



Certificate No.

IECRE.WE.TC.18.0032-R6

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 2.2-122

wind turbine class (class, standard, year)

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

023.09.2.03.20.10
13.10.2020

Type test conformity statement
Dated

023.09.2.04.20.08
13.10.2020

Manufacturing conformity statement
Dated

023.09.2.05.20.07
13.10.2020

Final evaluation report
Dated

2763946-32-e Rev. 13
13.10.2020

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:



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

Benjamin Bartels
Certification Body Wind Turbines
Munich, 13.10.2020



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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: | 2200 kW |
| Rated wind speed V_r : | 9.0 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 architecture Version 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 \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 |
| Normal and extreme temperature ranges: | 0°C - +38°C 0°C - +50°C |



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|---------------------------------------------------------------------------------------------------------------------|-------------------------|
| Relative humidity of the air: | Up to 95% |
| Air density: | 1.164 kg/m ³ |
| 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: SG122 infused blade, structural shells and adhesive joints
Material: Glass fiber reinforced, epoxy resin
Blade length: 59.8 m
Number of blades: 3
Manufacturer: SGRE (SIEMENS GAMESA RENEWABLE ENERGY)
Drawing / Data sheet / Part No.: SG 122 V0/V1/V2

Blade:

Type: SG122 infused blade, structural shells and adhesive joints
Material: Glass fiber reinforced, polyester resin
Blade length: 60 m
Number of blades: 3
Manufacturer: LM (LM WIND POWER BLADES INDIA PVT LTD)
Drawing / Data sheet / Part No.: LM 60.0 P

Blade bearing:

Type: Four points contact double row
Manufacturer: DEFONTAINE (DEFONTAINE (QINGDAO) MACHINERY CO LTD.)
Drawing / Data sheet / Part No.: 13-2418-00, 13-2418-01, 13-2418-02, 13-2418-03, 13-2418-04, 13-2418-05, 13-2418-06, 13-2418-07

Blade bearing:

Type: Four points contact double row
Manufacturer: TMB (TIANMA (CHENGDU) PRECISION MACHINERY CO LTD)
Drawing / Data sheet / Part No.: B030.53.2418K
B030.53.2418K2



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B030.53.2418K3
B030.53.2418K4

Blade bearing:

Type: Four points contact double row
Manufacturer: Laulagun
Drawing / Data sheet / Part No.: F2655M00DST0125KI
F2655M00DST0125XS
F2655M00DST0125KA
F2655M00DST0125XG

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: 42CrMo4 + QT
34CrNiMo6 + QT
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 (TIMKEN SINGAPORE PTE
LTD)
Drawing / Data sheet / Part No.: C951246 (front)
C951247 (rear)

Main bearing:



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Wind Turbine

Type: Spherical roller bearing
Manufacturer: ZKL (ZKL BEARING CZ AS)
Drawing / Data sheet / Part No.: 230/750 EW33MH TPF 11528-16 (front)
241/500 EW33MH TPF 11528-16 (rear)

Main bearing:

Type: Spherical roller bearing
Manufacturer: KOYO (KOYO BEARINGS INDIA PVT LTD)
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 (ZF WIND POWER COIMBATORE PVT LTD)
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: SGRE (SIEMENS GAMESA RENEWABLE ENERGY)
Drawing / Data sheet / Part No.: GE2000PL128.5-50Hz-ENHB
GE2000PL128.5-50Hz-ENHC



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Wind Turbine

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:

Type: Three stages gearbox (one planetary stage and two helical gear stages)
Gear Ratio: 128.5
Manufacturer: NGC (NANJING HIGH SPEED GEAR MANUFACTURING CO LTD)
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 Ltd
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.: GD293701, GD254280

Bearing Type:

Friction Bearing
Manufacturer: Dalian Tracy Slewing Bearing Manufacturing Company Ltd
Jiaxing SHIMAI Machinery Co Ltd
Dalian United Wind Power Generation Bearing Co Ltd
Wheels India Ltd
Drawing / Data sheet / Part No.: GP222733, GP517451



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| | |
|----------------------------------|------------------------------------------------------------------------------------------------------|
| <i>Gear Type:</i> | Planetary gear with motor and brake |
| Manufacturer: | Bonfiglioli (BONFIGLIOLI TRANSMISSIONS PVT LTD) |
| Drawing / Data sheet / Part No.: | 2T710T4A28003 2T710T4A28005 I7090T004704 |
| <i>Gear Type:</i> | Planetary gear with motor and brake |
| Manufacturer: | Comer (COMER INDUSTRIES (JIAXING) CO LTD) |
| Drawing / Data sheet / Part No.: | PG 2504 (5718.050.0508) |
| <i>Gear Type:</i> | Planetary gear with motor and brake |
| Manufacturer: | SEW |
| Drawing / Data sheet / Part No.: | P4W034 (2234 247 8.3) |
| <i>Gear Type:</i> | Planetary gear with motor and brake |
| Manufacturer: | NGC (NANJING HIGH SPEED GEAR MANUFACTURING CO LTD) |
| Drawing / Data sheet / Part No.: | FDX204S-01-00R1 |
| <i>Gear Type:</i> | Planetary gear with motor and brake |
| Manufacturer: | BREVINI (BREVINI POWER - TRANSMISSION SPA) |
| Drawing / Data sheet / Part No.: | SI0013423 |
| <i>Brake Type:</i> | Friction – brake on motor |
| Manufacturer: | ANTEC (ANTEC BREAKING SYSTEMS (TIANJIN) CO LTD) |
| Drawing / Data sheet / Part No.: | 20.101.562, 20.101.563, 20.103.227, 20.103.230, 20.104.893, 20.104.894, 20.104.895, 20.104.896 |
| Manufacturer: | Frenos Iruna (IRUNA INDIAN BRAKES PVT LTD) |
| Drawing / Data sheet / Part No.: | 1445062, 6700066, 6700067, 6700081, P75.19-A, P75.19-B |



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Manufacturer: JIAOZUO (JIAOZUO CITY BRAKES
DEVELOPMENT CO LTD)
Drawing / Data sheet / Part No.: GP345273
GP345274

Manufacturer: Altra Industrial Motion India Pvt. Ltd.
(formerly (GKN Land Systems India Pvt.
Ltd.)
Drawing / Data sheet / Part No.: 390-30263, 390-30264, 390-00015,
390-00016

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
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
Rated Power: 2170 kW
Rated Frequency: 50 Hz
Rated Speed: 1680 rpm
Max. speed: 1900 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
Drawing / Data sheet / Part No.: DTE 2350/24, DTE 2350/36
Rated Voltage: 690 V / 20kV / 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: 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
Drawing / Data sheet / Part No.: 2350 / HiT33
Rated Voltage: 690 V / 33000 V



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Rated Power: 2350 kVA

Degree of Protection: IP00

Location (e.g. tower bottom): Nacelle

Transformer:

Type: Dry type vacuum cast resin transformer

Manufacturer: ABB

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:



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Wind Turbine

Type: Dry type vacuum cast resin transformer
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, S.A. Unipersonal,
Ingeteam Power Technology S.A.,
Ingeteam Power Technology India Pvt
Ltd.,
Valencia Power Converters
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, S.A. Unipersonal,
Ingeteam Power Technology S.A.,
Ingeteam Power Technology India Pvt
Ltd.,
Valencia Power Converters
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



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Cabinets:

| | |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Type: | Ground Controller Cabinet |
| Manufacturer: | Gamesa Electric, S.A. Unipersonal, Ingeteam Power Technology S.A., Ingeteam Power Technology India Pvt Ltd., Valencia Power Converters |
| 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/ GD405029 |

Foundation:

| | |
|---------------------------------|----|
| Type: | NA |
| Manufacturer: | NA |
| Drawing / Data sheet / Part No: | NA |

Foundation Adaptor:

| | |
|---------------|---------------------|
| Type: | Tubular steel tower |
| Manufacturer: | NA |



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Drawing / Data sheet / Part No.: NA

Manuals:

Operation & maintenance manual: PM000882

Transport manual: GP199954

Installation & commissioning. manual: GP301951