



Certificate No.

**IECRE.WE.TC.18.0023-R0**

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  
Avda. Ciudad de la Innovación 2  
31621 Sarriguren (Navarra)  
Spain

for the wind turbine

G114 - 2.0MW

wind turbine class (class, standard, year)

WT class S, IEC 61400-1/A1, 2010

This certificate is transferred from IEC 61400-22 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 (\*covered in the design evaluation conformity statement)

STC – 150901 Rev. 4  
20.10.2017

Design evaluation conformity statement  
Dated

STC – 150901 Rev. 4  
20.10.2017

Type test conformity statement  
Dated

STC – 150903 Rev. 5  
07.11.2017

Manufacturing conformity statement  
Dated

STC – 150902 Rev. 4  
20.10.2017

Type characteristics measurements conformity  
statement  
Dated

STC – 170313 Rev. 3  
02.11.2017

Final evaluation report  
Dated

R12658950-12 Rev. 0  
20.12.2018

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:  
2020-09-10

Approved for issue on behalf of the IECRE  
Certification Body:

UL Renewables



Jörn Gerlach  
Vice Head of Certification Body  
Cuxhaven 2018-12-20

DEWI-OCC GmbH  
Am Seedeich 9  
27472 Cuxhaven, Germany



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#### Machine parameters:

Power regulation:	Pitch control
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6°
Cone angle:	-3°
Rated power:	2000 kW
Rated wind speed $V_r$ :	9.4 m/s
Rotor diameter:	114 m
Hub height(s):	106 & 110 m (with pedestal)
Hub height operating wind speed range $V_{in} - V_{out}$ :	3 m/s - 20 m/s
Design life time:	20 years
Software version:	Control Architecture Version V0 or superior

#### Wind conditions:

Characteristic turbulence intensity $I_{ref}$ at $V_{hub} = 15$ m/s:	16%
Annual average wind speed at hub height $V_{ave}$ :	7.4 m/s
Reference wind speed $V_{ref}$ :	37.4 m/s
Mean flow inclination:	8°
Hub height 50-year extreme wind speed $V_{e50}$ :	59.54 m/s

#### Electrical network conditions:

Normal supply voltage and range:	690 V $\pm$ 10%
Normal supply frequency and range:	50Hz $\pm$ 6%
Voltage imbalance:	5%
Maximum duration of electrical power network outages:	not dimensioning
Number of electrical network outages	100/yr.



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

Design conditions in case of offshore WT :	NA
Normal and extreme temperature ranges:	Normal: -10°C to +40°C Extreme: -20°C to +50°C
Relative humidity of the air:	Up to 95%
Air density:	1.159 kg/m <sup>3</sup>
Solar radiation:	1000 W/m <sup>2</sup>
Lightning protection system (standard and protection class):	IEC 61400-24:2010, LPL I
Earthquake model and parameters (standard and key parameters e.g. spectrum, model, seismic zone, soil class, etc.):	NA
Other design conditions :	NA



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#### **Major components:**

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

#### **Blade:**

Type: B114 Infused blades, structural shells and adhesive joints  
Material: Fibreglass reinforced resin  
Blade length: 56 m  
Number of blades: 3  
Manufacturer: Siemens Gamesa  
Drawing / Data sheet / Part No.: G114 CS

#### **Blade:**

Type: G114 Infused blades, structural shells and adhesive joints  
Material: Fibreglass reinforced resin  
Blade length: 56 m  
Number of blades: 3  
Manufacturer: LM  
Drawing / Data sheet / Part No.: LM 56.0 P3

#### **Blade bearing:**

Type: Four-point contact double row  
Manufacturer: Rollix  
Drawing / Data sheet / Part No.: 13-2415

#### **Blade bearing:**

Type: Four-point contact double row  
Manufacturer: TMB  
Drawing / Data sheet / Part No.: B030.50.2415

#### **Blade bearing:**

Type: Four-point contact double row  
Manufacturer: Rothe Erde India  
Drawing / Data sheet / Part No.: 13-2415



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#### Pitch System:

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

#### Main shaft:

Type: Steel shaft  
Manufacturer: Shandong Laiwu Wind Power Technology  
Co., Ltd.  
Material: 42CrMo4 / 34CrNiMo6  
Drawing / Data sheet / Part No.: GP299563

#### Main shaft:

Type: Steel shaft  
Manufacturer: Tongyu Heavy Industry Co. Ltd.  
Material: 42CrMo4 / 34CrNiMo6  
Drawing / Data sheet / Part No.: GP299574

#### Main bearing:

Type: Spherical roller bearing  
Manufacturer: JTEKT  
Drawing / Data sheet / Part No.: RHAW33

#### Main bearing:

Type: Spherical roller bearing  
Manufacturer: SKF  
Drawing / Data sheet / Part No.: CA\_W33  
ECA\_W33

#### Gearbox:

Type: Three stages gearbox (one planetary  
stage and two helical gear stages)  
Gear Ratio: 1:128.5 (50Hz)  
Manufacturer: Siemens Gamesa



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### Wind Turbine

Drawing / Data sheet / Part No.: GE2000PL

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 1:128.5 (50Hz)  
Manufacturer: ZF Wind Power  
Drawing / Data sheet / Part No.: EH861A

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 1:128.5 (50Hz)  
Manufacturer: ZF Wind Power  
Drawing / Data sheet / Part No.: GE2000PL

#### **Gearbox:**

Type: Three stages gearbox (one planetary stage and two helical gear stages)  
Gear Ratio: 1:128.5 (50Hz)  
Manufacturer: NGC  
Drawing / Data sheet / Part No.: GE2000PL

#### **Yaw System:**

*Drive Type:* Active by yaw drives  
Manufacturer: Siemens Gamesa  
Drawing / Data sheet / Part No.: GD254280

*Bearing Type:* Friction Bearing

Manufacturer: Siemens Gamesa  
Drawing / Data sheet / Part No.: GP222733

*Gear Type:* Planetary gear with motor and brake  
Manufacturer: WAFANGDIAN WRC Bearing  
Manufacture Co., Ltd /



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Dalian United Wind Power Generation  
Bearing Co., Ltd

Drawing / Data sheet / Part No.: GP222733

*Brake Type:* Hybrid

Manufacturer: Antec

Drawing / Data sheet / Part No.: 20.101.562 / 20.101.563

*Brake Type:* Hybrid

Manufacturer: Frenos Iruña

Drawing / Data sheet / Part No.: 1445062 / 6700066 / 6700067

**Generator:**

Type Doubly – fed induction machine

Manufacturer: Siemens Gamesa

Drawing / Data sheet / Part No.: CR20 / CR21

Rated Power: 2040 kW / 2170 kW

Rated Frequency: 50 Hz

Rated Speed: 1680 rpm

Max. speed: 1900 rpm

Rated Voltage: 690V

Rated Current: 1641 A

Insulation Class: F

Degree of Protection: IP54

**Generator:**

Type Doubly – fed induction machine

Manufacturer: ABB India Limited

Drawing / Data sheet / Part No.: ABB AMK 500L 4A

Rated Power: 2170 kW

Rated Frequency: 50 Hz



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### Wind Turbine

Rated Speed:	1680 rpm
Max. speed:	1900 rpm
Rated Voltage:	690V
Rated Current:	1634 A
Insulation Class:	F
Degree of Protection:	IP54

#### Converter:

Type:	Back to back DFIG converter
Manufacturer:	Ingeteam / Siemens Gamesa / Valencia Power Converters
Drawing / Data sheet / Part No:	Ingecon W
Rated Voltage (grid side):	690V
Rated Current (grid side):	250A / 300A
Degree of Protection:	IP54

#### Transformer:

Type:	Dry type vacuum cast resin transformer
Manufacturer:	ABB Power Technology S.A.
Drawing / Data sheet / Part No.:	2350 / HiT33
Rated Voltage:	0.69 / 33 kV
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.:	DTE 2350/36
Rated Voltage:	0.69 / 34.5 kV
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 2500m / HiT-35  
2350kVA 2500m  
Rated Voltage: 0.69 / 35 kV  
Rated Power: 2220 / 2350 kVA  
Degree of Protection: IP00  
Location (e.g. tower bottom): nacelle

#### Tower:

Type: Tubular Steel  
Manufacturer: Siemens Gamesa  
Sections: 4  
Length: 106m HH  
Drawing / Data sheet / Part No.: GD251543

#### Foundation:

Type: NA  
Manufacturer: NA  
Drawing / Data sheet / Part No.: NA

#### Foundation Adaptor:

Type: NA  
Manufacturer: NA  
Drawing / Data sheet / Part No.: NA

#### Manuals:

Operation & maintenance manual: PM000882  
Transport manual: GP301951  
Installation & commissioning. manual: GP301951