

# CONFORMITY STATEMENT

Statement No.:  
DE-DNVGL-SE-0074-04352-6

Issued:  
2020-05-04

Issued for:

## Design Evaluation

of

## Vestas V150-4.0 MW / V150-4.2 MW

Specified in Annex 1 and Annex 2

Issued to:

## Vestas Wind Systems A/S

Hedeager 42  
8200 Aarhus N  
Denmark

According to:

## DNVGL-SE-0074:2018-01 Type and component certification of wind turbines according to IEC 61400-22

Based on the document:

ER-DE-DNVGL-SE-0074-04352-5 Evaluation Report, dated 2020-04-29

Changes of the system design are to be approved by DNV GL.

Hellerup, 2020-05-04

For DNV GL Renewables Certification



**Bente Vestergaard**  
Service Line Leader Type Certification



By DAkKS according to DIN EN IEC/ISO 17065 accredited Certification Body for products. The accreditation is valid for the fields of certification listed in the certificate.

Hamburg, 2020-05-04

For DNV GL Renewables Certification



**Nils Kreidelmeyer**  
Senior Project Manager

The accredited certification body is Germanischer Lloyd Industrial Services GmbH, Brooktorkai 18, 20457 Hamburg.

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Basic standard

IEC 61400-1 ed. 3 + A1

## General

Wind Turbine class

See Annex 2

Power regulation

pitch-controlled

Rotor orientation

Upwind

Rotor tilt

6.0°

Cone angle

-5.5°

Rated power

4000 kW / 4200 kW

Rated wind speed  $v_r$ 

See Annex 2

Rotor diameter

150 m

Hub height(s)

See Annex 2

Hub height operating wind speed range  $v_{in} - v_{out}$ 

3 m/s – 24.5 m/s (HWO enabled)

Design life time

20 years

Software version

2019.06

## Wind conditions

Turbulence intensity  $I_{ref}$  at  $v_{hub} = 15$  m/s

See Annex 2

Annual average wind speed at hub height  $v_{ave}$ 

See Annex 2

Reference wind speed  $v_{ref}$ 

37.5 m/s

Mean flow inclination

8°

Hub height extreme wind speed  $v_{e50}$ 

52.5 m/s

## 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

## Other environmental conditions

Standard temperature ranges

Normal: -30°C to +40°C\*

Extreme: -30°C to +50°C

Low temperature turbine

Normal: -30°C to +45°C\*

Extreme: -40°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/m<sup>3</sup> (for normal operation)1.325 kg/m<sup>3</sup> (for low temperature operation)

Solar radiation

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

Description of lightning protection system

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

\*de-rating strategy above +30°C for 4.0 MW and above +20°C for 4.2 MW

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## Major components

<b>Blade</b>	Type	Hybrid / Infused
	Manufacturer	Vestas Wind Systems A/S
	Material	Carbon fibre reinforced epoxy and glass fibre reinforced epoxy
	Blade length	73.65 m
	Number of blades	3
	Drawing / Data sheet / Part no.	0069-0345, Rev. 3 0069-2202, Rev. 7 (OLPS)
<b>Blade Aero Addons</b>	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
<b>Blade bearing</b>	Type	Triple row cylinder bearing
	Drawing / Data sheet / Part no.	29110524, Rev. 3
	TPS no.	0023-3088, Rev. 5
<b>Pitch system</b>	Type	Hydraulic power unit
	Manufacturer	LJM/HINE/Liebherr/Hengli
	Hydraulic Cylinder (180/110x922)	29111326, Rev. 1
	Type	Pitch Actuation Module
	Manufacturer	Vestas Wind Systems A/S
	Drawing / Data sheet / Part no.	29111583, Rev. 1
<b>Main shaft</b>	Type	Cast iron
	Material	EN-GJS-500-14
	Drawing / Data sheet / Part no.	29085300, Rev. 4
<b>Main bearing</b>	Type	Spherical Roller Bearing
	Manufacturer	FAG
	Drawing / Data sheet / Part no.	F-582562.PRL-WPO 000
	Type	Spherical Roller Bearing
	Manufacturer	SKF
	Drawing / Data sheet / Part no.	240/950 CA / C3LW33VQ113
	Type	Spherical Roller Bearing
	Manufacturer	JTKET / Koyo
	Drawing / Data sheet / Part no.	240/950 RHAW33TS1CS
<b>Gearbox</b>	Type	2 stage planetary and helical stage gearbox
	Manufacturer	ZF (EH1052A)
	Gear ratio	1:143.37
	Drawing / Data sheet / Part no.	096-EH1052A001, Rev. A
	Type	2 stage planetary and helical stage gearbox
	Manufacturer	Winergy (PZAB 3580)
Gear ratio	1:142.76	
Drawing / Data sheet / Part no.	A5E45622888A, rev.2	

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<b>Yaw system</b>	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
	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	
<b>Generator</b>	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	

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	Rated current	3650 A
	Insulation class	H
	Degree of protection	IP54
	Drawing / Data sheet / Part no.	0071-4454, Rev. 0
<b>Converter</b>	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
<b>Transformer</b>	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 5000/30
	Manufacturer	SGB
	Rated voltage	33 / 0.72 V
	Degree of protection	IP00
	Drawing / Data sheet / Part no.	0073-7915, Rev. 02
<b>Tower</b>	Type	Conical steel tower
	Number of sections	4
	Length	102.6 m (105 m)
	Drawing / Data sheet / Part no.	0074-7302 Rev.0 (T966901)
	Type	Conical steel tower
	Number of sections	5
	Length	102.6 m (105 m)
	Drawing / Data sheet / Part no.	A005-4762, Rev.0 (T966906)
	Type	Conical steel tower
	Number of sections	5
	Length	102.6 m (105 m)
	Drawing / Data sheet / Part no.	0068-6713, Rev.4 (T966900)
	Type	Conical steel tower
	Number of sections	6
	Length	152.6 m (155 m)
	Drawing / Data sheet / Part no.	0078-9884 Rev.2 (T969B00)
<b>Manuels</b>	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
<b>Service lift</b>	Manufacturer	Avanti
	Type	Avanti Shark / Avanti Dolphin / Avanti Beluga
	Manufacturer	Power climber

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<b>Crane</b>	Type	Sherpa-SD4
	Manufacturer Maximum lifting capacity	Star 071/95 Liftket max 800 kg

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### Configurations covered by this Type Certificate

ID*	Variants	Hub Height	IEC WT class	Turbulence Intensity I <sub>ref</sub>	Rated wind speed V <sub>r</sub>	Mean wind speed V <sub>ave</sub>
1.1	V150-4.0 MW	105 (T966901)	IEC 3B	0.14	9.7 m/s	7.5 m/s
1.2	V150-4.2 MW	105 (T966901)	S (based on IEC 3B)	0.14	9.9 m/s	7.0 m/s
1.3	V150-4.0MW	105 (T966900)	IEC 3C	0.12	9.8 m/s	7.5 m/s
1.4	V150-4.2 MW	105 (T966900)	S (based on IEC 3C)	0.12	10.1 m/s	7.0 m/s
1.5	V150-4.0MW	105 (T966906)	IEC 3B	0.14	9.7 m/s	7.5 m/s
1.6	V150-4.2 MW	105 (T966906)	S (based on IEC 3B)	0.14	9.9 m/s	7.0 m/s
2.1	V150-4.0MW	155 (T969B00)	IEC 3B	0.14	9.7 m/s	7.5 m/s
2.2	V150-4.2 MW	155 (T969B00)	S (based on IEC 3B)	0.14	9.9 m/s	7.0 m/s

\* The ID follows the hub height with its first digit, the second digit is only consecutive to identify the different configurations within one hub height