WES18

TECHNICAL SPECIFICATIONS

De Weel 20, 1736 KB Zijdewind, The Netherlands,
tel. +31 226 425 150, fax: +31 226 423 433,
www.WindEnergySolutions.nl, info@WindEnergySolutions.nl

GENERAL

design acc.	NEN 6096
certified by	CIWI
cut in wind speed	3 m/sec.
rated wind speed	12 m/sec.
cut out wind speed	25 m/sec.
survival wind speed	60 m/sec.
nominal power	80 kW
grid voltage	400V ±10%
grid frequency	50/60Hz ±3Hz
specific power	315 W/m2
calculated lifetime	min. 20 years

ROTOR

number of blades	2
rotor position	upwind
angle of the main shaft	7^0 with horizon
diameter	18 m
swept area	254 m2
speed	variable 60 -120 rotations per minute
power regulation	passive: blade-angle adjustment active : fully variable mutator system
min. blade-angle	1.0
cone-angle	180 -164^0 (flapping range)
direction	clockwise
location main bearing	attached to gearbox

BLADES

blade length	7,8 m
weight one blade	86kg
chord	500 – 625mm
twist	5^0
material	carbon fibre reinforced epoxy
mounted	flexible

GEARBOX

number of stages	2
weight	700kg
ratio	1:20

GENERATOR

type	asynchronous
nominal power	80 kW
number of poles	4
nominal voltage	230/400 volt
frequency	variable: 40 - 80 Hz.
weight	450kg
protection	IP 55

GRID-CONNECTION

converter	diodebridge - mutator
converter principle	AC - DC - AC
power supply	400 V / 3 phase / 50 or 60 Hz. (deviating voltage and frequency are available as an option)

TOWER

type	cylindrical pipe
number of sections	3
hub height	31 m or 41 m
material	hot dip galvanised steel
location ascent	external

CONTROLLER

control by	PLC
remote monitoring	optional

YAW-SYSTEM

system	active
signal based on	wind vane
driven by	e-motor with worm-wheel reduction
power yaw-motor	0,55 kW
yaw speed	1,2⁰/sec.
yaw bearing	crown-bearing; externally geared
yaw-break	constant friction-break; 4 pcs.

SAFETY

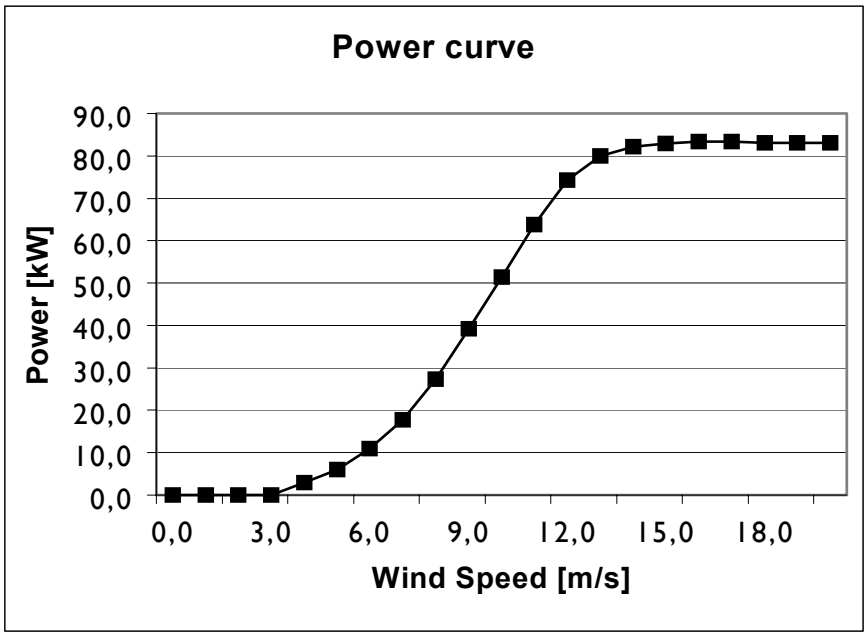
first safety system	passive blade pitch
activation	rotor speed (110 rpm)
second safety system	yawing out of the wind
activation	rotor speed (120 rpm) excessive vibrations failure anemometer or wind vane failure in one of PLC's grid failure too high generator or inverter temperature fault in yawing system
blocking system	
rotor blocking system	pin in high speed shaft; for service purposes
activation	manual

WEIGHTS

rotor	900 kg
nacelle including rotor	3000 kg
tower excluding nacelle	10000 kg

Measured actual power:
The curve data are valid for standard atmospheric conditions of 15° C air temperature, 1013 mbar air pressure and 1.225 kg/m³ air density, clean rotor blades and horizontal undisturbed air flow.

Wind speed [m/s]	Energy [kW]
0,0	0,0
1,0	0,0
2,0	0,0
3,0	0,0
4,0	2,9
5,0	6,0
6,0	11,0
7,0	17,7
8,0	27,3
9,0	39,2
10,0	51,4
11,0	63,8
12,0	74,2
13,0	79,9
14,0	82,2
15,0	82,9
16,0	83,3
17,0	83,3
18,0	83,0
19,0	83,0
20,0	83,0



Measured production
The annual energy production data for different annual mean wind speeds at hub height are calculated from the above power curve data assuming a Rayleigh wind speed distribution, 100% availability and no reductions due array losses, grid losses, or other external factors effecting the production.

Wind speed [m/s]	Energy [MWh]
4,5	74
5,0	101
5,5	130
6,0	161
6,5	193
7,0	225
7,5	256
8,0	285
8,5	313