

# WES

WIND ENERGY SOLUTIONS

**WES<sup>5</sup> TULIPO**

**2.5 kW**

## COMPANY



Wind Energy Solutions is a Dutch manufacturer of small to medium-sized wind turbines with generator capacities ranging from 2.5 kW to 250 kW. Our products are the result of 20 years of evolution in wind turbine technology. WES wind turbines have been installed and are operating in many different locations world-wide. They are characterized as being robust, reliable and easy to install in remote places, which enables our mission; "To Bring Renewable Energy Everywhere".

## WIND ENERGY

We believe that wind energy solutions can and should be applied in virtually any situation. As long as there is sufficient wind and a need for a reliable and renewable source of electricity, WES has a wind energy solution that works for you. Our aim is to help you make use of a renewable source of energy so that the environment and our future generations will benefit as well. In other words: TURNING WIND INTO PROFIT

### Wind energy solutions

WES manufactures grid-connected and hybrid (off-grid) wind turbines. WES delivers tailor-made solutions for the domestic and commercial market. Many of our customers are agricultural businesses and private home-owners that use our wind turbines to generate electricity for their own use to reduce their electricity bills and sell any excess electricity to the grid.

Some WES applications:

- Farmhouses / homes
- Urban apartment buildings
- Schools / office buildings
- Resort hotels
- Agricultural businesses
- Poultry/Cattle/Dairy farms
- Remote islands

CHALLENGE



## WES<sup>5</sup> TULIPO

The WES<sup>5</sup> Tulipo, a so-called “urban turbine”, is a small and innovative wind turbine especially designed for use in urban environments. This modern turbine was nominated for the prestigious Dutch Design price in the year 2000. With the specially designed blades and relatively low rotations, it emits almost no noise or vibrations. It needs minimum maintenance and is fully automatic. The beautiful curves of the Tulipo, it’s user-friendliness and double safety features make it very suitable to place near or on top of buildings.

With the Tulipo you can produce your own renewable energy. This little powerhouse can produce, depending on the wind availability, an average of 8.000 kWh for your home or business. This is good for all of us; because you do your share in reducing CO<sub>2</sub> emissions. Not only is the Tulipo economically attractive and environmentally friendly, it is also a very powerful marketing tool. A WES<sup>5</sup> Tulipo creates a strong and positive image showing that you care for the environment.

SOLUTIONS



## KEY POINTS

FEATURE	BENEFIT
5.2 kW generator	very little stress so little wear & tear
low nominal wind speed fixed stall blades	high electricity production high reliability and minimal maintenance
low rpm's and special blades	no noise emission
UL Safety Certificate	quality and safety assurance
PLC control	fully automatic functions and user-friendly
6 or 12 meter monopole tower	can be placed on flat roofed buildings
Innovative design	strong marketing tool

### UL Safety Certificate

The WES<sup>5</sup> Tulipo has the international UL Safety Certificate No. ZGYW-05000-I. Safety features include the active yaw mechanism and an electric brake.



## TECHNICAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

Supplier / producer	WES BV
Life expectancy	Minimum 15 years
Service	maintenance once a year
Nominal Power Output	2.5 kW at 140 rpm
Cut in wind speed	3 m/s
Cut out wind speed	20 m/s
Nominal wind speed	9 m/s
Survival wind speed	59,5 m/s (IEC 61400-1 class 2).
Yawing	active yawing
Power regulation	fixed pitch stall
Hub height	12.25 m. or 6.25 m.
Number of blades	3
Rotor diameter	5 m.
Noise emissions at 9 m/s	35 dB(A) at 20 m

### ELECTRICAL SPECIFICATIONS

Power	2,5 kW
Voltage	400V/50Hz 3 phase or 400V/60Hz 3 phase
Connection	grid connected
Converter	back-to-back inverter (IGBT)

### CERTIFICATION

Wind turbine	IEC 61400-2 (wind class 2)
Certification	IEC 61400-22 by UL
Lightning security	NEN 1014
Protection	IEC 529
Harmonics	NEN 11000-3-2- (< 16A)
EMC	EN 55081-1 en EN 55082-2 (CE)

### SAFETY

Safety	(IEC 61400-2) normal safety through central control rpm > 150, stop (brake and emergency yawing)
Autonomous safety circuit	"Failsafe" brake on fast shaft of generator independent yawing of 90 degrees
Safety actions	24Vdc/24 Ah for yawing and safety circuit
Emergency battery	

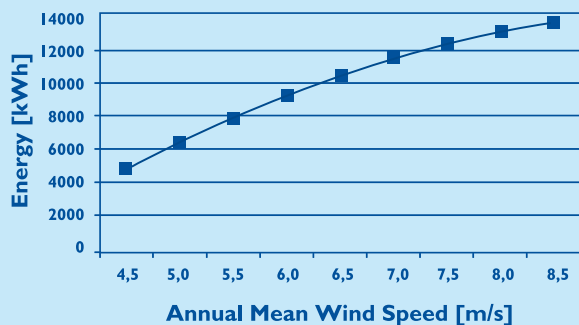
### GENERATOR

Type	a-synchronous
Brake	Spring powered electromagnetic brake of 80 Nm on fast shaft

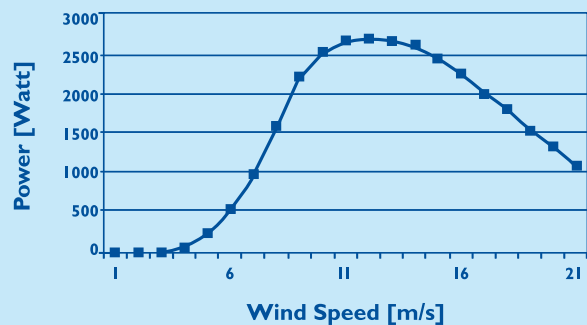
### MATERIAL SPECIFICATIONS

Tower	steel, height 12 m, diameter 273 mm
Total weight	850 kg
Foundation	Concrete block with anchor
Nose, cover	glass reinforced epoxy
Blades	glass reinforced epoxy
Corrosion protection	Total construction is galvanised Tower and covers and blades coated Ral 6019

#### Energy production



#### PV-curve WES<sup>5</sup> Tulipo



## WIND ENERGY SOLUTIONS BV

De Weel 20  
1736 KB Zijdewind  
T +31 226 425 150  
F +31 226 423 433  
[www.windenergysolutions.nl](http://www.windenergysolutions.nl)  
[info@windenergysolutions.nl](mailto:info@windenergysolutions.nl)

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