



Certificate No.

IECRE.WE.CC.18.0003-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

MHI Vestas Offshore Wind A/S
Dusager 4
8200 Aarhus N
Denmark

for the component

V164-9.5 MW rotor nacelle assembly with rated output power of
9.525 MW and load modes down to 9.0 MW

wind turbine class (class, standard, year)

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

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-0074-03250-3
2018-11-30

Design evaluation conformity statement
Dated

DE-DNVGL-SE-0074-03251-3
2018-11-30

Type test conformity statement
Dated

TT-DNVGL-SE-0074-03252-3
2018-11-30

Manufacturing conformity statement
Dated

ME-DNVGL-SE-0074-03253-3
2018-11-30

Final evaluation report
Dated

FER-CC-DNVGL-SE-0074-03249-3
2018-11-26

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:
2022-12-15

Approved for issue on behalf of the IECRE
Certification Body:



Renewables Certification
Brooktorkai 18
20457 Hamburg, Germany

Johan Olaison / Christer Eriksson:
Project Manager / Service Line Leader,
Type Certification
Hellerup 2018-12-13



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Machine parameters:

Power regulation:	Pitch-controlled
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6°
Cone angle:	-6°
Rated power:	9525 kW
Rated wind speed V_r :	12.4 m/s
Rotor diameter:	164 m
Hub height(s):	Reference HH 107 m, please see interfaces below
Hub height operating wind speed range $V_{in} - V_{out}$:	3-31 m/s
Max Storm (High Wind Operation) derating linearly to 4.3 MW at 31 m/s:	25-31 m/s
Design life time:	25 years
Software version:	17.08

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:	0°
Hub height 50-year extreme wind speed V_{e50} :	70 m/s

Electrical network conditions:

Normal supply voltage and range:	Nominal grid voltage: 33, 34, 66 kV
Normal supply frequency and range:	50Hz
Voltage imbalance:	2%
Maximum duration of electrical power network outages:	Not dimensioning
Number of electrical network outages	50



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Other environmental conditions (where taken into account):

Design conditions in case of offshore WT :	Site specific
Normal and extreme temperature ranges:	-10°C to +25°C (normal) -15°C to +35°C (extreme)
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

Interfaces:

Design loads for the component:	0009-2153.V14
Interface assumptions, conditions and requirements:	
The certification covers RNA including yaw section (upper tower top) excluding bolt connection to tower top.	
Load calculations are valid for system frequency range:	[0.191; 0.264] Hz
The interface between the power control module and the tower is not included.	



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Major components:

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

Blade:

Type: Structural shell
Material: Fibreglass, reinforced epoxy, carbon fibres and Solid Metal Tip (SMT)
Blade length: 80 m
Number of blades: 3
Manufacturer: MHI Vestas Offshore Wind A/S
Drawing / Data sheet / Part No.: 80 m blade, 300001662.V06

Blade bearing:

Type: Three row roller bearing
Manufacturer: Liebherr, Rollix
Drawing / Data sheet / Part No.: 107277.R4

Pitch System:

Motor / Actuator Type: Two cylinders per blade
Pitch Controller Type: Hydraulic
Manufacturer: LJM or Glual pitch cylinders

Main shaft:

Type: Hollow shaft
Material: Cast iron
Drawing / Data sheet / Part No.: 29040375.V04

Main bearing:

Type: Pre-tensioned wide spread tapered roller bearings
Manufacturer: Timken
Drawing / Data sheet / Part No.: NP596934 – 90WA1 (E-52111-C-NM.RC)
NP746013 – 90WA1 (E-52207-C-NM.RC)



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Gearbox:

Type: 3 stage planetary differential gearbox
Gear Ratio: 1:38.03
Manufacturer: ZF
Drawing / Data sheet / Part No.: GPC 842.0 D

Yaw System:

Drive Type: 10 electrical yaw motors incl. gearbox
and motor brake
Manufacturer: Lafert
Drawing / Data sheet / Part No.: 29020308 (motor), Rev. 0

Bearing Type: Slide bearing
Manufacturer: MHI Vestas Offshore Wind A/S
Drawing / Data sheet / Part No.: 300010675 (support beam machined),
Rev. 0

Gear Type: Internal ring gear
Manufacturer: Comer Industries
Drawing / Data sheet / Part No.: 29031015 (yaw gear), Rev. 0

Brake Type: Braking capacity is based on bearing
friction and electrically activated friction
brake on motors.

Manufacturer: MHI Vestas Offshore Wind A/S
Lafert
Drawing / Data sheet / Part No.: 29004587 (brake), Rev. -

Generator:

Type: Medium-speed low voltage 3-phase
synchronous permanent magnet
generator
Manufacturer: The Switch



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Rated Power:	10 MW
Rated Frequency:	50 Hz
Rated Speed:	400 rpm
Max. speed:	536 rpm
Rated Voltage:	740 V
Rated Current:	9700 A
Insulation Class:	H
Degree of Protection:	IP54
Drawing / Data sheet / Part No.:	PMM1500B09

Converter:

Type:	Full scale converter
Manufacturer:	Vestas Wind Systems A/S
Rated Voltage:	710 VAC machine-side 640 VAC line-side
Rated Current:	2 x 5000 A

Transformer:

Type:	Three-winding three-phase liquid-immersed HV transformer
Manufacturer:	Siemens
Rated Voltage:	Grid voltage: 33 or 34 kV
Rated Power:	9525 kW
Degree of Protection:	IP54
Location:	PCM 1
Drawing / Data sheet / Part No.:	TDU-104K03W6A-99

Transformer:

Type:	Three-winding three-phase liquid-immersed HV transformer
Manufacturer:	ABB Oy Transformers
Rated Voltage:	Grid voltage: 34 or 66 kV
Rated Power:	9525 kW



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Degree of Protection: IP54
Location: PCM 1
Drawing / Data sheet / Part No.: KTAU/M 42 FA
KTAU/M 72 FA

Switchgear:

Manufacturer: ABB
Part no. switchgear: SafePlus 36
Part no protection relay: ABB REF 615
Rated grid voltage: Up to 36 kV

Switchgear:

Manufacturer: Siemens AG
Part no. switchgear: 8DN8
Part no protection relay: 7SJ85
Rated grid voltage: Up to 72.5 kV

Switchgear:

Manufacturer: Mitsubishi Electric
Part no. switchgear: HG-VG-A
Part no protection relay: ABB REF 620
Rated grid voltage: Up to 72.5 kV

Turbine controller:

Manufacturer: Vestas Wind System A/S
Model: VMP 6000

Manuals:

Operation & maintenance manual: 0054-0948.V02 (operation)
0054-0949.V05 (service)
Installation & commissioning manual: 0054-0943.V13 (installation)
Commissioning manuals are site specific