



Certificate No.

**IECRE.WE.CC.19.0010-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

SWT-DD-120 Rotor Nacelle Assembly (see Annex 1 - Configuration matrix)

wind turbine class (class, standard, year)

See Annex 1, IEC 61400-1:2005 incl. Amd.1, 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-0074-04897-0  
2019-06-27

Design evaluation conformity statement  
Dated

DE-DNVGL-SE-0074-04898-0  
2019-06-27

Type test conformity statement  
Dated

TT-DNVGL-SE-0074-04899-0  
2019-06-27

Manufacturing conformity statement  
Dated

ME-DNVGL-SE-0074-04896-0  
2019-06-27

Final evaluation report  
Dated

FER-TC-DNVGL-SE-0074-04900-0  
2019-06-27

The conformity evaluation was carried out in accordance with the rules and procedures of the IECRE System [www.iecre.org](http://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:  
2024-02-28

Approved for issue on behalf of the IECRE  
Certification Body:



Renewables Certification  
Brooktorkai 18  
20457 Hamburg, Germany

Maria Olsen / Bente Vestergaard  
Project Manager / Service Line Leader,  
Type and Component Certification  
Hellerup 2019-06-27



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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:	4300 kW
Rated wind speed $V_r$ :	13 m/s
Rotor diameter:	120 m
Hub height(s):	85 m
Hub height operating wind speed range $V_{in} - V_{out}$ :	3 – 30 m/s
Design life time:	20 years
Software version:	137. 2.0.1

#### 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 $V_{ref}$ :	57 m/s
Mean flow inclination:	8°
Hub height 50-year extreme wind speed $V_{e50}$ :	85.5 m/s

#### 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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### **Wind Turbine**

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)  
-25°C to +50°C (extreme)  
(Grid connection required below  
-20°C)

Relative humidity of the air:

Max. 95 %

Air density:

1.225 kg/m<sup>3</sup>

Solar radiation:

1000 W/m<sup>2</sup>

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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## **COMPONENT CERTIFICATE**

### **Wind Turbine**

#### **Major components:**

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

#### **Blade:**

Type: B59-20  
Material: Glass fiber reinforced epoxy  
Blade length: 59 m  
Number of blades: 3  
Manufacturer: Siemens Gamesa Renewable Energy A/S  
Drawing / Data sheet / Part No.: D1724545 Rev. 003

#### **Blade bearing:**

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

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

Type: 4-point double row slewing ball bearing  
Manufacturer: ZWZ  
Drawing / Data sheet / Part No.: 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



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#### 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  
140.80.2301.000.62.130D\_B

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



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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
<b>Generator:</b>	
Type:	DD37 Synchronous with permanent magnet excitation
Manufacturer:	Siemens
Rated Power:	4.5 MW
Rated Frequency:	11.8 Hz / 12.3 Hz
Rated Speed:	13.1 rpm / 13.7 rpm
Rated Voltage:	Max. 755 V
Rated Current:	4000 A
Insulation Class:	CLASS F
Degree of Protection:	IP44
Drawing / Data sheet / Part No.:	D1699108/001
<b>Converter:</b>	
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



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#### 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

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



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## COMPONENT CERTIFICATE

### Wind Turbine

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-0074-04899-0
Installation & commissioning manual:	ZAI 1051572 ECN 267985

#### 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





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**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-120:

ID (Type. Variant)	IEC WT class	Mode	Power*	De-rating Temperature 0 m above sea	Rated wind speed $V_r$	Operating wind speed
1.1	1A (S)	1	4.3 MW	41°C	13 m/s	3-30 m/s
1.2	S	1	4.3 MW	41°C	13 m/s	3-30 m/s
1.3	1A (S)	2	4.3 MW	36°C	13 m/s	3-30 m/s
1.4	S	2	4.3 MW	36°C	13 m/s	3-30 m/s
1.5	1A (S)	1	4.3 MW	32°C	13 m/s	3-30 m/s
1.6	S	1	4.3 MW	32°C	13 m/s	3-30 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
1.1	13.7	10 m/s	0.16**	57.0 m/s	85.5 m/s	20 years
1.2	13.7	8.5 m/s	0.19**	57.0 m/s	85.5 m/s	20 years
1.3	13.1	10 m/s	0.16**	57.0 m/s	85.5 m/s	20 years
1.4	13.1	8.5 m/s	0.19**	57.0 m/s	85.5 m/s	20 years
1.5	13.4	10 m/s	0.16**	57.0 m/s	85.5 m/s	20 years
1.6	13.4	8.5 m/s	0.19**	57.0 m/s	85.5 m/s	20 years

\*\* Typhoon wind conditions with increased turbulence intensity for EWM (TI: 0.143)

ID (Type. Variant)	Rotor	Hub Height	Blade	Software version	Frequency Range 1 <sup>st</sup> Tower mode
1.1	120 m	85.0 m	B59-20	137. 2.0.1	0.261 – 0.289 Hz
1.2	120 m	85.0 m	B59-20	137. 2.0.1	0.261 – 0.289 Hz
1.3	120 m	85.0 m	B59-20	137. 2.0.1	0.261 – 0.289 Hz
1.4	120 m	85.0 m	B59-20	137. 2.0.1	0.261 – 0.289 Hz
1.5	120 m	85.0 m	B59-20	137. 2.0.1	0.261 – 0.289 Hz
1.6	120 m	85.0 m	B59-20	137. 2.0.1	0.261 – 0.289 Hz

ID (Type. Variant)	LPS version	Load set name	Hot Climate Package, HC	Normal temperature range, HC	Extreme temperature range, HC
1.1	Gen. 4	D343120LR30c	No	-	-
1.2	Gen. 4	D343120LR30d	No	-	-
1.3	Gen. 4	D343120LR31a	No	-	-
1.4	Gen. 4	D343120LR31a	No	-	-
1.5	Gen. 4	-	No	-	-
1.6	Gen. 4	-	No	-	-

ID (Type. Variant)	Cold Climate Package, CC***	Normal temperature range, CC	Extreme temperature range, CC	Ice detection system****	De-icing V1.1
1.1	No	-	-	Optional	No
1.2	No	-	-	Optional	No
1.3	No	-	-	Optional	No
1.4	No	-	-	Optional	No
1.5	No	-	-	Optional	No
1.6	No	-	-	Optional	No

\*\*\* Grid connection required below -20°C.

\*\*\*\* Based on Labkotec ice detector.