



Certificate No.

**IECRE.WE.TC.20.0086-R0**

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

## PROVISIONAL TYPE CERTIFICATE

### Wind Turbines

This certificate is issued to

Siemens Gamesa Renewable Energy Innovation & Technology SL  
Avda. Ciudad de la Innovación 9-11  
31621 Sarriguren (Navarra)  
Spain

for the wind turbines

SG 3.6-145

wind turbine class (class, standard, year)

S, IEC 61400-1/A1, 2010

This certificate 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)

IECRE.WE.CS.20.0050-R0  
14.07.2020

Design evaluation conformity statement  
Dated

IECRE.WE.CS.20.0050-R0  
14.07.2020

Type test conformity statement  
Dated

PSTC-200608-R0  
31.07.2020

Manufacturing conformity statement  
Dated

PSTC-200610-R0  
31.07.2020

Final evaluation report  
Dated

R13037983-12a-R0  
31.07.2020

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. Outstanding issues are listed in the last page 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:  
30.07.2021

Approved for issue on behalf of the IECRE  
Certification Body:

UL Renewables



Jörn Gerlach  
Vice Head of Certification Body  
Cuxhaven 31.07.2020

DEWI-OCC GmbH  
Am Seedeich 9  
27472 Cuxhaven, Germany



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#### Annex I - Wind turbine characteristics

##### Machine parameters:

Power regulation:	Variable speed and pitch control
Rotor orientation:	upwind
Number of rotor blades:	3
Rotor tilt:	6°
Cone angle:	-4°
Rated power:	3.6 MW
Rated wind speed $V_r$ :	10.0 m/s
Rotor diameter:	145 m
Hub height(s):	127.5 m
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 V3 or superior

##### Wind conditions:

Characteristic turbulence intensity $I_{ref}$ at $V_{hub} = 15$ m/s:	15.25 %
Annual average wind speed at hub height $V_{ave}$ :	7.0 m/s
Reference wind speed $V_{ref}$ :	37.4 m/s
Mean flow inclination:	8 degrees
Hub height 50-year extreme wind speed $V_{e50}$ :	52.4 m/s

##### Electrical network conditions:

Normal supply voltage and range:	690 V $\pm$ 10%
Normal supply frequency and range:	50Hz $\pm$ 6%
Voltage imbalance:	2% - 4%
Maximum duration of electrical power network outages:	not dimensioning
Number of electrical network outages	52/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: 0°C to +40°C Extreme: 0°C to +50°C
Relative humidity of the air:	Up to 95%
Air density:	1.12 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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#### **Annex II - Major components:**

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

#### **Blade:**

Manufacturer: SGRE  
Type: SG145 TB V1  
Material: Glass fiber reinforced epoxy resin  
Blade length: 71 m  
Number of blades: 3

#### **Blade bearing:**

Type: Four point contact double row  
Manufacturer: Laulagun  
Drawing / Data sheet / Part No.: F3132M00DST0125QBV

#### **Pitch System:**

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

#### **Main shaft:**

Type: Steel shaft  
Manufacturer (Designer): SGRE  
Material: Forged steel  
Drawing / Data sheet / Part No.: GP501560

#### **Main bearing:**

Type: Double-row spherical roller bearing  
Manufacturer: Koyo Jtekt  
Drawing / Data sheet / Part No.: RHAW33TS



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#### **Main bearing:**

Type: Double-row spherical roller bearing  
Manufacturer: Timken  
Drawing / Data sheet / Part No.: YMDWEW886  
WE-1478

#### **Main bearing:**

Type: Double-row spherical roller bearing  
Manufacturer: ZKL  
Drawing / Data sheet / Part No.: EW33MH\_TPF\_11517  
EW33MH\_TPF\_11519

#### **Gearbox:**

Type: Three stages (two planetary gear stages  
plus one helical gear stage)  
Gear Ratio: 1:106.4 (50 Hz)  
Manufacturer: SGRE  
Drawing / Data sheet / Part No.: gBOX3.65

#### **Yaw System:**

*Drive Type:* Sliding bearing, activated by yaw drives  
Manufacturer: SGRE  
Drawing / Data sheet / Part No.: GD268640

#### *Bearing Type:*

Slide bearing provided by axial and radial  
PETP bearing pads  
Manufacturer: SGRE  
Drawing / Data sheet / Part No.: GD268640

#### *Gear Type:*

Geared by yaw drives  
Manufacturer: Bonfiglioli  
Drawing / Data sheet / Part No.: 710T4



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<i>Gear Type:</i>	Geared by yaw drives
Manufacturer:	Comer
Drawing / Data sheet / Part No.:	PG 2504DSP
<i>Gear Type:</i>	Geared by yaw drives
Manufacturer:	NGC
Drawing / Data sheet / Part No.:	FDX204S
<i>Brake Type:</i>	Integrated in yaw bearing claws with active and passive brakes
Manufacturer:	SGRE
Drawing / Data sheet / Part No.:	GD268640
<b>Generator:</b>	
Type:	Asynchronous doubly-fed machine
Manufacturer (Designer):	SGRE
Drawing / Data sheet / Part No.:	CR33-6P
Rated Power:	3450 / 3585 kW
Rated Frequency:	50 Hz
Rated Speed:	1120 rpm
Rated Voltage:	690 V
Rated Current (stator / rotor):	2610-2712 A (range) / 961-1007 A (range)
Insulation Class:	F / F
Degree of Protection:	IP54 / IP23



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#### Converter:

Type: 4 Quadrant DFIG Converter  
Manufacturer (Designer): SGRE  
Drawing / Data sheet / Part No: DAC 3.3 MW  
DAC CONVERTER 3,4MW PREMIUM  
DAC CONVERTER 3,465MW FIRE  
FIGHTING  
Rated Voltage (grid side): 0 - 690 / 690 ( $\pm 10\%$ ) V  
Rated Current (grid side): 1250 / 660 A  
Degree of Protection: IP54

#### Transformer:

Type: Three phase dry type  
Manufacturer: ABB  
Drawing / Data sheet / Part No.: DTE 3900/36  
Rated Voltage: 33.6 / 0.69 kV  
34.5 / 0.69 kV  
33 / 0.69 kV  
30 / 0.69 kV  
Rated Power: 3900 KVA  
Location (e.g. tower bottom): Nacelle

#### Transformer:

Type: Three phase dry type  
Manufacturer: ABB  
Drawing / Data sheet / Part No.: DTE 3900/24  
Rated Voltage: 20 / 0.69 kV  
Rated Power: 3900 KVA  
Location (e.g. tower bottom): Nacelle



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#### Transformer:

Type: Three phase dry type  
Manufacturer: SGB  
Drawing / Data sheet / Part No.: DTTH1NG 2500/20  
Rated Voltage: 20 / 0.69 kV  
Rated Power: 3900 / 2900 KVA  
Location (e.g. tower bottom): Nacelle

#### Transformer:

Type: Three phase dry type  
Manufacturer: SGB  
Drawing / Data sheet / Part No.: DTTH1NCG 2500/30  
Rated Voltage: 34.5 / 0.69 kV  
Rated Power: 3900 / 2900 KVA  
Location (e.g. tower bottom): Nacelle

#### Transformer:

Type: Three phase dry type  
Manufacturer: ABB  
Drawing / Data sheet / Part No.: DTE 3900/AF  
Rated Voltage: 34.5 / 0.69 kV  
Rated Power: 3900 KVA  
Location (e.g. tower bottom): Nacelle

#### Transformer:

Type: Three phase dry type  
Manufacturer: Hainan Jinpan Smart Technology Co., Ltd.  
Drawing / Data sheet / Part No.: SCLB10-3900/35, 3900 kVA, 35 kV, 50Hz  
Rated Voltage: 35 / 0.69 kV  
Rated Power: 3900 KVA  
Location (e.g. tower bottom): Nacelle





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#### **Tower:**

Designer:	SGRE
Type:	Tubular steel tower
Sections:	5
Length:	127.5
Drawing / Data sheet / Part No.:	GD444587

#### **Foundation:**

Type:	N/A
Manufacturer:	N/A
Drawing / Data sheet / Part No.:	N/A

#### **Foundation Adaptor:**

Type:	N/A
Manufacturer:	N/A
Drawing / Data sheet / Part No.:	N/A

#### **Manuals:**

Operation & maintenance manual:	See R13037983-2-R0
Transport manual:	See R13037983-2-R0
Installation & commissioning. manual:	See R13037983-2-R0



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#### **Outstanding issues of no importance to the primary safety:**

##### Type Testing Evaluation:

- Safety and function tests (outstanding tests, only).
- Load Measurements.
- Validation of Wind Turbine Simulation Model.
- Field Test of the Main Gearbox.
- Rotor Blade Post-Fatigue Static Test.

##### Manufacturing Evaluation:

- The manufacturing inspection of the the Windar Indian site at Halol Industrial Estate, Panchmahal District, Gujarat, India shall be performed.
- The assembly of the drivetrain sub-assembly onto the nacelle at the field shall be evaluated.
- The manufacturing inspection of the Siemens Gamesa Renewable Power Pvt. Ltd. Facility at Madhuranthagam.
- The manufacturing inspection of the Siemens Gamesa Renewable Power Pvt. Ltd. Facility at Redhills shall be performed.