Certificate No.

IECRE.WE.TC.18.0032-R1

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 Ciudad de la Innovación n°2 31621 Sarriguren (Navarra) Spain
for the wind turbine	SG 2.1-122
wind turbine class (class, standard, year)	S, IEC 61400-1:2005 + Amd1:2010

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	Included in Design Evaluation Conformity Statement
Design evaluation conformity statement Dated	023.09.2.03.18.03 14.12.18
Type test conformity statement Dated	023.09.2.04.18.03 14.12.18
Manufacturing conformity statement Dated	023.09.2.05.18.01 14.12.18
Final evaluation report Dated	2763946-32-e Rev. 5 14.12.18

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.

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:
24.05.23

Approved for issue on behalf of the IECRE Certification Body:

Benjamin Bartels
Head of Certification Body Wind Turbines
Munich, 21.12.18

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

Certificate. No.

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TYPE CERTIFICATE

Wind Turbine

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
Rated wind speed V_r:	8.8 m/s
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 arquitecture Vesion V3 or superior

Wind conditions:

Characteristic turbulence intensity I_{ref} at V_{hub} = 15 m/s:	15.24
Annual average wind speed at hub height V_{ave} :	7.13 m/s
Reference wind speed V_{ref} :	37.4 m/s
Mean flow inclination:	8°
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:	50 Hz ± 6%
Voltage imbalance:	34.5 V (5%)
Maximum duration of electrical power network outages:	not dimensioning
Number of electrical network outages	100 / year

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/m³
Solar radiation:	1000 W/m²
Lightning protection system (standard and protection class):	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

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.:	SGRE 122 CS

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
Drawing / Data sheet / Part No.:	13-2418-XX

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

Main shaft:

Type:	Steel shaft
Manufacturer:	SGRE
Material:	42CrMo4 34CrNiMo6 (alternative)
Drawing / Data sheet / Part No.:	GP299574

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:	SCHAEFFLER
Drawing / Data sheet / Part No.:	EDD F-617842.PRL 000 (front) EDD F-617843.PRL 000 (rear)

Main bearing:

Type:	Two double row spherical roller bearing

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

TYPE CERTIFICATE

Wind Turbine

Manufacturer:	KOYO
Drawing / Data sheet / Part No.:	DSA310050 (front) DSA310090 (rear)

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

Yaw System:

Drive Type:	Active by yaw drives
Manufacturer:	SGRE
Drawing / Data sheet / Part No.:	GD254280
Bearing Type:	Friction Bearing
Manufacturer:	SGRE
Drawing / Data sheet / Part No.:	GP222733
Gear Type:	Planetary gear with motor and brake
Manufacturer:	Bonfiglioli
Drawing / Data sheet / Part No.:	710T4U
Gear Type:	Planetary gear with motor and brake
Manufacturer:	Comer
Drawing / Data sheet / Part No.:	PG 2504DSP
Gear Type:	Planetary gear with motor and brake
Manufacturer:	SEW
Drawing / Data sheet / Part No.:	P4W034 M4 – i1060.2

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

TYPE CERTIFICATE

Wind Turbine

Gear Type:	Planetary gear with motor and brake
Manufacturer:	NGC
Drawing / Data sheet / Part No.:	FDX204S-01-00R1
Gear Type:	Planetary gear with motor and brake
Manufacturer:	Brevini
Drawing / Data sheet / Part No.:	SI0013423
Brake Type:	Hybrid (active hydraulically / passive loaded)
Manufacturer:	Antec
Drawing / Data sheet / Part No.:	20.101.562, 20.101.563
Manufacturer:	Frenos Iruna
Drawing / Data sheet / Part No.:	1445062, 6700066, 6700067
Manufacturer:	JIAOZUO
Drawing / Data sheet / Part No.:	GMS-G114-A-01, GMS-G114-A-02
Manufacturer:	ALTRA GKN
Drawing / Data sheet / Part No.:	390-30263, 390-30264

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

TYPE CERTIFICATE

Wind Turbine

Generator:

Type	Doubly-fed induction machine
Manufacturer:	Gamesa
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
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

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

TYPE CERTIFICATE

Wind Turbine

Converter:

Type:	Back to back DFIG converter
Manufacturer:	Ingeteam / Gamesa / Valencia Power Converters
Drawing / Data sheet / Part No:	PT0097, PT0098, 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
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
Rated Voltage:	690 V / 33000 V
Rated Power:	2350 kVA
Degree of Protection:	IP00
Location (e.g. tower bottom):	Nacelle

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

TYPE CERTIFICATE

Wind Turbine

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

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

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

Certificate. No.

IECRE.WE.TC.18.0032-R1

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Wind Turbine

Tower:

Type:	Tubular steel tower
Sections:	4
Length:	108 m HH
Drawing / Data sheet / Part No.:	GD377175

Tower:

Type:	Tubular steel tower
Sections:	5
Length:	127 m HH
Drawing / Data sheet / Part No.:	GD370585, GD383292

Foundation:

Type:	NA
Manufacturer:	NA
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