



Certificate No.

**IECRE.WE.TC.19.0075-R1**

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

## TYPE CERTIFICATE Wind Turbine

This certificate is issued to

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

for the wind turbine

Vestas V150-4.0 MW / V150-4.2 MW

wind turbine class (class, standard, year)

WT class 3B (V150-4.0 MW), IEC 61400-1: 2005+Amd1: 2010  
WT class S (V150-4.2 MW), 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-0074-05341-1  
2019-12-13

Design evaluation conformity statement  
Dated

DE-DNVGL-SE-0074-04352-3  
2019-12-13

Type test conformity statement  
Dated

TT-DNVGL-SE-0074-05340-1  
2019-12-13

Manufacturing evaluation conformity statement  
Dated

ME-DNVGL-SE-0074-05339-1  
2019-12-13

Final evaluation report  
Dated

FER-TC-DNVGL-SE-0074-05338-1  
2019-12-13

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:  
2024-12-12

Approved for issue on behalf of the IECRE  
Certification Body:

  
  
Nils Kreidelmeyer / Bente Vestergaard  
Senior Project Manager / Service Line Leader, Type  
Certification  
Hamburg/Hellerup 2019-12-13



Renewables Certification  
Brooktorkai 18  
20457 Hamburg, Germany



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**TYPE CERTIFICATE**  
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**Machine parameters:**

Power regulation:	pitch-controlled
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6.0°
Cone angle:	-5.5°
Rated power:	4000 kW / 4200 kW
Rated wind speed $V_r$ :	9.7 m/s (V150-4.0 MW) 9.9 m/s (V150-4.2 MW)
Rotor diameter:	150 m
Hub height(s):	105 m
Hub height operating wind speed range $V_{in} - V_{out}$ :	3 m/s – 24.5 m/s (with the following HWO wind speeds: $V_{HWO1} = 17.5$ m/s $V_{HWO2} = 21.5$ m/s $V_{HWO3} = 24.5$ m/s)
Design life time:	20 years
Software version:	2019.01

**Wind conditions:**

Characteristic turbulence intensity $I_{ref}$ at $V_{hub} = 15$ m/s:	0.14
Annual average wind speed at hub height $V_{ave}$ :	7.5 m/s (V150-4.0 MW) 7.0 m/s (V150-4.2 MW)
Reference wind speed $V_{ref}$ :	37.5 m/s
Mean flow inclination:	8°

**Electrical network conditions:**

Normal supply voltage and range:	720 V
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 V150-4.0 MW

\*de-rating strategy above +20°C for V150-4.2 MW

Normal: -20°C to +45°C\*

Extreme: -40°C to +45°C

Relative humidity of the air:

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

Air density:

1.225 kg/m<sup>3</sup> (for normal  
operation)

1.273 kg/m<sup>3</sup> (for low  
temperature operation)

Solar radiation:

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

Lightning protection system (standard and protection  
class):

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



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**Major components:**

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

**Blade:**

Type:	Hybrid / Infused
Material:	Carbon fibre reinforced epoxy and glass fibre reinforced epoxy
Blade length:	73.65 m
Number of blades:	3
Manufacturer:	Vestas Wind Systems A/S
Drawing / Data sheet / Part No.:	0069-0345, Rev. 3

**Blade Aero Addons:**

Type	STE's and RVG's
Manufacturer	Vestas Wind Systems A/S
Drawing / Data sheet / Part no.	STE Kit: 0072-2639, Rev. 0 RVG: 0073-5893, Rev. 0

**Blade bearing:**

Type:	Triple row cylinder bearing
Drawing / Data sheet / Part no.:	29110524, Rev. 3
TPS no.:	0023-3088, Rev. 5

**Pitch System:**

Type:	Hydraulic power unit
Manufacturer:	LJM/HINE/Liebherr/Hengli
Hydraulic Cylinder (140/90x922):	29111326, Rev. 1

Type	Pitch Actuation Module
Manufacturer	Vestas Wind Systems A/S
Drawing / Data sheet / Part no.	29111583, 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: FAG  
Drawing / Data sheet / Part no.: F-582562.PRL-WPO 000

#### Gearbox:

Type: 2 stage planetary and 1 helical stage gearbox  
Manufacturer: ZF (EH1052A)  
Gear ratio: 1:143.37  
Drawing / Data sheet / Part no.: 096-EH1052A001, Rev. A

#### Gearbox:

Type: 2 stage planetary and 1 helical stage gearbox  
Manufacturer: Winergy (PZAB 3580)  
Gear ratio: 1:142.76  
Drawing / Data sheet / Part no.: A5E45622888A, rev.2

#### 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



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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
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

Type: Cast-Resin transformer  
DTTH1N 4000/30  
Manufacturer: SGB  
Rated voltage: 33 / 0.72 V  
Degree of protection: IP00



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Drawing / Data sheet / Part no.: 0073-7915, Rev. 0

#### **Tower:**

Type: Conical steel  
Number of sections: 4  
Length: 102.6 m (HH 105 m)  
Drawing / Data sheet / Part no.: 0074-7302 Rev. 0

#### **Manuals:**

Operating manual: 0079-9811, Rev. 1  
Transportation and handling manual: 0079-9801, Rev. 2  
Installation manual: 0079-9663, Rev. 2  
Commissioning manual: 0079-9665, Rev. 0

#### **Service lift:**

Manufacturer: Avanti  
Type: Avanti Shark or Power Lift Sherpa-SD

#### **Crane:**

Manufacturer: Star 071/95 Liftket  
Maximum lifting capacity: max 800 kg