



Certificate No.

IECRE.WE.CC.19.0002-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

Rotor-Nacelle Assembly: Onshore Direct Drive Platform 2nd Generation (see Annex 1 - Configuration matrix)

wind turbine class (class, standard, year)

See Annex 1, IEC 61400-1:2005 incl. Amd.1, 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

DB-DNVGL-SE-0074-04159-1
2018-11-29

Design evaluation conformity statement
Dated

DE-DNVGL-SE-0074-04160-1
2018-11-29

Type test conformity statement
Dated

TT-DNVGL-SE-0074-04162-0
2018-11-30

Manufacturing conformity statement
Dated

ME-DNVGL-SE-0074-04161-0
2018-11-29

Component Certificate issued by DNV GL for the LM 69.3P blade
Dated

CC-IEC61400-22-02208-1
2018-03-16

Final evaluation report
Dated

FER-TC-DNVGL-SE-0074-04163-0
2018-11-30

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

The rotor nacelle assembly 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:
2021-06-23

Approved for issue on behalf of the IECRE
Certification Body:



Maria Olsen / Christer Eriksson
Project Manager / Service Line Leader,
Type Certification
Hellerup 2019-02-25

Renewables Certification
Brooktorkai 18
20457 Hamburg, Germany



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Machine parameters:

Power regulation:	Pitch regulation with variable speed
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	7.5°
Cone angle:	3°
Rated power:	See Annex 1
Rated wind speed V_r :	11 m/s or 12 m/s - See Annex 1
Rotor diameter:	130 m or 142 m - See Annex 1
Hub height(s):	See Annex 1
Hub height operating wind speed range $V_{in} - V_{out}$:	See Annex 1
Design life time:	See Annex 1
Software version:	STC-1 controller version - See Annex 1

Wind conditions:

Characteristic turbulence intensity I_{ref} at $V_{hub} = 15$ m/s:	See Annex 1
Annual average wind speed at hub height V_{ave} :	See Annex 1
Reference wind speed V_{ref} :	See Annex 1
Mean flow inclination:	8°
Hub height 50-year extreme wind speed V_{e50} :	See Annex 1

Electrical network conditions:

Normal supply voltage and range:	<u>Low voltage side:</u> 690 V \pm 10% <u>High voltage side:</u> 10,5 kV \pm 10% 20 kV \pm 10% 33 kV \pm 10%
Normal supply frequency and range:	50 Hz \pm 6%
Voltage imbalance:	\pm 2% according to IEC 62400-1
Maximum duration of electrical power network outages:	No limits when requirements in manuals are followed



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Number of electrical network outages

Maximum 20 per year according
to IEC 61400-1

Other environmental conditions (where taken into account):

Normal and extreme temperature ranges:

-20°C to +40°C (normal)
-20°C to +50°C (extreme)

Relative humidity of the air:

Max. 95 %

Air density:

1.225 kg/m³

Solar radiation:

1000 W/m²

Lightning protection system (standard and protection
class):

Designed acc. to IEC 61400-24
and IEC 62305-3, Protection
level I

Interfaces:

The certification covers RNA, including bolt connection to
tower top.

Load calculations are valid for system frequency range:

See Annex 1



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Major components:

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

Blade:

Type: B63-10
Material: Glass fiber reinforced epoxy
Blade length: 63.45 m ± 0.05 m
Number of blades: 3
Manufacturer: Siemens Gamesa Renewable Energy A/S
Drawing / Data sheet / Part No.: D1132117-C01006952

Type: LM 69.3P
Material: Glass fiber-reinforced polyester and balsa / PET
Blade length: 69.26 m
Number of blades: 3
Manufacturer: LM Wind Power A/S
Drawing / Data sheet / Part No.: DR-008120, rev. A2

Blade bearing:

Type: 4-point double row slewing ball bearing
Manufacturer: ThyssenKrupp Rothe Erde GmbH
Drawing / Data sheet / Part No.: DD 130:
090.65.2635.020.49.1421_B
090.65.2635.030.49.1421_B
DD-142:
090.65.2635.002.49.1420_A

Type: 4-point double row slewing ball bearing
Manufacturer: TMB
Drawing / Data sheet / Part No.: DD 130:
B030.65.2640K2 V1
B030.65.2640K3 V1



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Type: 4-point double row slewing ball bearing
Manufacturer: ZWZ
Drawing / Data sheet / Part No.: DD 130:
FL-HSB2638D
FL-HSB2638DF

Pitch System:

Motor / Actuator Type: Two cylinders per blade
Pitch Controller Type: Hydraulic
Manufacturer: Fjero A/S
Drawing / Data sheet / Part No.: 71881 rev. 13 / 71882 rev. 3

Hub:

Type: Cast iron structure
Material: EN-GJS-400-18C-LT-Z
Drawing / Data sheet / Part No.: D1887000-C01045681

Fixed shaft:

Type: Cast iron structure
Material: EN-GJS-400-18C-LT-Z
Drawing / Data sheet / Part No.: D1452484-C01020621 (cast)
D1452486-C01026982 (machined)
D1452493-C01037769 (coated)

Main bearing:

Type: Double row tapered roller bearing
Manufacturer: ThyssenKrupp Rothe Erde GmbH
Drawing / Data sheet / Part No.: 140.75.2305.000.62.1320_G

Type: Double row tapered roller bearing
Manufacturer: Timken
Drawing / Data sheet / Part No.: DD-130 and DD-142
E-56159, Rev. K



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Type:	Double row tapered roller bearing
Manufacturer:	AB SKF (Sweden)
Drawing / Data sheet / Part No.:	BT2-8372, Rev. 2
Yaw system:	
Drive Type:	Sliding bearing, 12 yaw drives and 15 yaw clamps
Manufacturer:	Siemens
Drawing / Data sheet / Part No.:	Design Report SWT3.3-130 YawDrive_SWT33_130_7050_01
Bearing Type:	Sliding bearing
Manufacturer:	Siemens
Drawing / Data sheet / Part No.:	D1046097-C01005049
Gear Type:	Planetary gear
Manufacturer:	Comer industries
Drawing / Data sheet / Part No.:	N06855_00
Gear Type:	Planetary gear
Manufacturer:	Bonfiglioli
Drawing / Data sheet / Part No.:	56176320
Motor Type	1AV1104C 3-phase Squirrel Cage motor
Manufacturer:	Siemens
Drawing / Data sheet / Part No.:	1LE1002-1AC43-4FA4-Z
Brake Type:	Friction and brake in yaw motors
Generator:	
Type:	DD37 Synchronous with permanent magnet excitation
Manufacturer:	Siemens



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Rated Power: 4.1 MW (DD-142)
4.4 MW (DD-130)

Rated Frequency: 10.1 Hz (DD-142)
11.3 Hz (DD-130)

Rated Speed: 11.2 rpm (DD-142)
12.5 rpm (DD-130)

Rated Voltage: Max. 755 V

Rated Current: 4000 A

Insulation Class: CLASS F

Degree of Protection: IP44

Drawing / Data sheet / Part No.: D1699108/001

Converter:

Type: IMV3 (IGBT)

Manufacturer: Siemens

Rated Voltage: 690 V grid side

Rated Current: 4000 A

Degree of Protection: IP20

Drawing / Data sheet / Part No.: S1033AA1004

Transformer:

Type: DST 4000 H/10
Liquid-immersed

Manufacturer: SBG

Rated Voltage LV/HV: 10.5 kV / 0.69 kV

Degree of Protection: IP54

Drawing / Data sheet / Part No.: Technical specification VESWP410,
23.03.2018

Type: DST 4000 H/20
Liquid immersed

Manufacturer: SBG

Rated Voltage LV/HV: 20 kV / 0.69 kV

Degree of Protection: IP54



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Drawing / Data sheet / Part No.:	Technical specification VESWP420, 23.03.2018
Type:	DST 4000 H/30 Liquid immersed
Manufacturer:	SBG
Rated Voltage LV/HV:	33 kV / 0.69 kV
Degree of Protection:	IP54
Drawing / Data sheet / Part No.:	Technical specification VESWP433, 23.03.2018

High-voltage switchgear:

Type	8DJH 36
Manufacturer	Siemens
Rated voltage	36 kV
Rated current	630 A
IAC classification	IAC A FLR 20 kA, 1 s
Drawing / Data sheet / Part No.:	ZPS 1048860-262918

Type	8DJH
Manufacturer	Siemens
Rated voltage	12 kV, 24 kV
Rated current	630 A
IAC classification	IAC A FLR 21 kA, 1 s
Drawing / Data sheet / Part No.:	ZPS 1048860-262918

Manuals:

Operation & maintenance manual:	ZOM 1036343 ECN 266589
Health and Safety rules	SI 545781 R18
Service manual	ZSM 1050263 ECN 266994
Transport manual	See list in ER-DE-DNVGL-SE-0074- 04160-1
Installation & commissioning manual:	ZAI 1051572 ECN 267985



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Service lift:

Type: SWP L
Manufacturer: Avanti
Drawing / Data sheet / Part No.: Avanti L + XL lift manual

Type: Power Climber Sherpa RD
Manufacturer: Power Climber Sherpa
Drawing / Data sheet / Part No.: 38911-IM-E

Type: SWG 2.2.1 (max. load 240 kg)
Manufacturer: Skyman
Drawing / Data sheet / Part No.: Service lift SWG 2.2.1 – Service and Installation Manual

Type: G-servicelift GWB-250
Manufacturer: Goracon
Drawing / Data sheet / Part No.: 11967-User manual GWB-250 SWP_R7

Crane:

Type: CERTEX Jib Crane W2
Manufacturer: CERTEX
Drawing / Data sheet / Part No.: 05-080-0289-000

Type: Jib crane with chain hoist
Manufacturer: Demag
Drawing / Data sheet / Part No.: 76413046-220515



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Annex 1 – Configuration matrix

SWT-DD-130:

ID (Type. Variant)	IEC WT class	Mode	Power*	De-rating Temperature 0 m above sea	Rated wind speed V_r	Operating wind speed
2.1	2A	1	4.3 MW	23°C	11 m/s	3-28 m/s
2.2	1B	1	4.3 MW	23°C	11 m/s	3-28 m/s
2.3	2A	2	4.3 MW	23°C	11 m/s	3-28 m/s
2.4	1B	2	4.3 MW	23°C	11 m/s	3-28 m/s
2.5	2A	3	4.15 MW	23°C	11 m/s	3-28 m/s
2.6	1B	3	4.15 MW	23°C	11 m/s	3-28 m/s

* Power @ de-rating temperature. Turbine de-rates at higher temperature.

ID (Type. Variant)	RPM	Mean wind speed V_{ave}	Turbulence Intensity I_{ref}	Reference wind speed v_{ref}	Hub height extreme wind speed v_{e50}	Design Life time
2.1	12.5	8.5 m/s	0.16	42.5 m/s	59.5 m/s	20 years
2.2	12.5	10.0 m/s	0.14	50.0 m/s	70.0 m/s	25 years
2.3	12.0	8.5 m/s	0.16	42.5 m/s	59.5 m/s	20 years
2.4	12.0	10.0 m/s	0.14	50.0 m/s	70.0 m/s	25 years
2.5	11.52	8.5 m/s	0.16	42.5 m/s	59.5 m/s	20 years
2.6	11.52	10.0 m/s	0.14	50.0 m/s	70.0 m/s	25 years

ID (Type. Variant)	Rotor	Hub Height	Blade	Software version	Frequency Range 1 st Tower mode
2.1	130 m	85.0 m	B63-10	136.0.1.18	0.247 – 0.273 Hz
2.2	130 m	85.0 m	B63-10	136.0.1.18	0.247 – 0.273 Hz
2.3	130 m	85.0 m	B63-10	136.0.1.18	0.247 – 0.273 Hz
2.4	130 m	85.0 m	B63-10	136.0.1.18	0.247 – 0.273 Hz
2.5	130 m	85.0 m	B63-10	136.0.1.18	0.247 – 0.273 Hz
2.6	130 m	85.0 m	B63-10	136.0.1.18	0.247 – 0.273 Hz

ID (Type. Variant)	LPS version	Load set name	Hot Climate Package, HC	Normal temperature range, HC	Extreme temperature range, HC
2.1	Gen. 2	D443130LR301a	Optional	-20°C to +45°C	-20°C to +50°C
2.2	Gen. 2	D443130LR301e	Optional	-20°C to +45°C	-20°C to +50°C
2.3	Gen. 2	D443130LR301a	Optional	-20°C to +45°C	-20°C to +50°C
2.4	Gen. 2	D443130LR301e	Optional	-20°C to +45°C	-20°C to +50°C
2.5	Gen. 2	D443130LR301a	Optional	-20°C to +45°C	-20°C to +50°C
2.6	Gen. 2	D443130LR301e	Optional	-20°C to +45°C	-20°C to +50°C

ID (Type. Variant)	Cold Climate Package, CC**	Normal temperature range, CC	Extreme temperature range, CC	Ice detection system***	De-icing V1.1
2.1	Optional	-30°C to +40°C	-45°C to +50°C	Optional	Optional
2.2	Optional	-30°C to +40°C	-45°C to +50°C	Optional	Optional
2.3	Optional	-30°C to +40°C	-45°C to +50°C	Optional	Optional
2.4	Optional	-30°C to +40°C	-45°C to +50°C	Optional	Optional
2.5	Optional	-30°C to +40°C	-45°C to +50°C	Optional	Optional
2.6	Optional	-30°C to +40°C	-45°C to +50°C	Optional	Optional

** Grid connection required below -20°C.

*** Based on Labkotec ice detector.



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SWT-DD-142:

ID (Type. Variant)	IEC WT class	Mode	Power*	De-rating Temperature 0 m above sea	Rated wind speed V_r	Operating wind speed
3.1	3A	1	4.1 MW	13°C	11 m/s	3-26 m/s
3.2	2B	1	4.1 MW	13°C	11 m/s	3-26 m/s

* Power @ de-rating temperature. Turbine de-rates at higher temperature.

ID (Type. Variant)	RPM	Mean wind speed V_{ave}	Turbulence Intensity I_{ref}	Reference wind speed v_{ref}	Hub height extreme wind speed v_{e50}	Design Life time
3.1	11.2	7.5 m/s	0.16	37.5 m/s	52.5 m/s	20 years
3.2	11.2	8.5 m/s	0.14	42.5 m/s	59.5 m/s	25 years

ID (Type. Variant)	Rotor	Hub Height	Blade	Software version	Frequency Range 1 st Tower mode
3.1	142 m	109.0 m	LM 69.3P	136.0.1.20	0.19 – 0.21 Hz
3.2	142 m	109.0 m	LM 69.3P	136.0.1.20	0.20 – 0.22 Hz

ID (Type. Variant)	LPS version	Load set name	Hot Climate Package, HC	Normal temperature range, HC	Extreme temperature range, HC
3.1	Gen. 2	D441142LR301a	Optional	-20°C to +45°C	-20°C to +50°C
3.2	Gen. 2	D441142LR301e	Optional	-20°C to +45°C	-20°C to +50°C

ID (Type. Variant)	Cold Climate Package, CC**	Normal temperature range, CC	Extreme temperature range, CC	Ice detection system***	De-icing V1.1
3.1	Optional	-30°C to +40°C	-40°C to +50°C	Optional	No
3.2	Optional	-30°C to +40°C	-40°C to +50°C	Optional	No

** Grid connection required below -20°C.

*** Based on Labkotec ice detector.