



**Global Wind Power**

# **GWP47 - 750kW**

Meeting the deadlines is not good enough,  
beating the deadlines is our expectation

We bet on people



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## **GWP47-750kW**

*Designed by Norwin, a proven concept,  
respecting lessons learned*



### **Active Stall Regulation**

The GWP47-750kW, designed by Norwin is an ASR regulated wind turbine with rotor diameter of 47 m. The turbine uses LM 21.0P blades from LM Glasfiber. The blades can be turned to obtain optimal operational settings at both low and high wind speeds, a system we call ASR – Active Stall Regulation. The ASR wind turbines utilise the best things from both stall and pitch regulated wind turbines. An ASR turbine has the same regulation potential as a pitch regulated turbine; but by using the stall properties of the blades, the large load and power fluctuations that are typical for a pitch regulated machine are avoided.

### **Advantages of ASR**

Basically this means: Using the advantages of a stall turbine and avoiding the disadvantages of a pitch regulated turbine. ASR will in general give a higher production because the blade angle is optimised according to the actual wind speed.

At high wind speed the power is stabilised because problems with air density changes, double-stall and changes in grid frequency are eliminated. This means that stand still due to over production is avoided, and that the loads on the gearbox and generator are minimised, resulting in a longer lifetime. The ability to feather the blades in extreme wind speeds means that the characteristics of extreme loads are decreased compared to a normal stall regulated turbine.

It is possible for the turbine to regulate the power produced if the local grid has a high loading, by using a special unit for grid surveillance.

With blade regulation it is possible to make a much smoother cut-in to the grid at start up, and cut out at shut down. This will give less fluctuations on the grid during these situations and at the same time will extend the lifetime of the transmission and electrical system of the turbine.

### **Load control**

The load on a wind turbine can vary a lot from site to site and development work has been conducted to develop a Load Control system where the turbine not only is controlled to reach nominal power, but also is controlled according to the loading history. The advantage of using such a system is to ensure the projected lifetime of major components is achieved. The first phase of this work has been completed with the development of the control program for gearbox load control.

### **Full Service**

Full Service means that GWP retains all internal technical risks for the product, replacement of spare part and maintenance. Also included is an availability warranty and costs are based on a price per kWh produced. GWP offers a first class quality product in combination with a Full Service Agreement that reduces your risks to a minimum. GWP 's solid financial position as a part of the Reliance ADA Group means that you can have confidence in this service offer.



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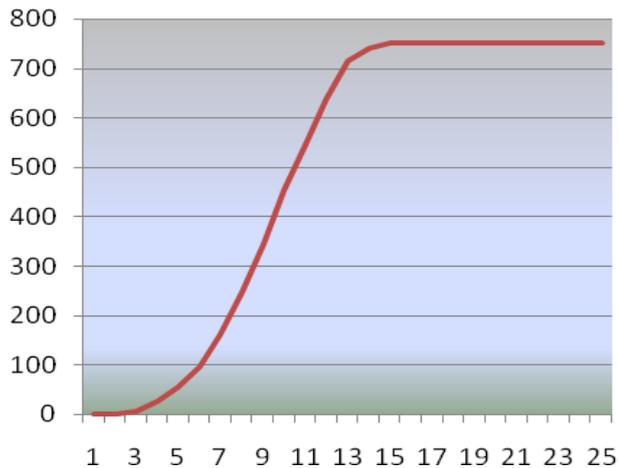
## GWP47-750kW, technical data

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### Power curve GWP47-750kW

Wind speed [m/s]

Calculated power curve for air density 1,225kg/m<sup>3</sup>



### General

Rated power: 750 / 180 kW  
Rotor diameter: 47 m  
Hub height: min. 35m, max. 65m  
Turbine concept: Conventional drive train with main shaft, ASR, Active Stall Regulation, thyristor controlled

### Rotor

Type: 3 bladed upwind rotor  
Diameter: 47 m  
Swept area: 1735 m<sup>2</sup>  
Rotor speed: 25,5 rpm at full speed  
Power regulation: ASR, Active Stall Regulation  
Blade length / type: LM 21.0P with extendors  
Blade material: Fibreglass  
Lightning protection: Blade integrated, direct contact to structure.

### Generator

Type: Closed, 6/4-pole, double wound, induction, IP55, 1000/1500 (50 Hz)  
or  
1200/1800 (60 Hz) rpm asynchronous

### Steel tower

Type: Tubular steel tower  
Hub height: Standard: 45m, 55m, 65m

### Safety system

Type: Active  
Stall Regulation system and mechanical brake

### Devices

Brakes: Rotor and yaw brake  
Locks: Rotor blade, yaw and drive train

### Operational data

Cut in wind speed: 3-4 m/s (based on 10min average)  
Cut out wind speed: 25 m/s (based on 10min average)  
Nominal power: 14,5 m/s  
Power factor: Controllable

### Maximum noise level

Measured, at 8 m/s 100 dB(A)





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## GWP47-750kW, Power Curve

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### Certification and power curve measurement

The GWP47-750kW turbine 'hit the road' for more than a decade ago and now has been adapted to the current demands, therefore we have it re - certified we updated the documents and carried out measurements according actual standards.

Below you find the power curve of the GWP47-750kW measured in 2002, based on:  
1.225 kg/m<sup>3</sup> air density, clean blades and undisturbed horizontal inflow.

Wind speed [m/s]	Electrical power [kW]
1	0
2	0
3	4
4	25
5	55
6	96
7	160
8	246
9	345
10	453
11	546
12	635
13	714
14	740
15	750
16	750
17	750
18	750
19	750
20	750
21	750
22	750
23	750
24	750
25	750



Sales Office Global Wind Power

Tel. +31 26 376 4505 Fax. +31 26 376 3455  
Meander 251 PO Box 5085 6802 EB Arnhem  
The Netherlands

[www.globalwindpower.nl](http://www.globalwindpower.nl)

Head Quarters, Production and Sales for India  
Global Wind Power Ltd

Tel: +91 22 3991 8500 Fax: +91 22 3991 8521  
301 Satellite Silver, Andheri Kurla Road,  
Andheri (East) Mumbai - 400 059, India.

[www.gwpl.co.in](http://www.gwpl.co.in)