



Certificate No.

IECRE.WE.CC.19.0011-R0

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

PROVISIONAL COMPONENT CERTIFICATE

Wind Turbine

This certificate is issued to

Vestas Wind Systems A/S
Hedeager 42
8200 Aarhus N
Denmark

for the component

Vestas V117-4.0 MW / V117-4.2 MW 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-0074-04881-0
08.05.19

Design evaluation conformity statement
Dated

DE-DNVGL-SE-0074-04865-0
08.05.19

Type test conformity statement
Dated

TT-B-DNVGL-SE-0074-04866-0
08.05.19

Final evaluation report
Dated

FER-CC-B-DNVGL-SE-0074-04864-0
08.05.19

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.

Outstanding issues for Provisional Component Certificate are listed in Annex 2 of this certificate.

Changes in the system design or the manufacturer's quality system are to be approved by DNV GL. Without approval, the certificate loses its validity.

This certificate is valid until:
07.05.20

Approved for issue on behalf of the IECRE
Certification Body:



 Ramakrishna Parasarampuram / Bente Vestergaard
 Project Manager / Service Line Leader, Component Certification
 Hamburg/Hellerup 08.05.19
 Renewables Certification
 Brooktorkai 18
 20457 Hamburg, Germany



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Machine parameters :

Power regulation:	pitch-controlled
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6.0°
Cone angle:	-4.0°
Rated power:	4000 kW / 4200 kW
Rated wind speed V_r :	Annex 1
Rotor diameter:	117 m
Hub height(s):	84 m, 91.5 m
Hub height operating wind speed range $V_{in} - V_{out}$:	3.0 – 32.0 m/s (HWO enabled)
Design life time:	20 years
Software version:	2017.09

Wind conditions :

Characteristic turbulence intensity I_{ref} at $V_{hub} = 15$ m/s:	Annex 1
Annual average wind speed at hub height V_{ave} :	Annex 1
Reference wind speed V_{ref} :	Annex 1
Mean flow inclination:	0°

Electrical network conditions :

Normal supply voltage and range:	720 V 19.1-36 kV \pm 10 %
Normal supply frequency and range:	50 or 60 Hz \pm 6 % Hz
Voltage imbalance:	IEC 61000-3-6 TR max 2 %
Maximum duration of electrical power network outages:	Two 3 months periods
Number of electrical network outages	Max 52 per year



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Other environmental conditions (where taken into account):

Normal and extreme temperature ranges:

*de-rating strategy above +30°C for V117-4.0 MW

*de-rating strategy above +20°C for V117-4.2 MW

Normal: -20°C to +40°C*

Extreme: -20°C to +50°C

Relative humidity of the air:

100% (max 40% of time) and
90% (rest of life time)

Air density:

1.225 kg/m³ (for normal
operation)

1.273 kg/m³ (for low
temperature operation)

1000 W/m²

Solar radiation:

Lightning protection system (standard and protection
class):

Designed acc. to IEC 61400-24,
Protection Level 1 and IEC
61312-1

Interfaces:

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

Load calculations are valid for tower frequency range:

0.299 Hz ±5% (HH 84 m)

0.256 Hz ±5% (HH 91.5 m)



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Major components:

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

Blade:

Type: Air foil shells bonded to supporting beam
Material: Fibreglass reinforced epoxy, carbon fibres and Solid Metal Tip (SMT)
Blade length: 57.15 m
Number of blades: 3
Manufacturer: Vestas
Drawing / Data sheet / Part No.: 0037-6856, Rev.0 – V117 Blade
0054-9342, Rev.1 – V117 STE kit
0043-3896, Rev.2 – V117 Root Vortex Generator
0056-7084, Rev.1 – V117 Gurney Flap Assembly

Blade bearing:

Type: Double row four-point contact ball bearing
Manufacturer: Laulagun/Rollix/Liebherr/TMB
Drawing / Data sheet / Part No.: 29058368, Rev.1

Pitch System:

Type: Hydraulic power unit
Manufacturer: LJM/Glual/Hine/Liebherr
Hydraulic Cylinder (140/90x922): 29080628, Rev.1

Type: Pitch Actuation Module
Manufacturer: Vestas Wind Systems A/S
Drawing / Data sheet / Part no.: 29113716, Rev.1



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Main shaft:

Type: Cast iron
Material: EN-GJS-500-14
Drawing / Data sheet / Part no.: 29085300, Rev. 4

Main bearing:

Type: Spherical Roller Bearing
Manufacturer: SKF/FAG
Drawing / Data sheet / Part no.: SKF - 240/950 CA/C3LW 33VQ113
FAG - F-582562.PRL-WPO

Gearbox:

Type: 2 stage planetary and 1 helical stage
gearbox
Manufacturer: Winergy
Gear ratio: 1:112.630
Drawing / Data sheet / Part no.: A5E43498362A, Rev. 001-AA

Yaw System:

Drive type: 8 x 2.7 kW, 400 V, 50 Hz asynchronous
motors
Drive manufacturer: Lafert
Drawing / Data sheet / Part no.: MZ10/A4A-55337

Drive type: 8 x 3.2 kW, 400 V, 60 Hz asynchronous
motors
Drive manufacturer: Lafert
Drawing / Data sheet / Part no.: MZ10/A4A-55338

Drive type: 8 x 2.7 kW, 400 V, 50 Hz asynchronous
motors
Drive manufacturer: ABB
Drawing / Data sheet / Part no.: 3GZF500810-23 A 14 AA 100 A



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Drive type: 8 x 3.2 kW, 400 V, 60 Hz asynchronous
motors
Drive manufacturer: ABB
Drawing / Data sheet / Part no.: 3GZF500810-23 A 14 AA 100 A

Drive type: 8 x 2.7 kW, 400 V, 50 Hz asynchronous
motors
Drive manufacturer: Bonfiglioli
Drawing / Data sheet / Part no.: CD00006614-02

Drive type: 8 x 3.2 kW, 400 V, 60 Hz asynchronous
motors
Drive manufacturer: Bonfiglioli
Drawing / Data sheet / Part no.: CD00007013-01

Gear type: Bevel stage and three planetary stages, i
= 952.3
Gear manufacturer: Bonfiglioli
Drawing / Data sheet / Part no.: I7090T010300

Gear type: Bevel stage and three planetary stages, i
= 935
Gear manufacturer: Comer
Drawing / Data sheet / Part no.: N07297_01

Bearing type: Preloaded sliding bearing, PETP pads
Bearing manufacturer: Vestas Wind Systems A/S
Drawing / Data sheet / Part no.: 29104726, Rev. 0



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Generator:

Type:	DASG 560/6M, Induction generator
Manufacturer:	Vestas Nacelles Deutschland (VND)
Rated power:	4450 kW
Rated frequency:	74 Hz
Rated speed:	1485 rpm
Rated voltage:	800 V
Rated current:	3650 A
Insulation class:	H
Degree of protection:	IP54

Converter:

Type:	Full quadrant IGBT
Manufacturer:	Vestas Wind Systems A/S
Rated voltage machine/grid:	720 Vrms / 800 Vrms
Rated current:	3200 A
Degree of protection:	IP54
Drawing / Data sheet / Part no.:	0069-2805, Rev. 0

Transformer:

Type:	Cast-Resin transformer 4GY6781-1EY
Manufacturer:	Siemens
Rated voltage:	33 / 0.72 V
Degree of protection:	IP00
Drawing / Data sheet / Part no.:	0073-7914, Rev. 0



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Type:	Cast-Resin transformer DTTH1N 4000/30
Manufacturer:	SGB
Rated voltage:	33 / 0.72 V
Degree of protection:	IP00
Drawing / Data sheet / Part no.:	0073-7915, Rev. 0

Manuals:

O&M manual:	0040-6996, Rev. 14
Transport manual:	0040-6996, Rev. 14
Installation / Commissioning manual:	0040-6996, Rev. 14



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Annex 1

Configurations covered by this Provisional Component Certificate

Variants	Hub Height	IEC WT class	Turbulence Intensity I_{ref}	Rated wind speed V_r	Mean wind speed V_{ave}	Reference wind speed V_{ref}
V117-4.0 MW	84	S	0.16	11.7 m/s	8.5 m/s	57.0 m/s
V117-4.2 MW	84	S	0.16	12.0 m/s	8.5 m/s	57.0 m/s
V117-4.0 MW	91.5	S	0.14	11.7 m/s	10.0 m/s	55.0 m/s
V117-4.2 MW	91.5	S	0.14	12.0 m/s	9.5 m/s	55.0 m/s



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Annex 2

Outstanding issues:

The following outstanding issues should be resolved for Component Certification:

- Initial documentation for the V117 blade static and fatigue tests has been submitted by Vestas and reviewed by DNV GL. For Component Certification, the comments raised for the initial documentation shall be closed by Vestas.
- The Power curve measurements for Vestas V117-4.0 MW / V117-4.2 MW wind turbine are pending for Component Certification.
- The load measurements for Vestas V117-4.0 MW / V117-4.2 MW wind turbine are pending for Component Certification.
- The robustness test, disassembly of the gearbox after robustness test and gear box field test for PZAB 3530,3 gear box are pending for the Component Certification.
- The Manufacturing Evaluation for the components listed in section 7.5.3 of IECRE OD-501, Ed.2 is pending for Component Certification
- Final set of manuals for Vestas V117-4.0 MW / V117-4.2 MW wind turbine shall be submitted by Vestas and approved by DNV GL for Component Certification.