



WES 18Mk1

TECHNICAL SPECIFICATIONS

GENERAL

design acc.	NEN 6096
certified by	CIWI
cut in wind speed	2.7 m/sec.
rated wind speed	13 m/sec.
cut out wind speed	25 m/sec.
survival wind speed	60 m/sec.
nominal power	80 kW
grid voltage	400V \pm 10%
grid frequency	50/60Hz \pm 3Hz
specific power	315 W/m ²
calculated lifetime	min. 20 years

ROTOR

number of blades	2
rotor position	upwind
angle of the main shaft	7° with horizon
diameter	18 m
swept area	254 m ²
speed	variable 60 -120 rotations per minute
power regulation	passive: blade-angle adjustment active : fully variable back-to-back system
min. blade-angle	1.0
cone-angle	180 -164° (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°
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	Back-to-back – IGBT
converter principle	AC - DC – AC
power supply	400 V / 50 or 60 Hz. / 3 phase + neutral (deviating voltage and frequency are available as an option)

TOWER

type	Conical tubular steel or lattice steel
number of sections	3
hub height	Tube: 19, 25, 31, 40m or Lattice: 32 m
material	hot dip galvanised steel
location ascent / ladder	External

CONTROLLER

control by	PLC
remote monitoring & control	yes

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	1,2°/sec.
yaw bearing	crown-bearing; externally geared
yaw-break	constant friction-break; 4 pcs.

SAFETY

first safety system activation	passive blade pitch
second safety system activation	rotor speed (110 rpm) yawing out of the wind <ul style="list-style-type: none"> • 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 activation	pin in high speed shaft; for service purposes manual

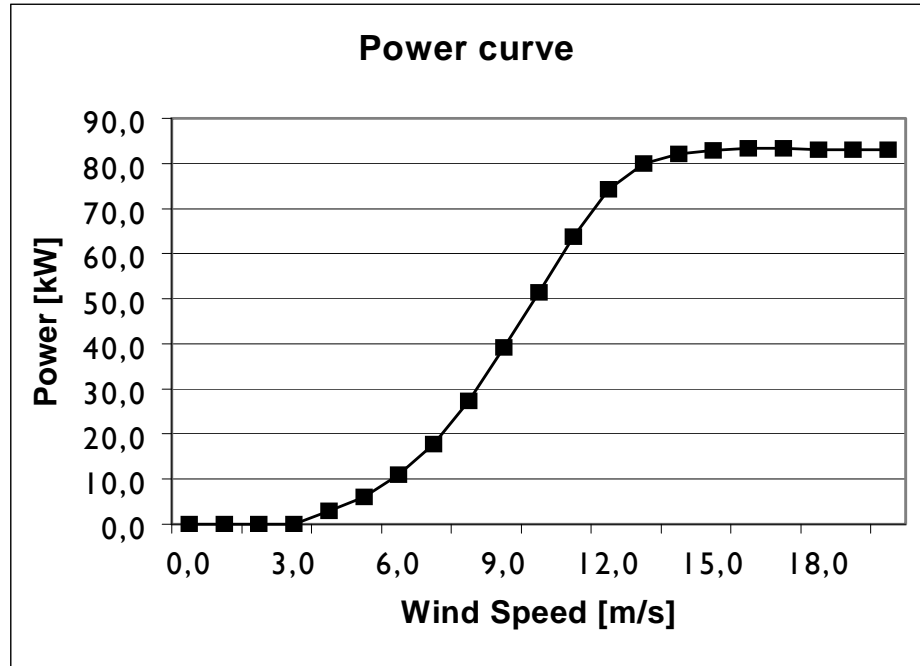
WEIGHTS

rotor	900 kg
nacelle including rotor	3000 kg
tower excluding nacelle	10000 kg (30 m. tower) 13000 kg (40 m. tower)

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

