Certificate No.

IECRE.WE.TC.20.0080-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 3.4-145
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.20.0043-R1 14.07.2020
Design evaluation conformity statement Dated	IECRE.WE.CS.20.0043-R1 14.07.2020
Type test conformity statement Dated	PSTC-TT-20607-R0 31.07.2020
Manufacturing conformity statement Dated	PSTC-ME-200609-R0 31.07.2020
Final evaluation report Dated	R13037983-12-R0 31.07.2020

The conformity evaluation was carried out in accordance with the rules and procedures of the IECRE System 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:

Jörn Gerlach
Vice Head of Certification Body
Cuxhaven 31.07.2020

UL Renewables

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:	3.465 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:	15.73%
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 degrees
Hub height 50-year extreme wind speed V_{e50}:	52.4 m/s

Electrical network conditions:

Normal supply voltage and range:	690 V ± 10%
Normal supply frequency and range:	50Hz ± 6%
Voltage imbalance:	2% - 4%
Maximum duration of electrical power network outages:	not dimensioning
Number of electrical network outages	52/yr.

Other environmental conditions (where taken into account):

Design conditions in case of offshore WT :	NA
Normal and extreme temperature ranges:	Normal: 0ºC to +40ºC Extreme: 0ºC to +50ºC
Relative humidity of the air:	Up to 95%
Air density:	1.15 kg/m³
Solar radiation:	1000 W/m²
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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Gear Type:	Geared by yaw drives
Manufacturer:	Comer
Drawing / Data sheet / Part No.:	PG 2504DSP
Gear Type:	Geared by yaw drives
Manufacturer:	NGC
Drawing / Data sheet / Part No.:	FDX204S
Brake Type:	Integrated in yaw bearing claws with active and passive brakes
Manufacturer:	SGRE
Drawing / Data sheet / Part No.:	GD268640

Generator:

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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Generator:

Type:	Asynchronous doubly-fed machine
Manufacturer:	Siemens
Drawing / Data sheet / Part No.:	JFWA-630MR
Rated Power:	3585 kW
Rated Frequency:	50 Hz
Rated Speed:	1120 rpm
Rated Voltage:	690 V
Rated Current (stator / rotor):	2829 A / 1125 A
Insulation Class:	F
Degree of Protection:	IP54 / IP23

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 (± 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

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Wind Turbines

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

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

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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

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.