>	0.135	0.132	0.130
18.0	0.137	0.134	0.132	0.129	<b>0.127</b>	0.124	0.122	0.120
18.5	0.127	0.124	0.122	0.119	<b>0.117</b>	0.115	0.113	0.111
19.0	0.117	0.115	0.113	0.111	<b>0.108</b>	0.106	0.105	0.103
19.5	0.109	0.107	0.105	0.103	<b>0.101</b>	0.099	0.097	0.096
20.0	0.102	0.100	0.098	0.096	<b>0.094</b>	0.092	0.091	0.089
20.5	0.095	0.093	0.091	0.089	<b>0.088</b>	0.086	0.085	0.083
21.0	0.089	0.087	0.085	0.084	<b>0.082</b>	0.081	0.079	0.078
21.5	0.083	0.081	0.080	0.078	<b>0.077</b>	0.076	0.074	0.073
22.0	0.078	0.076	0.075	0.074	<b>0.072</b>	0.071	0.070	0.069
22.5	0.073	0.072	0.071	0.069	<b>0.068</b>	0.067	0.066	0.065
23.0	0.069	0.068	0.067	0.065	<b>0.064</b>	0.063	0.062	0.061
23.5	0.065	0.064	0.063	0.062	<b>0.061</b>	0.060	0.059	0.058
24.0	0.062	0.061	0.059	0.058	<b>0.057</b>	0.056	0.055	0.055
24.5	0.058	0.057	0.056	0.055	<b>0.054</b>	0.053	0.053	0.052
25.0	0.055	0.054	0.053	0.052	<b>0.052</b>	0.051	0.050	0.049

**Noise level - Nordex N90/2500 HS****Mode 4 / Sound optimized mode - 102.0 dB(A)**

Basis: The specified sound power level is an expected value in terms of statistics. Results of single measurements will be within the confidence interval according to IEC 61400-14 [4].

Wind turbine data:

Operational mode: Mode 4 / Sound optimized mode - 102.0 dB(A)

Rotor diameter: 90 m

Remarks:

Verification according to: Measurements are to be carried out by a measuring institute accredited for noise emission measurements at wind turbines according to ISO/IEC 17025 [3] at the reference position as defined in IEC 61400-11 [1]. The data analysis must be carried out according to the preferred method 1 of IEC 61400-11 [1]. The tonal penalties in the vicinity of wind turbines  $K_{TN}$  based on these measurements are to be determined according to „Technische Richtlinien für Windenergieanlagen“ [2].

Tonality: The noise can be tonal in the vicinity of wind turbines. The specified sound power level includes potential tonal penalties according to „Technische Richtlinien für Windenergieanlagen“ [2], without taking account any tonality  $K_{TN} \leq 2$  dB.

[1] IEC 61400-11 ed. 2: Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques; 2002-12

[2] Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte, Revision 18; FGW 2008-02

[3] ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories; 2005-08

[4] IEC 61400-14, Wind turbines – Part 14: Declaration of apparent sound power level and tonality values, first edition, 2005-03

**Noise level - Nordex N90/2500 HS**

**Mode 4 / Sound optimized mode - 102.0 dB(A)**

Maximum sound power level $L_{WA}$ [dB(A)] over the complete operating range of the turbine
102.0

**Power curves - Nordex N90/2500 HS****Mode 4 / Sound optimized mode - 102.0 dB(A)**

Basis: These power curve values according to IEC 61400-12-1 are based on aerodynamic calculations by Nordex Energy GmbH.

Wind turbine data:

Operational mode: Mode 4 / Sound optimized mode - 102.0 dB(A)

Rotor diameter: 90 m

Determinations for the power curve verification:

Verification according to: IEC 61400-12-1:2005

Type of anemometer: Thies First Class (Advanced), Risø P2546A or Vector A100

Measurement of power: low voltage side, 660 VAC

Air density: normalization to the nearest air density shown in the table

Filter of turbulence:  $9 \% \leq TI \leq 15 \%$

Filter of wind shear:  $a \leq 0.2$  (Hellman exponent)  
Wind shear measurement and determination according to the requirements of MEASNET power performance measurement procedure, Version 5, December – 2009, chapter 3.3 and 3.8

Filter of temperature:  $2\text{ }^{\circ}\text{C} \leq \theta \leq 25\text{ }^{\circ}\text{C}$

Status signal: Ready for operation without consideration of the cut-out hysteresis  
(IEC 61400-12-1:2005, database B)

## Power curves - Nordex N90/2500 HS

## Mode 4 / Sound optimized mode - 102.0 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	1	1	2	2	3	4	4	5	6
3.5	26	27	28	30	31	33	34	35	37
4.0	58	61	63	65	67	69	72	74	76
4.5	99	102	106	109	112	115	118	121	125
5.0	149	153	158	162	167	171	176	180	185
5.5	208	215	221	228	234	240	246	253	259
6.0	279	288	296	305	313	321	330	338	347
6.5	360	370	381	392	402	413	424	434	445
7.0	447	460	473	486	499	512	525	538	551
7.5	537	552	568	583	598	614	629	645	661
8.0	627	645	663	681	699	717	736	754	773
8.5	718	738	759	780	800	822	843	865	887
9.0	808	832	855	879	903	927	952	976	1002
9.5	899	925	952	978	1006	1033	1061	1089	1119
10.0	989	1020	1049	1079	1109	1140	1171	1203	1236
10.5	1080	1114	1147	1180	1213	1247	1283	1318	1355
11.0	1172	1208	1244	1281	1318	1356	1394	1434	1474
11.5	1263	1303	1343	1382	1423	1464	1507	1550	1594
12.0	1355	1398	1441	1484	1528	1573	1620	1667	1714
12.5	1446	1494	1540	1586	1634	1683	1732	1781	1821
13.0	1539	1590	1639	1690	1740	1790	1831	1872	1902
13.5	1632	1687	1739	1790	1834	1874	1907	1938	1961
14.0	1726	1781	1829	1871	1906	1938	1961	1984	1998
14.5	1814	1860	1899	1932	1958	1982	1997	2012	2016
15.0	1884	1921	1952	1976	1994	2009	2015	2020	2020
15.5	1938	1966	1988	2004	2014	2020	2020	2020	2020
16.0	1978	1997	2011	2018	2020	2020	2020	2020	2020
16.5	2004	2014	2020	2020	2020	2020	2020	2020	2020
17.0	2018	2020	2020	2020	2020	2020	2020	2020	2020
17.5	2020	2020	2020	2020	2020	2020	2020	2020	2020
18.0	2020	2020	2020	2020	2020	2020	2020	2020	2020
18.5	2020	2020	2020	2020	2020	2020	2020	2020	2020
19.0	2020	2020	2020	2020	2020	2020	2020	2020	2020
19.5	2020	2020	2020	2020	2020	2020	2020	2020	2020
20.0	2020	2020	2020	2020	2020	2020	2020	2020	2020
20.5	2020	2020	2020	2020	2020	2020	2020	2020	2020
21.0	2020	2020	2020	2020	2020	2020	2020	2020	2020
21.5	2020	2020	2020	2020	2020	2020	2020	2020	2020
22.0	2020	2020	2020	2020	2020	2020	2020	2020	2020
22.5	2020	2020	2020	2020	2020	2020	2020	2020	2020
23.0	2020	2020	2020	2020	2020	2020	2020	2020	2020
23.5	2020	2020	2020	2020	2020	2020	2020	2020	2020
24.0	2020	2020	2020	2020	2020	2020	2020	2020	2020
24.5	2020	2020	2020	2020	2020	2020	2020	2020	2020
25.0	2020	2020	2020	2020	2020	2020	2020	2020	2020

## Power curves - Nordex N90/2500 HS

## Mode 4 / Sound optimized mode - 102.0 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	6	7	8	9	9	10	11	11
3.5	38	39	41	42	43	45	46	47
4.0	78	80	82	84	87	89	91	93
4.5	128	131	134	137	140	143	146	149
5.0	189	194	198	203	208	212	217	221
5.5	266	272	278	285	291	297	304	310
6.0	355	364	372	380	389	397	405	414
6.5	456	466	477	487	498	508	519	529
7.0	564	577	590	602	615	628	640	653
7.5	677	692	707	722	737	751	766	781
8.0	792	810	827	844	861	877	894	911
8.5	909	929	948	967	986	1005	1024	1043
9.0	1028	1050	1072	1093	1114	1136	1157	1177
9.5	1148	1173	1197	1221	1245	1268	1291	1314
10.0	1270	1298	1324	1350	1376	1402	1427	1452
10.5	1392	1423	1452	1481	1509	1537	1565	1592
11.0	1515	1550	1581	1613	1644	1675	1705	1735
11.5	1639	1677	1711	1746	1773	1800	1826	1851
12.0	1762	1795	1824	1853	1875	1894	1914	1933
12.5	1861	1887	1909	1931	1947	1960	1974	1987
13.0	1933	1952	1968	1983	1993	2001	2008	2016
13.5	1983	1994	2004	2013	2016	2018	2019	2020
14.0	2012	2016	2018	2020	2020	2020	2020	2020
14.5	2020	2020	2020	2020	2020	2020	2020	2020
15.0	2020	2020	2020	2020	2020	2020	2020	2020
15.5	2020	2020	2020	2020	2020	2020	2020	2020
16.0	2020	2020	2020	2020	2020	2020	2020	2020
16.5	2020	2020	2020	2020	2020	2020	2020	2020
17.0	2020	2020	2020	2020	2020	2020	2020	2020
17.5	2020	2020	2020	2020	2020	2020	2020	2020
18.0	2020	2020	2020	2020	2020	2020	2020	2020
18.5	2020	2020	2020	2020	2020	2020	2020	2020
19.0	2020	2020	2020	2020	2020	2020	2020	2020
19.5	2020	2020	2020	2020	2020	2020	2020	2020
20.0	2020	2020	2020	2020	2020	2020	2020	2020
20.5	2020	2020	2020	2020	2020	2020	2020	2020
21.0	2020	2020	2020	2020	2020	2020	2020	2020
21.5	2020	2020	2020	2020	2020	2020	2020	2020
22.0	2020	2020	2020	2020	2020	2020	2020	2020
22.5	2020	2020	2020	2020	2020	2020	2020	2020
23.0	2020	2020	2020	2020	2020	2020	2020	2020
23.5	2020	2020	2020	2020	2020	2020	2020	2020
24.0	2020	2020	2020	2020	2020	2020	2020	2020
24.5	2020	2020	2020	2020	2020	2020	2020	2020
25.0	2020	2020	2020	2020	2020	2020	2020	2020

## Thrust curves - Nordex N90/2500 HS

### Mode 4 / Sound optimized mode - 102.0 dB(A)

Basis:

The represented thrust coefficients are based on aerodynamical calculations of the Nordex Energy GmbH. The thrust curves are only for information and will not be warranted.

Wind turbine data:

Operational mode:

Mode 4 / Sound optimized mode - 102.0 dB(A)

Blade regulation:

Pitch

Air density:

to the nearest air density shown in the table

**Thrust curves - Nordex N90/2500 HS****Mode 4 / Sound optimized mode - 102.0 dB(A)**

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	0.891	0.893	0.895	0.897	0.899	0.901	0.903	0.905	0.906
3.5	0.907	0.910	0.913	0.916	0.919	0.922	0.925	0.928	0.931
4.0	0.918	0.922	0.926	0.930	0.934	0.938	0.942	0.946	0.950
4.5	0.927	0.933	0.938	0.943	0.948	0.953	0.958	0.963	0.968
5.0	0.936	0.942	0.948	0.954	0.960	0.966	0.971	0.976	0.976
5.5	0.917	0.918	0.919	0.920	0.921	0.923	0.924	0.925	0.926
6.0	0.882	0.881	0.881	0.880	0.879	0.879	0.878	0.878	0.879
6.5	0.833	0.833	0.834	0.834	0.834	0.835	0.835	0.833	0.831
7.0	0.778	0.776	0.773	0.771	0.770	0.768	0.767	0.766	0.765
7.5	0.711	0.710	0.708	0.707	0.706	0.705	0.705	0.705	0.705
8.0	0.651	0.651	0.650	0.649	0.649	0.649	0.649	0.650	0.651
8.5	0.598	0.598	0.598	0.598	0.598	0.599	0.599	0.600	0.602
9.0	0.551	0.552	0.552	0.552	0.553	0.554	0.555	0.556	0.558
9.5	0.510	0.510	0.511	0.511	0.512	0.514	0.515	0.517	0.519
10.0	0.472	0.473	0.474	0.475	0.476	0.477	0.479	0.481	0.483
10.5	0.439	0.440	0.441	0.442	0.443	0.445	0.447	0.449	0.451
11.0	0.409	0.410	0.412	0.413	0.414	0.416	0.418	0.420	0.423
11.5	0.382	0.384	0.385	0.386	0.388	0.389	0.391	0.394	0.396
12.0	0.358	0.360	0.361	0.362	0.364	0.366	0.368	0.370	0.373
12.5	0.336	0.338	0.339	0.341	0.342	0.344	0.346	0.349	0.351
13.0	0.317	0.318	0.320	0.321	0.323	0.325	0.327	0.329	0.332
13.5	0.299	0.301	0.302	0.303	0.305	0.307	0.309	0.311	0.300
14.0	0.282	0.284	0.286	0.287	0.289	0.291	0.281	0.272	0.264
14.5	0.268	0.270	0.271	0.272	0.265	0.257	0.249	0.242	0.236
15.0	0.254	0.256	0.253	0.244	0.236	0.229	0.223	0.217	0.212
15.5	0.242	0.233	0.225	0.218	0.212	0.206	0.201	0.196	0.191
16.0	0.217	0.209	0.203	0.197	0.192	0.187	0.182	0.178	0.174
16.5	0.196	0.190	0.184	0.179	0.175	0.170	0.166	0.162	0.158
17.0	0.178	0.173	0.168	0.164	0.160	0.156	0.152	0.148	0.145
17.5	0.163	0.159	0.154	0.150	0.146	0.143	0.139	0.136	0.133
18.0	0.150	0.146	0.142	0.138	0.135	0.131	0.128	0.125	0.123
18.5	0.138	0.134	0.131	0.127	0.124	0.121	0.119	0.116	0.113
19.0	0.128	0.124	0.121	0.118	0.115	0.112	0.110	0.107	0.105
19.5	0.118	0.115	0.112	0.109	0.107	0.104	0.102	0.100	0.098
20.0	0.110	0.107	0.104	0.102	0.099	0.097	0.095	0.093	0.091
20.5	0.102	0.100	0.097	0.095	0.093	0.090	0.088	0.087	0.085
21.0	0.096	0.093	0.091	0.089	0.087	0.085	0.083	0.081	0.079
21.5	0.089	0.087	0.085	0.083	0.081	0.079	0.077	0.076	0.074
22.0	0.084	0.082	0.080	0.078	0.076	0.074	0.073	0.071	0.070
22.5	0.079	0.077	0.075	0.073	0.071	0.070	0.068	0.067	0.066
23.0	0.074	0.072	0.070	0.069	0.067	0.066	0.064	0.063	0.062
23.5	0.070	0.068	0.066	0.065	0.063	0.062	0.061	0.059	0.058
24.0	0.066	0.064	0.063	0.061	0.060	0.059	0.057	0.056	0.055
24.5	0.062	0.061	0.059	0.058	0.057	0.055	0.054	0.053	0.052
25.0	0.059	0.057	0.056	0.055	0.054	0.052	0.051	0.050	0.049



## Thrust curves - Nordex N90/2500 HS

## Mode 4 / Sound optimized mode - 102.0 dB(A)

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	0.908	0.910	0.912	0.914	<b>0.916</b>	0.918	0.920	0.922
3.5	0.934	0.937	0.940	0.943	<b>0.946</b>	0.949	0.952	0.955
4.0	0.954	0.958	0.962	0.966	<b>0.970</b>	0.974	0.977	0.981
4.5	0.972	0.977	0.982	0.986	<b>0.991</b>	0.995	1.000	1.000
5.0	0.977	0.978	0.979	0.980	<b>0.981</b>	0.981	0.982	0.983
5.5	0.927	0.928	0.929	0.930	<b>0.931</b>	0.932	0.933	0.934
6.0	0.881	0.882	0.884	0.885	<b>0.886</b>	0.888	0.889	0.890
6.5	0.830	0.828	0.827	0.825	<b>0.823</b>	0.822	0.820	0.818
7.0	0.765	0.764	0.762	0.760	<b>0.758</b>	0.756	0.755	0.753
7.5	0.706	0.705	0.703	0.701	<b>0.699</b>	0.697	0.695	0.693
8.0	0.652	0.651	0.649	0.647	<b>0.645</b>	0.644	0.642	0.640
8.5	0.604	0.603	0.601	0.599	<b>0.597</b>	0.595	0.594	0.592
9.0	0.560	0.560	0.558	0.556	<b>0.554</b>	0.553	0.551	0.549
9.5	0.521	0.521	0.519	0.518	<b>0.516</b>	0.514	0.513	0.511
10.0	0.486	0.485	0.484	0.483	<b>0.481</b>	0.479	0.478	0.476
10.5	0.454	0.454	0.452	0.451	<b>0.450</b>	0.448	0.447	0.445
11.0	0.425	0.425	0.424	0.423	<b>0.421</b>	0.420	0.419	0.417
11.5	0.399	0.399	0.398	0.397	<b>0.396</b>	0.394	0.393	0.392
12.0	0.375	0.375	0.374	0.373	<b>0.372</b>	0.371	0.370	0.368
12.5	0.354	0.354	0.353	0.352	<b>0.343</b>	0.334	0.326	0.318
13.0	0.334	0.324	0.315	0.307	<b>0.299</b>	0.292	0.285	0.279
13.5	0.291	0.283	0.276	0.270	<b>0.263</b>	0.258	0.252	0.247
14.0	0.258	0.251	0.245	0.240	<b>0.234</b>	0.229	0.225	0.220
14.5	0.230	0.225	0.220	0.215	<b>0.210</b>	0.206	0.201	0.197
15.0	0.207	0.202	0.198	0.193	<b>0.189</b>	0.185	0.182	0.178
15.5	0.187	0.183	0.179	0.175	<b>0.171</b>	0.168	0.165	0.161
16.0	0.170	0.166	0.162	0.159	<b>0.156</b>	0.153	0.150	0.147
16.5	0.155	0.151	0.148	0.145	<b>0.142</b>	0.139	0.137	0.134
17.0	0.142	0.139	0.136	0.133	<b>0.130</b>	0.128	0.125	0.123
17.5	0.130	0.127	0.125	0.122	<b>0.120</b>	0.118	0.115	0.113
18.0	0.120	0.117	0.115	0.113	<b>0.111</b>	0.108	0.106	0.105
18.5	0.111	0.109	0.106	0.104	<b>0.102</b>	0.100	0.099	0.097
19.0	0.103	0.101	0.099	0.097	<b>0.095</b>	0.093	0.091	0.090
19.5	0.095	0.094	0.092	0.090	<b>0.088</b>	0.087	0.085	0.084
20.0	0.089	0.087	0.085	0.084	<b>0.082</b>	0.081	0.079	0.078
20.5	0.083	0.081	0.080	0.078	<b>0.077</b>	0.075	0.074	0.073
21.0	0.078	0.076	0.075	0.073	<b>0.072</b>	0.071	0.069	0.068
21.5	0.073	0.071	0.070	0.069	<b>0.067</b>	0.066	0.065	0.064
22.0	0.068	0.067	0.066	0.065	<b>0.063</b>	0.062	0.061	0.060
22.5	0.064	0.063	0.062	0.061	<b>0.060</b>	0.059	0.058	0.057
23.0	0.061	0.059	0.058	0.057	<b>0.056</b>	0.055	0.054	0.053
23.5	0.057	0.056	0.055	0.054	<b>0.053</b>	0.052	0.051	0.051
24.0	0.054	0.053	0.052	0.051	<b>0.050</b>	0.049	0.049	0.048
24.5	0.051	0.050	0.049	0.048	<b>0.048</b>	0.047	0.046	0.045
25.0	0.048	0.048	0.047	0.046	<b>0.045</b>	0.044	0.044	0.043

**Noise level - Nordex N90/2500 HS****Mode 5 / Sound optimized mode - 105.5 dB(A)**

Basis: The specified sound power level is an expected value in terms of statistics. Results of single measurements will be within the confidence interval according to IEC 61400-14 [4].

Wind turbine data:

Operational mode: Mode 5 / Sound optimized mode - 105.5 dB(A)

Rotor diameter: 90 m

Remarks:

Verification according to: Measurements are to be carried out by a measuring institute accredited for noise emission measurements at wind turbines according to ISO/IEC 17025 [3] at the reference position as defined in IEC 61400-11 [1]. The data analysis must be carried out according to the preferred method 1 of IEC 61400-11 [1]. The tonal penalties in the vicinity of wind turbines  $K_{TN}$  based on these measurements are to be determined according to „Technische Richtlinien für Windenergieanlagen“ [2].

Tonality: The noise can be tonal in the vicinity of wind turbines. The specified sound power level includes potential tonal penalties according to „Technische Richtlinien für Windenergieanlagen“ [2], without taking account any tonality  $K_{TN} \leq 2$  dB.

[1] IEC 61400-11 ed. 2: Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques; 2002-12

[2] Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte, Revision 18; FGW 2008-02

[3] ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories; 2005-08

[4] IEC 61400-14, Wind turbines – Part 14: Declaration of apparent sound power level and tonality values, first edition, 2005-03

**Noise level - Nordex N90/2500 HS**

**Mode 5 / Sound optimized mode - 105.5 dB(A)**

Maximum sound power level $L_{WA}$ [dB(A)] over the complete operating range of the turbine
105.5

**Power curves - Nordex N90/2500 HS****Mode 5 / Sound optimized mode - 105.5 dB(A)**

Basis: These power curve values according to IEC 61400-12-1 are based on aerodynamic calculations by Nordex Energy GmbH.

Wind turbine data:

Operational mode: Mode 5 / Sound optimized mode - 105.5 dB(A)

Rotor diameter: 90 m

Determinations for the power curve verification:

Verification according to: IEC 61400-12-1:2005

Type of anemometer: Thies First Class (Advanced), Risø P2546A or Vector A100

Measurement of power: low voltage side, 660 VAC

Air density: normalization to the nearest air density shown in the table

Filter of turbulence:  $9 \% \leq TI \leq 15 \%$

Filter of wind shear:  $a \leq 0.2$  (Hellman exponent)  
Wind shear measurement and determination according to the requirements of MEASNET power performance measurement procedure, Version 5, December – 2009, chapter 3.3 and 3.8

Filter of temperature:  $2\text{ °C} \leq \theta \leq 25\text{ °C}$

Status signal: Ready for operation without consideration of the cut-out hysteresis  
(IEC 61400-12-1:2005, database B)

## Power curves - Nordex N90/2500 HS

## Mode 5 / Sound optimized mode - 105.5 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	1	1	2	2	3	4	4	5	6
3.5	26	27	28	30	31	33	34	35	37
4.0	58	61	63	65	67	70	72	74	76
4.5	99	103	106	109	112	115	119	122	125
5.0	149	153	158	163	167	171	176	180	185
5.5	209	215	222	228	234	241	247	253	260
6.0	280	288	297	305	314	322	331	339	348
6.5	361	372	383	394	405	416	427	437	448
7.0	453	467	480	494	508	521	535	549	562
7.5	554	571	588	605	622	639	656	673	690
8.0	663	684	705	726	747	768	789	810	831
8.5	780	806	831	856	882	907	933	959	985
9.0	905	936	966	997	1027	1058	1090	1121	1153
9.5	1037	1074	1110	1147	1183	1221	1258	1296	1335
10.0	1178	1221	1264	1307	1350	1394	1439	1485	1530
10.5	1326	1377	1427	1477	1528	1580	1633	1686	1740
11.0	1482	1542	1600	1658	1717	1778	1840	1903	1966
11.5	1647	1716	1783	1850	1919	1988	2055	2110	2166
12.0	1821	1901	1976	2052	2114	2174	2230	2273	2316
12.5	2003	2090	2154	2219	2268	2315	2358	2389	2420
13.0	2168	2242	2293	2344	2380	2414	2444	2462	2480
13.5	2298	2357	2394	2431	2454	2475	2491	2495	2499
14.0	2393	2437	2460	2483	2492	2498	2500	2500	2500
14.5	2457	2485	2493	2500	2500	2500	2500	2500	2500
15.0	2491	2500	2500	2500	2500	2500	2500	2500	2500
15.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
16.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
16.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
17.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
17.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
18.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
18.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
19.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
19.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
20.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
20.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
21.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
21.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
22.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
22.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
23.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
23.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
24.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
24.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
25.0	2500	2500	2500	2500	2500	2500	2500	2500	2500

## Power curves - Nordex N90/2500 HS

## Mode 5 / Sound optimized mode - 105.5 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	6	7	8	9	<b>9</b>	10	11	11
3.5	38	39	41	42	<b>43</b>	45	46	47
4.0	78	80	83	85	<b>87</b>	89	91	93
4.5	128	131	134	137	<b>140</b>	144	147	150
5.0	190	194	199	203	<b>208</b>	213	217	222
5.5	266	273	279	285	<b>292</b>	298	304	311
6.0	356	365	373	382	<b>390</b>	398	407	415
6.5	459	470	481	492	<b>503</b>	513	524	535
7.0	576	590	603	617	<b>630</b>	644	658	671
7.5	707	724	741	758	<b>775</b>	791	808	825
8.0	852	873	893	914	<b>935</b>	955	976	996
8.5	1011	1036	1061	1086	<b>1111</b>	1136	1161	1186
9.0	1185	1215	1245	1274	<b>1304</b>	1334	1364	1394
9.5	1373	1409	1445	1480	<b>1515</b>	1551	1586	1621
10.0	1576	1619	1660	1702	<b>1743</b>	1786	1828	1871
10.5	1794	1845	1895	1944	<b>1990</b>	2030	2069	2109
11.0	2025	2071	2116	2160	<b>2200</b>	2230	2259	2289
11.5	2217	2252	2286	2320	<b>2349</b>	2370	2391	2412
12.0	2354	2379	2403	2428	<b>2447</b>	2458	2469	2480
12.5	2446	2460	2473	2487	<b>2495</b>	2497	2498	2499
13.0	2493	2496	2498	2500	<b>2500</b>	2500	2500	2500
13.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
14.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
14.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
15.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
15.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
16.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
16.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
17.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
17.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
18.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
18.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
19.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
19.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
20.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
20.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
21.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
21.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
22.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
22.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
23.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
23.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
24.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
24.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
25.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500

## Thrust curves - Nordex N90/2500 HS

### Mode 5 / Sound optimized mode - 105.5 dB(A)

Basis:

The represented thrust coefficients are based on aerodynamical calculations of the Nordex Energy GmbH. The thrust curves are only for information and will not be warranted.

Wind turbine data:

Operational mode:

Mode 5 / Sound optimized mode - 105.5 dB(A)

Blade regulation:

Pitch

Air density:

to the nearest air density shown in the table

**Thrust curves - Nordex N90/2500 HS****Mode 5 / Sound optimized mode - 105.5 dB(A)**

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	0.891	0.893	0.895	0.897	0.899	0.901	0.903	0.905	0.907
3.5	0.907	0.910	0.913	0.916	0.919	0.922	0.925	0.929	0.931
4.0	0.918	0.922	0.926	0.930	0.934	0.939	0.943	0.947	0.951
4.5	0.928	0.933	0.938	0.943	0.948	0.953	0.958	0.963	0.968
5.0	0.936	0.942	0.948	0.954	0.960	0.966	0.972	0.976	0.977
5.5	0.917	0.918	0.919	0.920	0.922	0.923	0.924	0.925	0.926
6.0	0.881	0.882	0.881	0.881	0.880	0.879	0.879	0.878	0.879
6.5	0.838	0.839	0.841	0.842	0.844	0.845	0.847	0.849	0.850
7.0	0.800	0.801	0.802	0.803	0.805	0.806	0.808	0.810	0.813
7.5	0.758	0.760	0.762	0.765	0.767	0.770	0.773	0.776	0.780
8.0	0.718	0.722	0.725	0.729	0.732	0.736	0.740	0.745	0.750
8.5	0.682	0.687	0.692	0.696	0.701	0.705	0.710	0.716	0.722
9.0	0.650	0.656	0.661	0.667	0.672	0.678	0.684	0.690	0.697
9.5	0.621	0.628	0.634	0.639	0.646	0.652	0.659	0.667	0.675
10.0	0.593	0.601	0.608	0.615	0.622	0.629	0.637	0.645	0.654
10.5	0.568	0.577	0.584	0.592	0.599	0.607	0.616	0.625	0.634
11.0	0.545	0.555	0.563	0.571	0.579	0.588	0.597	0.606	0.616
11.5	0.525	0.535	0.543	0.551	0.560	0.570	0.579	0.590	0.600
12.0	0.506	0.516	0.525	0.534	0.543	0.553	0.564	0.574	0.586
12.5	0.488	0.500	0.509	0.518	0.528	0.538	0.536	0.515	0.497
13.0	0.472	0.484	0.494	0.504	0.486	0.469	0.452	0.438	0.425
13.5	0.458	0.470	0.449	0.433	0.418	0.405	0.393	0.382	0.371
14.0	0.420	0.404	0.390	0.378	0.366	0.356	0.346	0.336	0.328
14.5	0.368	0.356	0.345	0.334	0.325	0.315	0.307	0.299	0.292
15.0	0.327	0.317	0.307	0.298	0.290	0.282	0.275	0.268	0.261
15.5	0.293	0.284	0.276	0.268	0.261	0.254	0.248	0.242	0.236
16.0	0.264	0.256	0.249	0.242	0.236	0.230	0.224	0.219	0.214
16.5	0.239	0.233	0.226	0.220	0.214	0.209	0.204	0.199	0.195
17.0	0.218	0.212	0.206	0.201	0.196	0.191	0.186	0.182	0.178
17.5	0.199	0.194	0.189	0.184	0.179	0.175	0.171	0.167	0.163
18.0	0.183	0.178	0.173	0.169	0.165	0.161	0.157	0.153	0.150
18.5	0.169	0.164	0.160	0.156	0.152	0.148	0.145	0.142	0.139
19.0	0.156	0.152	0.148	0.144	0.141	0.137	0.134	0.131	0.128
19.5	0.144	0.140	0.137	0.134	0.130	0.127	0.124	0.122	0.119
20.0	0.134	0.130	0.127	0.124	0.121	0.118	0.116	0.113	0.111
20.5	0.125	0.121	0.118	0.116	0.113	0.110	0.108	0.106	0.103
21.0	0.116	0.113	0.111	0.108	0.105	0.103	0.101	0.099	0.097
21.5	0.109	0.106	0.104	0.101	0.099	0.097	0.094	0.092	0.091
22.0	0.102	0.099	0.097	0.095	0.093	0.091	0.089	0.087	0.085
22.5	0.096	0.093	0.091	0.089	0.087	0.085	0.083	0.082	0.080
23.0	0.090	0.088	0.086	0.084	0.082	0.080	0.078	0.077	0.075
23.5	0.085	0.083	0.081	0.079	0.077	0.076	0.074	0.073	0.071
24.0	0.080	0.078	0.076	0.075	0.073	0.071	0.070	0.069	0.067
24.5	0.076	0.074	0.072	0.071	0.069	0.068	0.066	0.065	0.064
25.0	0.072	0.070	0.068	0.067	0.065	0.064	0.063	0.061	0.060



## Thrust curves - Nordex N90/2500 HS

## Mode 5 / Sound optimized mode - 105.5 dB(A)

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	0.909	0.910	0.912	0.914	<b>0.916</b>	0.918	0.920	0.922
3.5	0.934	0.937	0.940	0.943	<b>0.946</b>	0.949	0.952	0.955
4.0	0.955	0.959	0.962	0.966	<b>0.970</b>	0.974	0.978	0.981
4.5	0.973	0.977	0.982	0.987	<b>0.991</b>	0.996	1.000	1.000
5.0	0.977	0.978	0.979	0.980	<b>0.981</b>	0.982	0.982	0.983
5.5	0.927	0.928	0.929	0.930	<b>0.931</b>	0.932	0.933	0.934
6.0	0.881	0.882	0.884	0.885	<b>0.886</b>	0.888	0.889	0.891
6.5	0.852	0.853	0.854	0.856	<b>0.857</b>	0.859	0.860	0.862
7.0	0.815	0.817	0.819	0.821	<b>0.822</b>	0.824	0.826	0.827
7.5	0.784	0.786	0.788	0.790	<b>0.792</b>	0.794	0.796	0.798
8.0	0.754	0.757	0.760	0.762	<b>0.764</b>	0.767	0.769	0.771
8.5	0.728	0.731	0.734	0.737	<b>0.739</b>	0.742	0.745	0.747
9.0	0.704	0.708	0.711	0.714	<b>0.717</b>	0.720	0.723	0.725
9.5	0.683	0.687	0.691	0.694	<b>0.697</b>	0.700	0.704	0.707
10.0	0.663	0.668	0.672	0.676	<b>0.679</b>	0.683	0.687	0.690
10.5	0.644	0.650	0.654	0.658	<b>0.663</b>	0.667	0.671	0.675
11.0	0.627	0.633	0.638	0.643	<b>0.647</b>	0.652	0.657	0.661
11.5	0.611	0.618	0.623	0.628	<b>0.618</b>	0.593	0.572	0.554
12.0	0.580	0.556	0.537	0.519	<b>0.503</b>	0.489	0.476	0.464
12.5	0.480	0.466	0.453	0.441	<b>0.429</b>	0.419	0.409	0.399
13.0	0.413	0.402	0.392	0.382	<b>0.373</b>	0.364	0.356	0.348
13.5	0.361	0.352	0.344	0.335	<b>0.328</b>	0.321	0.314	0.307
14.0	0.319	0.312	0.304	0.297	<b>0.291</b>	0.285	0.279	0.273
14.5	0.285	0.278	0.272	0.266	<b>0.260</b>	0.254	0.249	0.244
15.0	0.255	0.249	0.244	0.239	<b>0.234</b>	0.229	0.224	0.220
15.5	0.230	0.225	0.220	0.216	<b>0.211</b>	0.207	0.203	0.199
16.0	0.209	0.204	0.200	0.196	<b>0.192</b>	0.188	0.184	0.181
16.5	0.190	0.186	0.182	0.178	<b>0.175</b>	0.171	0.168	0.165
17.0	0.174	0.170	0.167	0.163	<b>0.160</b>	0.157	0.154	0.151
17.5	0.160	0.156	0.153	0.150	<b>0.147</b>	0.144	0.142	0.139
18.0	0.147	0.144	0.141	0.138	<b>0.135</b>	0.133	0.130	0.128
18.5	0.136	0.133	0.130	0.128	<b>0.125</b>	0.123	0.121	0.119
19.0	0.126	0.123	0.121	0.118	<b>0.116</b>	0.114	0.112	0.110
19.5	0.117	0.114	0.112	0.110	<b>0.108</b>	0.106	0.104	0.102
20.0	0.109	0.106	0.104	0.102	<b>0.101</b>	0.099	0.097	0.095
20.5	0.101	0.099	0.097	0.096	<b>0.094</b>	0.092	0.091	0.089
21.0	0.095	0.093	0.091	0.089	<b>0.088</b>	0.086	0.085	0.083
21.5	0.089	0.087	0.085	0.084	<b>0.082</b>	0.081	0.080	0.078
22.0	0.083	0.082	0.080	0.079	<b>0.077</b>	0.076	0.075	0.074
22.5	0.078	0.077	0.076	0.074	<b>0.073</b>	0.072	0.070	0.069
23.0	0.074	0.073	0.071	0.070	<b>0.069</b>	0.068	0.066	0.065
23.5	0.070	0.068	0.067	0.066	<b>0.065</b>	0.064	0.063	0.062
24.0	0.066	0.065	0.064	0.062	<b>0.061</b>	0.060	0.059	0.058
24.5	0.062	0.061	0.060	0.059	<b>0.058</b>	0.057	0.056	0.055
25.0	0.059	0.058	0.057	0.056	<b>0.055</b>	0.054	0.053	0.053

**Noise level - Nordex N90/2500 HS****Mode 6 / Sound minimized mode - 105.5 dB(A)**

Basis: The specified sound power level is an expected value in terms of statistics. Results of single measurements will be within the confidence interval according to IEC 61400-14 [4].

Wind turbine data:

Operational mode: Mode 6 / Sound minimized mode - 105.5 dB(A)

Rotor diameter: 90 m

Remarks:

Verification according to: Measurements are to be carried out by a measuring institute accredited for noise emission measurements at wind turbines according to ISO/IEC 17025 [3] at the reference position as defined in IEC 61400-11 [1]. The data analysis must be carried out according to the preferred method 1 of IEC 61400-11 [1]. The tonal penalties in the vicinity of wind turbines  $K_{TN}$  based on these measurements are to be determined according to „Technische Richtlinien für Windenergieanlagen“ [2].

Tonality: The noise can be tonal in the vicinity of wind turbines. The specified sound power level includes potential tonal penalties according to „Technische Richtlinien für Windenergieanlagen“ [2], without taking account any tonality  $K_{TN} \leq 2$  dB.

[1] IEC 61400-11 ed. 2: Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques; 2002-12

[2] Technische Richtlinie für Windenergieanlagen – Teil 1: Bestimmung der Schallemissionswerte, Revision 18; FGW 2008-02

[3] ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories; 2005-08

[4] IEC 61400-14, Wind turbines – Part 14: Declaration of apparent sound power level and tonality values, first edition, 2005-03

## Noise level - Nordex N90/2500 HS

Mode 6 / Sound minimized mode - 105.5 dB(A)

Maximum sound power level $L_{WA}$ [dB(A)] over the complete operating range of the turbine
105.5

**Power curves - Nordex N90/2500 HS****Mode 6 / Sound minimized mode - 105.5 dB(A)**

Basis: These power curve values according to IEC 61400-12-1 are based on aerodynamic calculations by Nordex Energy GmbH.

Wind turbine data:

Operational mode: Mode 6 / Sound minimized mode - 105.5 dB(A)

Rotor diameter: 90 m

Determinations for the power curve verification:

Verification according to: IEC 61400-12-1:2005

Type of anemometer: Thies First Class (Advanced), Risø P2546A or Vector A100

Measurement of power: low voltage side, 660 VAC

Air density: normalization to the nearest air density shown in the table

Filter of turbulence:  $9 \% \leq TI \leq 15 \%$

Filter of wind shear:  $a \leq 0.2$  (Hellman exponent)  
Wind shear measurement and determination according to the requirements of MEASNET power performance measurement procedure, Version 5, December – 2009, chapter 3.3 and 3.8

Filter of temperature:  $2\text{ °C} \leq \theta \leq 25\text{ °C}$

Status signal: Ready for operation without consideration of the cut-out hysteresis  
(IEC 61400-12-1:2005, database B)

## Power curves - Nordex N90/2500 HS

## Mode 6 / Sound minimized mode - 105.5 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	1	1	2	2	3	4	4	5	6
3.5	26	27	29	30	32	33	35	36	37
4.0	59	61	64	66	68	71	73	76	78
4.5	101	104	108	111	115	118	122	125	129
5.0	151	156	161	165	170	175	180	185	190
5.5	210	216	223	230	236	243	249	256	262
6.0	278	286	295	303	312	320	329	337	346
6.5	353	364	375	385	396	407	417	428	439
7.0	436	449	462	475	488	501	514	528	541
7.5	523	538	554	570	586	602	618	634	650
8.0	619	638	657	676	695	713	732	751	770
8.5	758	780	802	824	847	869	891	913	936
9.0	924	951	977	1004	1030	1057	1084	1110	1137
9.5	1110	1142	1173	1205	1237	1268	1300	1332	1363
10.0	1297	1334	1371	1408	1445	1482	1519	1556	1594
10.5	1473	1515	1557	1599	1642	1685	1728	1772	1816
11.0	1642	1690	1737	1785	1833	1882	1932	1982	2034
11.5	1807	1860	1913	1966	2021	2077	2126	2171	2216
12.0	1970	2028	2086	2144	2190	2238	2279	2313	2348
12.5	2127	2186	2235	2283	2319	2357	2387	2412	2437
13.0	2260	2308	2346	2384	2410	2437	2457	2472	2486
13.5	2360	2397	2425	2452	2468	2484	2494	2497	2500
14.0	2431	2457	2474	2491	2495	2499	2500	2500	2500
14.5	2475	2491	2496	2500	2500	2500	2500	2500	2500
15.0	2496	2500	2500	2500	2500	2500	2500	2500	2500
15.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
16.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
16.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
17.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
17.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
18.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
18.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
19.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
19.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
20.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
20.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
21.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
21.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
22.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
22.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
23.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
23.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
24.0	2500	2500	2500	2500	2500	2500	2500	2500	2500
24.5	2500	2500	2500	2500	2500	2500	2500	2500	2500
25.0	2500	2500	2500	2500	2500	2500	2500	2500	2500

## Power curves - Nordex N90/2500 HS

## Mode 6 / Sound minimized mode - 105.5 dB(A)

wind speed $v_{hub}$ [m/s]	Power $P_{el}$ [kW] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	7	7	8	9	<b>9</b>	10	11	12
3.5	39	40	42	43	<b>45</b>	46	47	49
4.0	80	83	85	87	<b>89</b>	92	94	96
4.5	132	136	139	142	<b>146</b>	149	153	156
5.0	195	200	204	209	<b>214</b>	219	224	229
5.5	269	275	282	289	<b>295</b>	302	308	315
6.0	354	363	371	380	<b>388</b>	397	405	414
6.5	450	460	471	482	<b>492</b>	503	514	525
7.0	554	567	581	594	<b>607</b>	620	634	647
7.5	666	682	698	714	<b>730</b>	746	762	779
8.0	789	809	828	847	<b>866</b>	885	904	924
8.5	958	980	1003	1025	<b>1047</b>	1070	1092	1115
9.0	1164	1190	1217	1243	<b>1270</b>	1297	1324	1351
9.5	1395	1427	1459	1490	<b>1522</b>	1553	1585	1616
10.0	1632	1669	1706	1743	<b>1781</b>	1819	1857	1895
10.5	1861	1905	1949	1993	<b>2032</b>	2068	2103	2139
11.0	2081	2120	2160	2199	<b>2231</b>	2258	2285	2312
11.5	2255	2285	2315	2344	<b>2368</b>	2387	2405	2424
12.0	2377	2398	2419	2440	<b>2455</b>	2464	2474	2484
12.5	2456	2467	2479	2490	<b>2496</b>	2497	2498	2499
13.0	2495	2497	2498	2500	<b>2500</b>	2500	2500	2500
13.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
14.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
14.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
15.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
15.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
16.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
16.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
17.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
17.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
18.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
18.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
19.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
19.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
20.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
20.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
21.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
21.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
22.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
22.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
23.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
23.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
24.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
24.5	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500
25.0	2500	2500	2500	2500	<b>2500</b>	2500	2500	2500

## Thrust curves - Nordex N90/2500 HS

### Mode 6 / Sound minimized mode - 105.5 dB(A)

Basis:

The represented thrust coefficients are based on aerodynamical calculations of the Nordex Energy GmbH. The thrust curves are only for information and will not be warranted.

Wind turbine data:

Operational mode:

Mode 6 / Sound minimized mode - 105.5 dB(A)

Blade regulation:

Pitch

Air density:

to the nearest air density shown in the table

**Thrust curves - Nordex N90/2500 HS****Mode 6 / Sound minimized mode - 105.5 dB(A)**

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]								
	0.900	0.925	0.950	0.975	1.000	1.025	1.050	1.075	1.100
3.0	0.891	0.892	0.893	0.894	0.896	0.897	0.898	0.899	0.900
3.5	0.884	0.886	0.888	0.890	0.892	0.894	0.895	0.897	0.899
4.0	0.874	0.877	0.879	0.882	0.884	0.887	0.890	0.892	0.895
4.5	0.863	0.866	0.870	0.873	0.877	0.880	0.883	0.886	0.889
5.0	0.853	0.857	0.861	0.865	0.869	0.872	0.876	0.880	0.884
5.5	0.844	0.849	0.851	0.852	0.852	0.853	0.853	0.854	0.854
6.0	0.799	0.800	0.800	0.801	0.802	0.802	0.803	0.803	0.804
6.5	0.755	0.755	0.756	0.757	0.758	0.758	0.759	0.760	0.761
7.0	0.712	0.713	0.714	0.715	0.716	0.717	0.718	0.719	0.720
7.5	0.671	0.673	0.674	0.675	0.676	0.677	0.678	0.679	0.680
8.0	0.633	0.634	0.636	0.637	0.638	0.640	0.641	0.642	0.644
8.5	0.594	0.596	0.598	0.599	0.601	0.603	0.604	0.606	0.607
9.0	0.685	0.683	0.682	0.681	0.680	0.679	0.678	0.677	0.676
9.5	0.730	0.730	0.729	0.729	0.728	0.728	0.727	0.727	0.727
10.0	0.716	0.717	0.718	0.719	0.719	0.720	0.721	0.722	0.723
10.5	0.684	0.685	0.686	0.687	0.688	0.689	0.689	0.689	0.691
11.0	0.651	0.651	0.650	0.650	0.650	0.650	0.652	0.654	0.657
11.5	0.610	0.610	0.610	0.610	0.612	0.614	0.617	0.620	0.625
12.0	0.571	0.572	0.573	0.575	0.577	0.580	0.584	0.588	0.593
12.5	0.536	0.538	0.540	0.542	0.545	0.549	0.536	0.515	0.497
13.0	0.504	0.506	0.509	0.509	0.486	0.469	0.452	0.438	0.425
13.5	0.475	0.469	0.449	0.432	0.418	0.405	0.393	0.382	0.371
14.0	0.420	0.404	0.390	0.378	0.366	0.356	0.346	0.336	0.328
14.5	0.368	0.356	0.345	0.334	0.325	0.315	0.307	0.299	0.292
15.0	0.327	0.317	0.307	0.298	0.290	0.282	0.275	0.268	0.261
15.5	0.293	0.284	0.276	0.268	0.261	0.254	0.248	0.242	0.236
16.0	0.264	0.256	0.249	0.242	0.236	0.230	0.224	0.219	0.214
16.5	0.239	0.233	0.226	0.220	0.214	0.209	0.204	0.199	0.195
17.0	0.218	0.212	0.206	0.201	0.196	0.191	0.186	0.182	0.178
17.5	0.199	0.194	0.189	0.184	0.179	0.175	0.171	0.167	0.163
18.0	0.183	0.178	0.173	0.169	0.165	0.161	0.157	0.153	0.150
18.5	0.169	0.164	0.160	0.156	0.152	0.148	0.145	0.142	0.139
19.0	0.156	0.152	0.148	0.144	0.141	0.137	0.134	0.131	0.128
19.5	0.144	0.140	0.137	0.134	0.130	0.127	0.124	0.122	0.119
20.0	0.134	0.130	0.127	0.124	0.121	0.118	0.116	0.113	0.111
20.5	0.125	0.121	0.118	0.116	0.113	0.110	0.108	0.106	0.103
21.0	0.116	0.113	0.111	0.108	0.105	0.103	0.101	0.099	0.097
21.5	0.109	0.106	0.104	0.101	0.099	0.097	0.094	0.092	0.091
22.0	0.102	0.099	0.097	0.095	0.093	0.091	0.089	0.087	0.085
22.5	0.096	0.093	0.091	0.089	0.087	0.085	0.083	0.082	0.080
23.0	0.090	0.088	0.086	0.084	0.082	0.080	0.078	0.077	0.075
23.5	0.085	0.083	0.081	0.079	0.077	0.076	0.074	0.073	0.071
24.0	0.080	0.078	0.076	0.075	0.073	0.071	0.070	0.069	0.067
24.5	0.076	0.074	0.072	0.071	0.069	0.068	0.066	0.065	0.064
25.0	0.072	0.070	0.068	0.067	0.065	0.064	0.063	0.061	0.060



## Thrust curves - Nordex N90/2500 HS

## Mode 6 / Sound minimized mode - 105.5 dB(A)

wind speed $v_{hub}$ [m/s]	Thrust coefficients $c_T$ [-] at air density $\rho$ [kg/m <sup>3</sup> ]							
	1.125	1.150	1.175	1.200	1.225	1.250	1.275	1.300
3.0	0.901	0.903	0.904	0.905	<b>0.906</b>	0.907	0.909	0.910
3.5	0.901	0.903	0.905	0.907	<b>0.909</b>	0.911	0.912	0.914
4.0	0.897	0.900	0.903	0.905	<b>0.908</b>	0.910	0.913	0.915
4.5	0.893	0.896	0.899	0.902	<b>0.906</b>	0.909	0.912	0.915
5.0	0.888	0.892	0.896	0.900	<b>0.904</b>	0.907	0.909	0.910
5.5	0.855	0.855	0.856	0.856	<b>0.857</b>	0.857	0.857	0.858
6.0	0.805	0.805	0.806	0.806	<b>0.807</b>	0.807	0.808	0.809
6.5	0.761	0.762	0.763	0.763	<b>0.764</b>	0.765	0.765	0.766
7.0	0.721	0.722	0.722	0.723	<b>0.724</b>	0.725	0.726	0.727
7.5	0.681	0.683	0.684	0.685	<b>0.686</b>	0.687	0.688	0.689
8.0	0.645	0.646	0.648	0.649	<b>0.650</b>	0.651	0.653	0.654
8.5	0.609	0.611	0.612	0.614	<b>0.615</b>	0.617	0.618	0.620
9.0	0.676	0.675	0.674	0.673	<b>0.672</b>	0.671	0.671	0.670
9.5	0.726	0.726	0.726	0.725	<b>0.725</b>	0.725	0.724	0.724
10.0	0.724	0.725	0.726	0.727	<b>0.728</b>	0.729	0.730	0.730
10.5	0.693	0.694	0.695	0.696	<b>0.697</b>	0.698	0.699	0.700
11.0	0.661	0.663	0.665	0.666	<b>0.667</b>	0.668	0.670	0.671
11.5	0.630	0.632	0.634	0.635	<b>0.618</b>	0.593	0.572	0.554
12.0	0.580	0.556	0.537	0.519	<b>0.503</b>	0.489	0.476	0.464
12.5	0.480	0.466	0.453	0.441	<b>0.429</b>	0.419	0.409	0.399
13.0	0.413	0.402	0.392	0.382	<b>0.373</b>	0.364	0.356	0.348
13.5	0.361	0.352	0.344	0.335	<b>0.328</b>	0.321	0.314	0.307
14.0	0.319	0.312	0.304	0.297	<b>0.291</b>	0.285	0.279	0.273
14.5	0.285	0.278	0.272	0.266	<b>0.260</b>	0.254	0.249	0.244
15.0	0.255	0.249	0.244	0.239	<b>0.234</b>	0.229	0.224	0.220
15.5	0.230	0.225	0.220	0.216	<b>0.211</b>	0.207	0.203	0.199
16.0	0.209	0.204	0.200	0.196	<b>0.192</b>	0.188	0.184	0.181
16.5	0.190	0.186	0.182	0.178	<b>0.175</b>	0.171	0.168	0.165
17.0	0.174	0.170	0.167	0.163	<b>0.160</b>	0.157	0.154	0.151
17.5	0.160	0.156	0.153	0.150	<b>0.147</b>	0.144	0.142	0.139
18.0	0.147	0.144	0.141	0.138	<b>0.135</b>	0.133	0.130	0.128
18.5	0.136	0.133	0.130	0.128	<b>0.125</b>	0.123	0.121	0.119
19.0	0.126	0.123	0.121	0.118	<b>0.116</b>	0.114	0.112	0.110
19.5	0.117	0.114	0.112	0.110	<b>0.108</b>	0.106	0.104	0.102
20.0	0.109	0.106	0.104	0.102	<b>0.101</b>	0.099	0.097	0.095
20.5	0.101	0.099	0.097	0.096	<b>0.094</b>	0.092	0.091	0.089
21.0	0.095	0.093	0.091	0.089	<b>0.088</b>	0.086	0.085	0.083
21.5	0.089	0.087	0.085	0.084	<b>0.082</b>	0.081	0.080	0.078
22.0	0.083	0.082	0.080	0.079	<b>0.077</b>	0.076	0.075	0.074
22.5	0.078	0.077	0.076	0.074	<b>0.073</b>	0.072	0.070	0.069
23.0	0.074	0.073	0.071	0.070	<b>0.069</b>	0.068	0.066	0.065
23.5	0.070	0.068	0.067	0.066	<b>0.065</b>	0.064	0.063	0.062
24.0	0.066	0.065	0.064	0.062	<b>0.061</b>	0.060	0.059	0.058
24.5	0.062	0.061	0.060	0.059	<b>0.058</b>	0.057	0.056	0.055
25.0	0.059	0.058	0.057	0.056	<b>0.055</b>	0.054	0.053	0.053