

**Gamesa
G58-850 kW**



Benefits

Optimum performance for low winds

- ▶▶ Class IIA/IIIB.
- ▶▶ Pitch and variable speed technology to maximize energy production.
- ▶▶ Production of lighter blades using fiberglass and prepreg method.
- ▶▶ Compliance with the main international Grid Codes.
- ▶▶ Aerodynamic design and Gamesa NRS® control system to minimize noise emissions.
- ▶▶ Gamesa WindNet®: Remote monitoring and control system with Web access.
- ▶▶ Over 7,700 Gamesa G5X-850 kW wind turbines installed.



G58-850 kW

Rotor

Diameter	58 m
Swept area	2,642 m ²
Rotational speed	Variable 14.6 - 30.8 rpm, tower 55 and 65m Variable 16.2 - 30.8 rpm, tower 44m
Rotational direction	Clock Wise (front view)
Weight (incl. Hub)	Approx. 12 T
Top head mass	Approx. 35 T

Blades

Number of blades	3
Length	28.3 m
Airfoils	NACA 63.XXX + FFA-W3
Material	Epoxy reinforced glass fiber
Total blade weight	2,400 kg

Tubular Tower

Modular type	Height	Weight
2 sections	44 m	45 T
3 sections	55 m	62 T
3 sections	65 m	79 T

Gearbox

Type	1 planetary stage / 2 helical stages
Ratio	1:61.74 (50 Hz) 1:74,5 (60 Hz)
Cooling	Oil pump with oil cooler
Oil heater	1.5 kW

Generator 850 kW

Type	Doubly-fed machine
Rated power	850 kW
Voltage	690 V ac
Frequency	50 Hz / 60 Hz
Protection class	IP 54
Number of poles	4
Rotational speed	1,000:1,950 rpm (50 Hz) 1,320:2,340 rpm (60 Hz)
Rated Stator Current	670 A @ 690 V
Power factor (standard)	0.95 CAP - 0.95 IND at partial loads and 1 at nominal power.*
Power factor (optional)	0.95 CAP - 0.95 IND throughout the power range.*

* Power factor at generator output terminals, on low voltage side before transformer input terminals.

Mechanical design

Drive train with main shaft supported by two spherical bearings that transmit the side loads directly to the frame by means of the bearing housing. This prevents the gearbox from receiving additional loads, reducing malfunctions and facilitating its service.

Brake

Aerodynamic primary brake by means of full-feathering blades. In addition, a hydraulically-activated mechanical disc brake for emergencies is mounted on the gearbox high speed shaft.

Lightning protection

The Gamesa G58-850 kW wind turbine generator uses the "total lightning protection" system, in accordance with standard IEC 61024-1. This system conducts the lightning from both sides of the blade tip down to the root joint and from there across the nacelle and tower structure to the grounding system located in the foundations. As a result, the blade and sensitive electrical components are protected from damage.

Control System

The Generator is a doubly fed machine (DFM), whose speed and power is controlled through IGBT converters and PWM (Pulse Width Modulation) electronic control.

Benefits:

- ▶▶ Active and reactive power control.
- ▶▶ Low harmonic content and minimal losses.
- ▶▶ Increased efficiency and production.
- ▶▶ Prolonged working life of the turbine.

Gamesa WindNet[®]

The new generation SCADA System (a wind farm control system) entirely developed by Gamesa allows realtime operation and remote control of wind turbines, meteorological mast and the electrical substation. This innovative modular design based on TCP/IP architecture has tools for controlling active and reactive energy, voltage and frequency. It also contains environmental options to optimize the production to perfectly comply with regulations currently in force. The intuitive remote web client employs a very friendly user interface. The system includes analytical tools for decision-making, Report Generator and Information Manager and TrendViewer, to give a sharp, clear view of trends.

SMP Predictive Maintenance System

Predictive Maintenance System for the early detection of potential deterioration or malfunctions in the wind turbine's main components.

Benefits:

- ▶▶ Reduction in major corrective measures.
- ▶▶ Increase in the machine's availability and working life.
- ▶▶ Preferential terms in negotiations with insurance companies.
- ▶▶ Integration within the control system.

Noise control

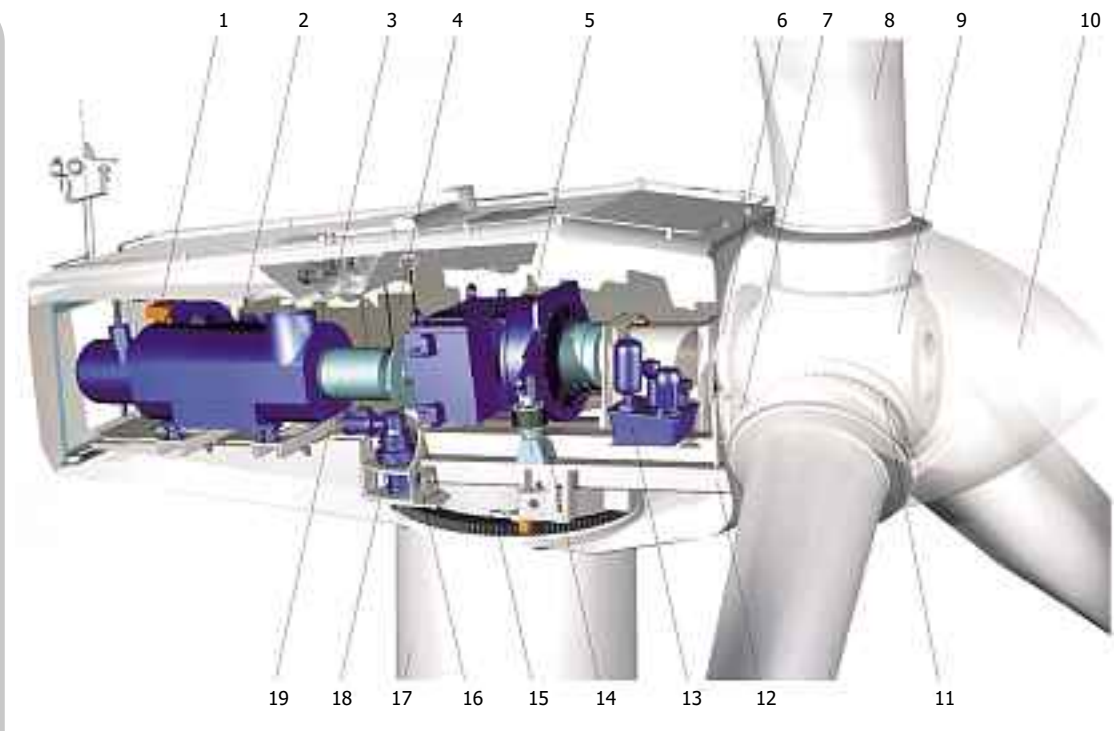
Aerodynamic blade tip and mechanical component design minimize noise emissions. In addition, Gamesa has developed the Gamesa NRS® noise control system, which permits programming the noise emissions according to criteria such as date, time or wind direction. This achieves the goals of local regulation compliance as well as maximum production.

Grid connection

Gamesa's doubly-fed wind turbines and Active Crowbar and over sized converter technologies ensure compliance with the most demanding grid connection requirements. Low voltage ride-through capability and dynamic regulation of active and reactive power.



- 1 Service crane
- 2 Generator
- 3 Cooling system
- 4 Top control unit
- 5 Gearbox
- 6 Main shaft with two bearings
- 7 Rotor lock system
- 8 Blade
- 9 Blade Hub
- 10 Hub cover
- 11 Blade bearing
- 12 Bed frame
- 13 Hydraulic unit
- 14 Shock absorbers
- 15 Yaw ring
- 16 Brake
- 17 Tower
- 18 Yaw gears
- 19 Transmission. High speed shaft

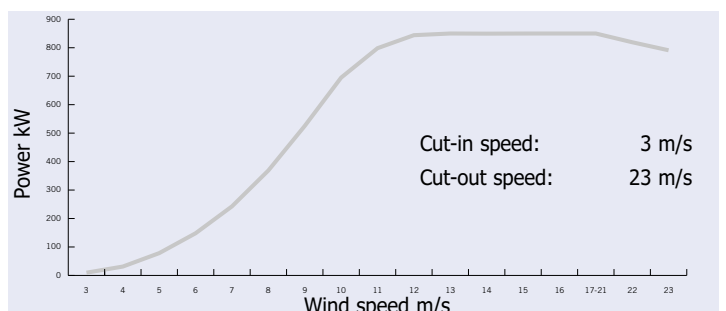


Power Curve Gamesa G58-850kW

(for an air density of 1.225 kg/m³)

Power curve calculation based on NACA 63.XXX and FFA-W3 airfoils.

Calculation parameters: 50 Hz grid frequency; tip angle pitch regulated, 10% turbulence intensity and a variable rotor speed ranging from 14.6 - 30.8 rpm.



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