



Certificate No.

**IECRE.WE.TC.18.0032-R2**

IECRE - IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications

## TYPE CERTIFICATE

### Wind Turbine

This certificate is issued to

SIEMENS GAMESA RENEWABLE ENERGY  
INNOVATION & TECHNOLOGY, S.L.  
Ciudad de la Innovación n°2  
31621 Sarriguren (Navarra)  
Spain

for the wind turbine

SG 2.1-122

wind turbine class (class, standard, year)

III<sub>B</sub> / S IEC 61400-1:2005 +Amd1:2010

This certificate is based on a transferred IEC 61400-22 type certificate to IECRE and attests compliance with IEC 61400 Series as specified in subsequent pages . It is based on the following reference documents:

Design basis evaluation conformity statement  
Dated

Included in Design Evaluation Conformity Statement

Design evaluation conformity statement  
Dated

023.09.2.03.19.05  
28.06.2019

Type test conformity statement  
Dated

023.09.2.04.19.05  
28.06.2019

Manufacturing conformity statement  
Dated

023.09.2.05.19.03  
28.06.2019

Final evaluation report  
Dated

2763946-32-e Rev. 8  
28.06.2019

The conformity evaluation was carried out in accordance with the rules and procedures of the IECRE System [www.iecre.org](http://www.iecre.org)

The wind turbine type specification begins on page 2 of this certificate.

Changes in the system design or the manufacturer's quality system are to be approved by the Certification Body. Without approval, the certificate loses its validity.

This certificate is valid until:  
24.05.2023

Approved for issue on behalf of the IECRE  
Certification Body:



Add value.  
Inspire trust.

TÜV SÜD Industrie Service GmbH  
Westendstr. 199,  
80686 Munich, Germany

Benjamin Bartels  
Certification Body Wind Turbines  
Munich, 28.06.2019



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#### Machine parameters:

Power regulation:	Three independent hydraulic pitch system
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6°
Cone angle:	-3.7°
Rated power:	2100 kW – 2300 kW
Rated wind speed $V_r$ :	8.8 m/s (2.1 MW) 9.2 m/s (2.3 MW)
Rotor diameter:	122 m
Hub height(s):	108 m / 127 m
Hub height operating wind speed range $V_{in} - V_{out}$ :	3 – 20 m/s
Design life time:	20 y
Software version:	Control architecture Vesion V3 or superior

#### Wind conditions:

Characteristic turbulence intensity $I_{ref}$ at $V_{hub} = 15$ m/s:	14.0 (III <sub>B</sub> ) / 15.24 (S)
Annual average wind speed at hub height $V_{ave}$ :	7.5 m/s (III <sub>B</sub> ) / 7.13 m/s (S)
Reference wind speed $V_{ref}$ :	37.5 m/s (III <sub>B</sub> ) / 37.4 m/s (S)
Mean flow inclination:	8°
Hub height 50-year extreme wind speed $V_{e50}$ :	52.5 m/s (III <sub>B</sub> ) / 52.4 m/s (S)

#### Electrical network conditions:

Normal supply voltage and range:	690 V ± 10 %
Normal supply frequency and range:	50 Hz ± 6%
Voltage imbalance:	34.5 V (5%)
Maximum duration of electrical power network outages:	N/A
Number of electrical network outages	100 / year



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**Other environmental conditions (where taken into account):**

Design conditions in case of offshore WT :	N/A
Normal and extreme temperature ranges:	-10°C - +40°C -20°C - +50°C
Relative humidity of the air:	Up to 95%
Air density:	1.164 kg/m <sup>3</sup>
Solar radiation:	1000 W/m <sup>2</sup>
Lightning protection system (standard and protection class):	IEC 61400-24 LPS 1
Earthquake model and parameters (standard and key parameters e.g. spectrum, model, seismic zone, soil class, etc.):	N/A
Other design conditions :	N/A



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#### **Major components:**

\*\*If not otherwise stated, the certificate holder  
is the manufacturer.

#### **Blade:**

Type: B122  
Material: Glass fiber reinforced, impregnated  
Blade length: 60 m  
Number of blades: 3  
Manufacturer: SGRE  
Drawing / Data sheet / Part No.: SG 122 V0

#### **Blade:**

Type: B122  
Material: Glass fiber reinforced, impregnated  
Blade length: 60 m  
Number of blades: 3  
Manufacturer: SGRE  
Drawing / Data sheet / Part No.: SG 122 V1

#### **Blade:**

Type: G122  
Material: Glass fiber reinforced, impregnated  
Blade length: 60 m  
Number of blades: 3  
Manufacturer: LM  
Drawing / Data sheet / Part No.: LM 60.0 P

#### **Blade bearing:**

Type: Four points contact double row  
Manufacturer: Rollix / DEFONTAINE  
Drawing / Data sheet / Part No.: 13-2418-XX



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## **TYPE CERTIFICATE**

### **Wind Turbine**

#### **Blade bearing:**

Type: Four points contact double row  
Manufacturer: TMB  
Drawing / Data sheet / Part No.: B030.53.2418Kx

#### **Pitch System:**

Motor / Actuator Type: Double acting hydraulic cylinder  
Pitch Controller Type: Hydraulic  
Manufacturer: Glual

#### **Pitch System:**

Motor / Actuator Type: Double acting hydraulic cylinder  
Pitch Controller Type: Hydraulic  
Manufacturer: Hydratech

#### **Pitch System:**

Motor / Actuator Type: Double acting hydraulic cylinder  
Pitch Controller Type: Hydraulic  
Manufacturer: Hine

#### **Pitch System:**

Motor / Actuator Type: Double acting hydraulic cylinder  
Pitch Controller Type: Hydraulic  
Manufacturer: Fluitechnik / Wheels India



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## **TYPE CERTIFICATE**

### **Wind Turbine**

#### **Main shaft:**

Type: Steel shaft  
Manufacturer: SGRE  
Material: 42CrMo4  
34CrNiMo6 (alternative)  
Drawing / Data sheet / Part No.: GP360361

#### **Main shaft:**

Type: Steel shaft  
Manufacturer: SGRE  
Material: 42CrMo4  
34CrNiMo6 (alternative)  
Drawing / Data sheet / Part No.: GP460606

#### **Main bearing:**

Type: Two double row spherical roller bearing  
Manufacturer: TIMKEN  
Drawing / Data sheet / Part No.: C951246 (front)  
C951247 (rear)

#### **Main bearing:**

Type: Two double row spherical roller bearing  
Manufacturer: ZKL  
Drawing / Data sheet / Part No.: 230/750 EW33MH TPF 11528-16 (front)  
241/500 EW33MH TPF 11528-16 (rear)

#### **Main bearing:**

Type: Two double row spherical roller bearing  
Manufacturer: KOYO  
Drawing / Data sheet / Part No.: DSA310080 (front)  
DSA310090 (rear)



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### Wind Turbine

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 128.5  
Manufacturer: ZF Wind Power  
Drawing / Data sheet / Part No.:  
GE2000PL128.5-50Hz-CSA  
GE2000PL128.5-50Hz-ENHB  
GE2000PL128.5-50Hz-ENHC  
GE2000PL128.5-50Hz-ENHB-XTR  
GE2000PL128.5-50Hz-ENHC-XTR  
GE2000PL-128.5-50Hz-CSA-XTR

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 128.5  
Manufacturer: SGRE  
Drawing / Data sheet / Part No.:  
GE2000PL128.5-50Hz-ENHB  
GE2000PL128.5-50Hz-ENHC  
GE2000PL128.5-50Hz-ENHB-XTR  
GE2000PL128.5-50Hz-ENHC-XTR

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 128.5  
Manufacturer: NGC  
Drawing / Data sheet / Part No.:  
GE2000PL128.5-50Hz-ENHB  
GE2000PL128.5-50Hz- ENHB-XTR

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 128.5  
Manufacturer: Siemens Limited  
Drawing / Data sheet / Part No.:  
GE2000PL128.5-50Hz-CSA  
GE2000PL128.5-50Hz-CSA-XTR



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## TYPE CERTIFICATE

### Wind Turbine

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 128.5  
Manufacturer: Siemens Limited (Winergy)  
Drawing / Data sheet / Part No.: GE2000PL128.5-50Hz-G122 MY20 OPTIMAFLEX

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 128.5  
Manufacturer: Siemens Gamesa  
Drawing / Data sheet / Part No.: GE2000PL128.5-50Hz-G122 MY20 OPTIMAFLEX

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 128.5  
Manufacturer: NGC  
Drawing / Data sheet / Part No.: GE2000PL128.5-50Hz-G122 MY20 OPTIMAFLEX

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 128.5  
Manufacturer: ZF  
Drawing / Data sheet / Part No.: GE2000PL128.5-50Hz-G122 MY20 OPTIMAFLEX

#### **Yaw System:**

*Drive Type:* Active by yaw drives  
Manufacturer: SGRE  
Drawing / Data sheet / Part No.: GD254280 - Layout  
*Bearing Type:* Friction Bearing  
Manufacturer: SGRE





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Drawing / Data sheet / Part No.:	GP222733 – Yaw Ring
<i>Gear Type:</i>	Planetary gear with motor and brake
Manufacturer:	Bonfiglioli
Drawing / Data sheet / Part No.:	710T4
<i>Gear Type:</i>	Planetary gear with motor and brake
Manufacturer:	Comer
Drawing / Data sheet / Part No.:	PG 2504DSP / 5718.050.0508
<i>Gear Type:</i>	Planetary gear with motor and brake
Manufacturer:	SEW
Drawing / Data sheet / Part No.:	P4W034
<i>Gear Type:</i>	Planetary gear with motor and brake
Manufacturer:	NGC
Drawing / Data sheet / Part No.:	FDX204S-01-00R1
<i>Gear Type:</i>	Planetary gear with motor and brake
Manufacturer:	Brevini
Drawing / Data sheet / Part No.:	SI0013423
<i>Brake Type:</i>	Hybrid (active hydraulically / passive loaded)
Manufacturer:	Antec
Drawing / Data sheet / Part No.:	20.101.562, 20.101.563 20.103.227 Rev. B, 20.103.230 Rev. A
Manufacturer:	Frenos Iruna
Drawing / Data sheet / Part No.:	1445062, 6700066, 6700067, 6700081
Manufacturer:	JIAOZUO
Drawing / Data sheet / Part No.:	GMS-G114-A-01, GMS-G114-A-02



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### Wind Turbine

Manufacturer: ALTRA GKN  
Drawing / Data sheet / Part No.: 390-30263, 390-30264, 390-00015,  
390-00016

#### Generator:

Type Doubly-fed induction machine  
Manufacturer: Gamesa / Cantarey  
Drawing / Data sheet / Part No.: CR2x-4P  
Rated Power: 2170 kW / 2040 kW  
Rated Frequency: 50 Hz  
Rated Speed: 1680 rpm  
Max. speed: 1900 rpm  
Rated Voltage: 690 V  
Rated Current: 1641 A  
Insulation Class: F  
Degree of Protection: IP54 / IP23

#### Generator:

Type Doubly-fed induction machine  
Manufacturer: ABB India Limited  
Drawing / Data sheet / Part No.: AMK 500L4A / AMK 500L4A BATY  
Rated Power: 2170 kW  
Rated Frequency: 50 Hz  
Rated Speed: 1680 rpm  
Max. speed: 1900 rpm  
Rated Voltage: 690 V  
Rated Current: 1634 A  
Insulation Class: F  
Degree of Protection: IP54

#### Converter:

Type: Back to back DFIG converter  
Manufacturer: Ingeteam / Gamesa / Valencia Power  
Converters



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Drawing / Data sheet / Part No.: PT0097, PT0103, PT0110, PEGE0044,  
PEGE0114  
Rated Voltage (grid side): 690 V  
Rated Current (grid side): 250 - 300 A  
Degree of Protection: IP54

#### Transformer:

Type: Dry type vacuum cast resin transformer  
Manufacturer: ABB Power Technology S.A.  
Drawing / Data sheet / Part No.: DTE 2350/24, DTE 2350/36  
Rated Voltage: 690 V / 20000 V  
Rated Power: 2350 kVA  
Degree of Protection: IP00  
Location (e.g. tower bottom): Nacelle

#### Transformer:

Type: Dry type vacuum cast resin transformer  
Manufacturer: Starkstrom Gerätebau GmbH  
Drawing / Data sheet / Part No.: DTTH1NG 2500/30, 50 Hz  
DTTH1NG 2500/20, 50 Hz  
Rated Voltage: 690 V / 33000 V  
Rated Power: 2350 kVA  
Degree of Protection: IP00  
Location (e.g. tower bottom): Nacelle

#### Transformer:

Type: Dry type vacuum cast resin transformer  
Manufacturer: ABB Power Technology S.A.  
Drawing / Data sheet / Part No.: 2350 / HiT33  
Rated Voltage: 690 V / 33000 V  
Rated Power: 2350 kVA  
Degree of Protection: IP00  
Location (e.g. tower bottom): Nacelle



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#### **Transformer:**

Type: Dry type vacuum cast resin transformer  
Manufacturer: ABB Power Technology S.A.  
Drawing / Data sheet / Part No.: HiT-35 2220kVA  
Rated Voltage: 690 V / 35000 V  
Rated Power: 2350 kVA  
Degree of Protection: IP00  
Location (e.g. tower bottom): Nacelle

#### **Transformer:**

Type: Dry type vacuum cast resin transformer  
Manufacturer: RAYCHEM  
Drawing / Data sheet / Part No.: ADA2716015  
Rated Voltage: 690 V / 33000 V  
Rated Power: 2350 kVA  
Degree of Protection: IP00  
Location (e.g. tower bottom): Nacelle

#### **Tower:**

Type: Tubular steel tower  
Sections: 4  
Length: 108 m HH  
Drawing / Data sheet / Part No.: GD405795

#### **Tower:**

Type: Tubular steel tower  
Sections: 5  
Length: 127 m HH  
Drawing / Data sheet / Part No.: GD405029

#### **Foundation:**

Type: NA  
Manufacturer: NA



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Drawing / Data sheet / Part No: NA

#### **Foundation Adaptor:**

Type: Tubular steel tower

Manufacturer: NA

Drawing / Data sheet / Part No.: NA

#### **Manuals:**

Operation & maintenance manual: PM000882

Transport manual: GP199954

Installation & commissioning. manual: GP301951