



Certificate No.

IECRE.WE.CC.19.0020-R0

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

COMPONENT CERTIFICATE

Wind Turbine

This certificate is issued to

Siemens Gamesa Renewable Energy A/S
Borupvej 16
7330 Brande
Denmark

for the component

SG 8.0-167 DD, SG DD-167 Rotor Nacelle Assembly

wind turbine class (class, standard, year)

WT class S, IEC 61400-1:2005 + Amd1:2010

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

DB-DNVGL-SE-0074-03457-1
2019-08-30

Design evaluation conformity statement
Dated

DE-DNVGL-SE-0074-03457-1
2019-08-30

Type test conformity statement
Dated

TT-DNVGL-SE-0074-03457-1
2019-08-30

Manufacturing conformity statement
Dated

ME-DNVGL-SE-0074-03457-1
2019-08-30

Final evaluation report
Dated

FER-TC-DNVGL-SE-0074-03457-1
2019-08-30

The conformity evaluation was carried out in accordance with the rules and procedures of the IECRE System www.iecre.org

The component 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:
2024-08-29

Approved for issue on behalf of the IECRE
Certification Body:



DNVGL Renewables Certification
Brooktorkai 18
20457 Hamburg, Germany

Mersudin Bajric / Bente Vestergaard
Project Manager / Service Line Leader,
Type Certification
Hamburg 2019-10-03



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Machine parameters :

Power regulation:	Pitch controlled
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6°
Cone angle:	1°
Rated power:	As specified in annex 1
Rated wind speed V_r :	As specified in annex 1
Rotor diameter:	167 m
Hub height(s):	119 m
Hub height operating wind speed range $V_{in} - V_{out}$:	4 m/s – 25 m/s
Design life time:	25 years
Software version:	PLANC 8.1.3 / 140.0.1.1

Wind conditions :

Characteristic turbulence intensity I_{ref} at $V_{hub} = 15$ m/s:	0.14
Annual average wind speed at hub height V_{ave} :	10 m/s
Reference wind speed V_{ref} :	50 m/s
Mean flow inclination:	8°
Hub height 50-year extreme wind speed V_{e50} :	70 m/s

Electrical network conditions :

Normal supply voltage and range:	Low voltage side: 690 V +/- 10%V High voltage side: 33 kV ± 10 % 66 kV ± 10 %
Normal supply frequency and range:	50/60 Hz -3 Hz / +2 Hz
Voltage imbalance:	± 2 % acc. to IEC 61400-1
Maximum duration of electrical power network outages:	No limits when requirements in manuals are followed
Number of electrical network outages	50 p.a.



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Other environmental conditions (where taken into account):

Design conditions in case of offshore WT (water depth, wave conditions, salinity, etc.):	Other environmental (climatic) conditions as outlined in IEC 61400-3, ed.1: 2009: Chapter 6.5 "Other environmental conditions"
Normal temperature range, operation with power boost (PB)	-10°C to + 20°C
Normal temperature range, operation with high temperature ride through (HTRT)	-10°C to + 35°C (derating temperature see configuration matrix)
Extreme temperature range, stand-still	-20°C to + 45°C
Relative humidity of the air:	Outside:100%
Air density:	1.225 kg/m ³
Solar radiation:	1000 W/m ²
Lightning protection system (standard and protection class):	Designed acc. to IEC 61400-24, Protection Level I
Corrosion class for the wind turbine acc. to ISO 12944	External structural surfaces: C5-M High

Interfaces

The certification covers the rotor-nacelle assembly including yaw system and tower top flange including bolt connection between tower top flange and yaw ring.

Interface to tower: D1012633, 004/ECN 69854 Tower Top drawing

Interface to other components or systems and design loads See configuration matrix



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Major components:

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

Blade:

Type	B81-00 (self-supporting)
Manufacturer	Siemens Gamesa Renewable Energy
Material	Glass fibre reinforced epoxy and balsa
Blade length	81.4 m
Number of blades	3
Drawing	D1590846 Rev.2

Blade bearing:

Type 1	Double row 4-point slewing ball bearing
Manufacturer	Rollix
Drawing / Data sheet / Part no.	13-4000-00, Rev. A

Type 2	Double row 4-point slewing ball bearing
Manufacturer	Thyssenkrupp Rothe Erde GmbH
Drawing / Data sheet / Part no.	090.70.4000.000.49.142D, Rev. C

Type 3	Double row 4-point slewing ball bearing
Manufacturer	TMB
Drawing / Data sheet / Part no.	B030.69.400K, Rev. 4

Pitch System:

Type	Hydraulic, 2 cylinders per blade
Manufacturer	Siemens Gamesa Renewable Energy

Fixed shaft:

Type	Cast
Material	EN-GJS-400-C-Z
Drawing / Data sheet / Part no.	D1103766, ECN No. C01021029-003



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Main bearing:

Type 1	Double row tapered roller bearing
Manufacturer	Rothe Erde GmbH
Drawing / Data sheet / Part no.	140.99.3480.201.62.132D, Rev. B

Type 2	Double row tapered roller bearing
Manufacturer	SKF
Drawing / Data sheet / Part no.	BT2-8392

Type 3	Double row tapered roller bearing
Manufacturer	SKF
Drawing / Data sheet / Part no.	BT2-8392 B

Yaw System:

Drive type	Active, 16 yaw drives
Drive manufacturer	Siemens Gamesa Renewable Energy
Drawing / Data sheet / Part no.	Included in yaw gear
Bearing type	Plain bearing, yaw clamps
Bearing manufacturer	Siemens Gamesa Renewable Energy
Drawing / Data sheet / Part no.	D1168565-90070
Gear type incl. drive & brake Alt.1	PG 1904 PR, Ratio: 948/1
Gear manufacturer incl. drive & brake	Comer Industries
Drawing / Data sheet / Part no.	N06855-03, Rev. 1 with 40 Nm motor brake
Brake type	Friction and brake on motor
Brake manufacturer	Siemens Gamesa Renewable Energy
Drawing / Data sheet / Part no.	Included in yaw gear motor



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Generator:

Type	Permanent magnet synchronous generator DD83
Manufacturer	Siemens
Rated power	8.4 MW / 9.4 MW
Rated frequency	12 Hz / 13 Hz
Rated speed	10.3 rpm / 10.8 rpm
Rated voltage	max. 820 V
Rated current	2x 3.7 kA / 2x 4 kA
Power factor	0.82 / 0.89
Insulation class	F
Degree of protection	IP44
Drawing / Data sheet / Part no.	D1745856, ECN No.: C01039365, Rev. 1

Converter

Type	NetConverter® power conversion system, module type IM V3
Manufacturer	Siemens
Rated voltage (grid)	690 V
Rated current (grid)	4250 A (per system)
Rated grid frequency	50 / 60 Hz
Degree of protection	IP2XD
Drawing / Data sheet / Part no.	G4P2C10 Product Data sheet IM V3

Transformer

Type 1	Liquid-immersed TDN-903A03W1K-99
Manufacturer	Siemens
Rated voltage HV / LV	33 kV / 0.69 kV
Rated grid frequency	50 / 60 Hz
Degree of protection	n.a.
Drawing / Data sheet / Part no.	Leistungsschild 246938031



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Type 2	Liquid-immersed TDN-903A06W1K-99
Manufacturer	Siemens
Rated voltage HV / LV	66 kV / 0.69 kV
Rated grid frequency	50 / 60 Hz
Degree of protection	n.a.
Drawing / Data sheet / Part no.	Leistungsschild 246931931
Switchgear	
Type 1	NXPLUS C Wind
Manufacturer	Siemens
Rated current	630 A
Rated voltage	36 kV
Rated grid frequency	50 / 60 Hz
IAC-Classification	IAC A FLR 25 kA 1 s
Drawing / Data sheet / Part no.	Technical Data NX Plus C Wind - G81072-H2119 (2 breakers solution) Technical Data NX Plus C Wind G81072-H2250 (1 breaker solution)
Type 2	8VM1
Manufacturer	Siemens
Rated current	1250 A
Rated voltage	72.5 kV
Rated grid frequency	50 / 60 Hz
Drawing / Data sheet / Part no.	EM HP GIS S / VDB-32718, 05.05.2017



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Manuals:

Installation Manual	D2132256, C01070238, Installation Manual SG-8.0-167
Commissioning manual	D2130467 Rev.0, Commission nacelle
Operation Manual	ZOM 1036343, 270694 / 12 User terminal for SICS on DD turbines - Operating manual, software version 140.0.0.XX
Service Manual	X00353159, C01059712 / 001, Maintenance manual, SG 8.0-167 DD / SG DD-167



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Annex 1 – Configuration matrix

Configuration variant 1, SG 8.0-167 DD (with PB)

Variant	Wind turbine class	Rated power	Rotational speed	Rated wind speed v_r	Derating temperature
1	IB*	8.0 MW	10.3 rpm	12 m/s	25°C

*Wind class IB with 25 years design lifetime

Options

Variant	HWRT	HWRT operating wind speed range	Power Boost	Power boosted power	Power Curve Upgrade Kit
1	Yes	25 – 28 m/s	Yes	8.4 MW	No

Further information

Variant	Controller name (BHawC)	Controller version (BHawC)	Load set name	Turbine control software version
1	PLANC.dll	PLANC 8.1.3	D780167LR31	140.0.1.1

HWRT: High Wind Ride Through
PB: Power Boost



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Annex 1 -Configuration matrix

Configuration variant 2, SG DD-167 (with PB)

Variant	Wind turbine class	Rated power	Rotational speed	Rated wind speed v_r	Derating temperature
2	IB*	8.6 MW	10.4 rpm	13 m/s	10°C

*Wind class IB with 25 years design lifetime

Options

Variant	HWRT	HWRT operating wind speed range	Power Boost	Power boosted power	Power Curve Upgrade Kit
2	Yes	25 – 28 m/s	Yes	9.0 MW	No

Further information

Variant	Controller name (BHawC)	Controller version (BHawC)	Load set name	Turbine control software version
2	PLANC.dll	PLANC 8.1.3	D786167LR31	140.0.1.1

HWRT: High Wind Ride Through
PB: Power Boost