



Certificate No.

IECRE.WE.TC.18.0032-R5

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_B / S IEC 61400-1:2005 +Amd1:2010
(with alternative temperature range)

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

023.09.2.03.20.09
30.09.2020

Type test conformity statement
Dated

023.09.2.04.20.07
23.09.2020

Manufacturing conformity statement
Dated

023.09.2.05.20.06
23.09.2020

Final evaluation report
Dated

2763946-32-e Rev. 12
30.09.2020

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.

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:



Benjamin Bartels
Certification Body Wind Turbines
Munich, 30.09.2020

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



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Machine parameters:

Power regulation:	Three independent hydraulic pitch systems
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6°
Cone angle:	-3.7°
Rated power:	2.1 – 2.3 MW
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 Version V3 or superior

Wind conditions:

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

Electrical network conditions:

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

Other environmental conditions (where taken into account):

Design conditions in case of offshore WT :	N/A
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Normal and extreme temperature ranges:	0°C - +40°C 0°C - +50°C
Relative humidity of the air:	Up to 95%
Air density:	1.225 kg/m ³ (III _B) 1.164 kg/m ³ (S)
Solar radiation:	1000 W/m ²
Lightning protection system (standard and protection class):	IEC 61400-24 / LP1
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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II. Main Components

Major components:

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

Blade:

Type: G122 infused blade, structural shells and adhesive joints
Material: Glass fiber reinforced, epoxy resin
Blade length: 59.8 m
Number of blades: 3
Manufacturer: SGRE
Drawing / Data sheet / Part No.: SG 122 V0/V1/V2

Blade:

Type: G122 infused blade, structural shells and adhesive joints
Material: Glass fiber reinforced, polyester resin
Blade length: 60 m
Number of blades: 3
Manufacturer: LM Wind Power
Drawing / Data sheet / Part No.: LM 60.0 P

Blade bearing:

Type: Four points contact double row
Manufacturer: DEFONTAINE
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

Blade bearing:



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Wind Turbine

Type: Four points contact double row
Manufacturer: Laulagun
Drawing / Data sheet / Part No.: M00DST0125

Pitch System:

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

Main shaft:

Type: Steel shaft
Manufacturer: SGRE
Material: forged steel
Drawing / Data sheet / Part No.: GP360361, GP460606

Main bearing:

Type: 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: Spherical roller bearing
Manufacturer: TIMKEN
Drawing / Data sheet / Part No.: C951246 (front)
C951247 (rear)

Main bearing:

Type: 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:



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Wind Turbine

Type: Spherical roller bearing
Manufacturer: KOYO
Drawing / Data sheet / Part No.: DSA310080 (front)
DSA310090 (rear)

Main bearing:

Type: Spherical roller bearing
Manufacturer: SKF
Drawing / Data sheet / Part No.: 230/750 CA/W33 (front)
241/500 ECA/W33 (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
GE2000PL128.5-50Hz-G122 MY20-
OPTIMAFLEX
GE2000PL128.5-50Hz-G122 MY20SL

Gearbox:

Type: Three stages gearbox (one planetary stage and two helical gear stages)
Gear Ratio: 128.5
Manufacturer: SGRÉ
Drawing / Data sheet / Part No.: GE2000PL128.5-50Hz-ENHB
GE2000PL128.5-50Hz-ENHC
GE2000PL128.5-50Hz-ENHB-XTR
GE2000PL128.5-50Hz-ENHC-XTR
GE2000PL128.5-50Hz-G122 MY20-
OPTIMAFLEX
GE2000PL128.5-50Hz-G122 MY20B
GE2000PL128.5-50Hz-G122 MY20SL

Gearbox:



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Wind Turbine

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
GE2000PL128.5-50Hz-G122 MY20-
OPTIMAFLEX
GE2000PL128.5-50Hz-G122 MY20B

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
GE2000PL128.5-50Hz-G122 MY20-
OPTIMAFLEX
GE2000PL128.5-50Hz-G122 MY20SL

Yaw System:

Drive Type: Active by yaw drives
Manufacturer: SGRE
Drawing / Data sheet / Part No.: see yaw gear

Bearing Type: Friction Bearing
Manufacturer: SGRE (design)
Drawing / Data sheet / Part No.: GD254280, GD293701

Gear Type: Planetary gear with motor and brake
Manufacturer: Bonfiglioli
Drawing / Data sheet / Part No.: 710T4 (56265391)
709T4 (17090T004704)

Gear Type: Planetary gear with motor and brake
Manufacturer: Comer
Drawing / Data sheet / Part No.: PG 2504 (5718.050.0508)



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Gear Type: Planetary gear with motor and brake
Manufacturer: SEW
Drawing / Data sheet / Part No.: P4W034 (2234 247 8.3)

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: Friction – brake on motor
Manufacturer: Antec
Drawing / Data sheet / Part No.: Included in yaw gear motor

Manufacturer: Frenos Iruna
Drawing / Data sheet / Part No.: Included in yaw gear motor

Manufacturer: JIAOZUO
Drawing / Data sheet / Part No.: Included in yaw gear motor

Manufacturer: Altra Industrial Motion India Pvt. Ltd.
(formerly GKN Land Systems India Pvt.
Ltd.)
Drawing / Data sheet / Part No.: Included in yaw gear motor

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



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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 BATY E
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

Generator:

Type	Doubly-fed induction machine
Manufacturer:	ABB
Drawing / Data sheet / Part No.:	AMK 500L4A BATY C/D
Rated Power:	2170 kW
Rated Frequency:	50 Hz
Rated Speed:	1680 rpm
Max. speed:	2280 rpm
Rated Voltage:	690 V
Rated Current:	1634 A / 1635 A
Insulation Class:	F
Degree of Protection:	IP54



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Converter:

Type: Back to back DFIG converter
Manufacturer: Ingeteam / Gamesa / Valencia Power Converters
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 / 20kV / 34.5 kV
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 / 20kV / 30 kV / 33kV
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



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Wind Turbine

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

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

Transformer:

Type: Dry type vacuum cast resin transformer
Manufacturer: SGB
Drawing / Data sheet / Part No.: DTTH1NG 2500/30 (GD220231-en
REV3)
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



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Wind Turbine

Manufacturer:	SGB
Drawing / Data sheet / Part No.:	DTTH 2500/30 (GD220231-en REV5)
Rated Voltage:	690 V / 33000 V
Rated Power:	2350 kVA
Degree of Protection:	IP00
Location (e.g. tower bottom):	Nacelle

Cabinets:

Type:	Top Controller Cabinet
Manufacturer:	Gamesa Electric, Ingeteam Power Technology S. A., Ingeteam Power Technology India Pvt Ltd.
Drawing / Data sheet / Part No.:	GP422444 / GP424794 / GP508804 / GP522637 / GP522636 / GP521272
Rated Voltage:	3X 690 V _{AC} , 230 V _{AC}
Rated frequency:	50 / 60 Hz
Rated current	150 A (690 V)
Icc max	35 kA
Degree of Protection:	IP54

Cabinets:

Type:	Hub Cabinet
Manufacturer:	Gamesa Electric, Ingeteam Power Technology S. A., Ingeteam Power Technology India Pvt Ltd.
Drawing / Data sheet / Part No.:	GP425243 / GP424539 / GP430255 / GP515302
Rated Voltage:	230 V _{AC}
Rated frequency:	50 / 60 Hz
Rated current	16 A
Icc max	6 kA
Degree of Protection:	IP54

Cabinets:

Type:	Ground Controller Cabinet
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Manufacturer: Gamesa Electric, Ingeteam Power
Technology S. A., Ingeteam Power
Technology India Pvt Ltd.
Drawing / Data sheet / Part No.: G09X00E51 / GP429667 / GP425444 /
GP510040
Rated Voltage: 3x 690 V_{AC}
Rated frequency: 50 / 60 Hz
Rated current 12.5 A
Icc max 3 kA
Degree of Protection: IP54

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.: GD383292 / GD370585/ GD468275

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:



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Operation & maintenance manual:	PM000882
Transport manual:	GP199954
Installation & commissioning. manual:	GP301951