



Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

This certificate is issued to

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

for the wind turbine

V164-10MW

wind turbine class (class, standard, year)

Class S IEC 61400-1: 2019  
Class S,T IEC 61400-1: 2019

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-0074-05744-1  
2020-10-30

Design evaluation conformity statement  
Dated

IECRE.WE.CS.20.0090-R0  
2020-10-30

Type test conformity statement  
Dated

TT-DNVGL-SE-0074-05827-2  
2020-10-30

Manufacturing conformity statement  
Dated

ME-DNVGL-SE-0074-05826-2  
2020-10-30

Final evaluation report  
Dated

FER-TC-DNVGL-SE-0074-06858-0  
2020-10-30

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 wind turbine type specification begins on page 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:  
2025-10-29

Approved for issue on behalf of the IECRE Certification  
Body:

Johan Olaison/Bente Vestergaard  
Project Manager / Service Line Leader, Type Certification  
Hellerup 2020-10-30



Renewables Certification  
Brooktorkai 18  
20457 Hamburg, Germany



Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

**Machine parameters:**

Power regulation:	Pitch-controlled
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6°
Cone angle:	-6°
Rated power:	10 MW
Rated wind speed $V_r$ :	12.5 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:	SW 2020.15

**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 $V_{ref}$ :	50.0 m/s
Reference wind speed $V_{refT}$ :	57.0 m/s
Mean flow inclination:	0°

**Electrical network conditions:**

Normal supply voltage and range:	Up to 66 kV
Normal supply frequency and range:	50, 60 Hz
Voltage imbalance:	2 %
Maximum duration of electrical power network outages:	Not dimensioning
Number of electrical network outages	50



Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

**Other environmental conditions (where taken into account):**

Design conditions in case of offshore WT :	Site specific
Normal and extreme temperature ranges:	-15°C to +35°C (normal) -20°C to +50°C (extreme)
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, Protection Level I

**Interfaces:**

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

Commissioning manuals have not been evaluated, as these are site specific





Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

**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.: 300024869.V01

**Blade bearing:**

Type: Three row slew roller bearing  
Manufacturer: Liebherr  
Drawing / Data sheet / Part No.: 300023040 V01

Type: Three row slew roller bearing  
Manufacturer: Rollix  
Drawing / Data sheet / Part No.: 300052307 V00

**Pitch System:**

Motor / Actuator Type: Two double acting hydraulic cylinders per blade  
Pitch Controller Type: Hydraulic  
Manufacturer: Lind Jensens Maskinfabrik A/S (LJM)  
Drawing / Data sheet / Part No.: 300024225 rev. 0

**Main shaft:**

Type: Hollow shaft  
Manufacturer: MHI Vestas Offshore Wind A/S  
Material: Cast iron, EN-GJS-500-14  
Drawing / Data sheet / Part No.: 300026486 V01



Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

**Main bearing:**

Type: Two pretensioned tapered roller bearings

Manufacturer: Schaeffler Technologies AG & Co. KG

Drawing / Data sheet / Part No.: F-615869.01.TR1-WPOS  
F-615870.01.TR1-WPOS

Manufacturer: Timken

Drawing / Data sheet / Part No.: NP596934 – 90WA2 (E-55904, Rev. C)  
NP746013 – 90WA2 (E-55905, Rev. C)

**Gearbox:**

Type: 2 stage planetary gearbox

Gear Ratio: 1:40.8

Manufacturer: Winergy

Drawing / Data sheet / Part No.: PZFB 2780.1

**Yaw System:**

*Drive Type:* 10 electrical yaw motors incl. gearbox  
and motor brake

Manufacturer: Lafert

Drawing / Data sheet / Part No.: 300009451 (motor), Rev. 0

*Bearing Type:* Slide bearing

Manufacturer: MHI Vestas Offshore Wind A/S

Drawing / Data sheet / Part No.: 300010675 (support beam machined),  
Rev. 1

*Gear Type:* Internal ring gear

Manufacturer: Comer Industries

Drawing / Data sheet / Part No.: M\_29031014 (yaw gear), Rev. 2

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

Manufacturer: MHI Vestas Offshore Wind A/S  
Lafert



Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

Drawing / Data sheet / Part No.: 300009494 (brake), Rev. 0

**Generator:**

Type Medium-speed low voltage 3-phase  
synchronous permanent magnet  
generator  
Manufacturer: The Switch  
Drawing / Data sheet / Part No.: PMM1500B10  
Rated Power: 10.4 MW  
Rated Speed: 400 rpm  
Rated Voltage: 730 V  
Insulation Class: H  
Degree of Protection: IP54

Type Medium-speed low voltage 3-phase  
synchronous permanent magnet  
generator  
Manufacturer: The Switch  
Drawing / Data sheet / Part No.: PMM1500D00  
Rated Power: 10.4 MW  
Rated Speed: 425 rpm  
Rated Voltage: 730 V  
Insulation Class: H  
Degree of Protection: IP54

**Converter:**

Type: Full scale converter  
Manufacturer: Vestas Wind Systems A/S  
Rated Voltage (grid side): 710 VAC machine-side  
640 VAC line-side  
Rated Current (grid side): 2 x 5000 A  
Rated grid frequency: 50 / 60 Hz





Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

**Transformer:**

Type: Three-winding three-phase liquid-immersed HV transformer  
Manufacturer: Siemens Energy Austria AG  
Drawing / Data sheet / Part No.: TDU-104K03W6A-99  
Rated Voltage: 33 or 34 kV (HV)  
640 V (LV)  
Rated grid frequency: 50 Hz  
Degree of Protection: IP54  
Location (e.g. tower bottom): PCM module, bottom half of tower

Type: Three-winding three-phase liquid-immersed HV transformer  
Manufacturer: ABB Oy Transformers  
Drawing / Data sheet / Part No.: KTAU/M 42 FA 11111  
Rated Voltage: 34 kV (HV)  
640 V (LV)  
Rated grid frequency: 50 Hz  
Degree of Protection: IP54  
Location (e.g. tower bottom): PCM module, bottom half of tower

Type: Three-winding three-phase liquid-immersed HV transformer  
Manufacturer: ABB Oy Transformers  
Drawing / Data sheet / Part No.: KTAU/M 72 FA 11120  
Rated Voltage: 66 kV (HV)  
640 V (LV)  
Rated grid frequency: 50/60 Hz  
Degree of Protection: IP54  
Location (e.g. tower bottom): PCM module, bottom half of tower

Type: Three-winding three-phase liquid-immersed HV transformer  
Manufacturer: Siemens Energy Austria AG  
Drawing / Data sheet / Part No.: TDU-114K07W6K-TU  
Rated Voltage: 66 kV (HV)



Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

640 V (LV)

Rated grid frequency:

50 Hz

Degree of Protection:

IP54

Location (e.g. tower bottom):

PCM module, bottom half of tower

**Switchgear:**

Manufacturer

ABB

Type

SafePlus 36

Part no protection relay

ABB REF 615

Rated grid voltage

Up to 36 kV

Rated grid frequency

50 / 60 Hz

Manufacturer

Siemens AG

Type

8DN8

Part no protection relay

SIPROTEC 4 7SJ85

Rated grid voltage

Up to 72.5 kV

Rated grid frequency

50 / 60 Hz

Manufacturer

Mitsubishi Electric

Type

HG-VG-A

Part no protection relay

ABB REF 620

Rated grid voltage

Up to 72.5 kV

Rated grid frequency

50 / 60 Hz

Manufacturer

Schneider Electric Sachsenwerk GmbH

Type

WIA 6/72.5-2/628

Part no protection relay

MiCOM P14x

Rated grid voltage

Up to 72.5 kV

Rated grid frequency

50 / 60 Hz





Certificate No.

**IECRE.WE.TC.20.0090-R0**

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

**TYPE CERTIFICATE RNA**  
**Rotor Nacelle Assembly**

**Manuals:**

Operating manual	0054-0948.V04
Service manual	0054-0949.V09
Installation manual	0054-0943.V15
Commissioning Manual	Site specific