Global Wind Power

GWP47-750kW
Power Curve

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 utilize 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 optimized according to the actual wind speed.

At high wind speed the power is stabilized 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 minimized, 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 gives 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 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.

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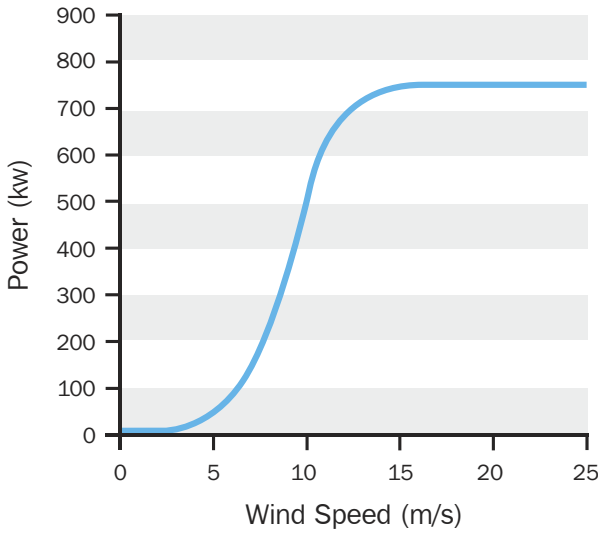
Technical Data

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 m2
Rotor Speed:	25,5 rpm at full speed
Power Regulation:	ASR, Active Stall Regulation
Blade length / type:	M 21.0P with extensors
Blade material:	Fibreglass
Lightning protection:	Blade integrated, direct contact to structure
Generator	
Type: or	Closed, 6/4-pole, double wound induction, IP55, 1000/1500 (50 Hz) 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
Operational data	
Measured, at 8 m/s:	100 dB(A)

Power Curve

Wind speed (m/s)

Calculated power curve for air density 1,225kg/m3



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