



Certificate No.

IECRE.WE.TC.16.0001-R0

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 V100-2 MW 50 Hz VCS Mk 10

wind turbine class (class, standard, year)

IIB, 61400-1: 2005

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-0074-00196-2
2016-04-29

Design evaluation conformity statement
Dated

DE-DNVGL-SE-0074-00197-2
2016-04-29

Type test conformity statement
Dated

TT-DNVGL-SE-0074-00199-2
2016-04-29

Manufacturing conformity statement
Dated

ME-DNVGL-SE-0074-00198-3
2016-09-19

Type characteristics conformity statement
Dated

TCM-DNVGL-SE-0074-00753-1
2016-04-29

Final evaluation report
Dated

FER-TC-DNVGL-SE-0074-00195-3
2016-09-19

The conformity evaluation was carried out in accordance with the rules and procedures of the IECRE System 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 the Certification Body. Without approval, the certificate loses its validity.

This certificate is valid until:
2020-04-29

Approved for issue on behalf of the IECRE
Certification Body:

Handwritten signature of Mark Wollenberg

Mark Wollenberg / Christer Eriksson:
Project Manager / Service Line Leader, Type
Certification:
Hellerup 2016-10-27



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°
Cone angle:	3°
Rated power:	2000 kW
Rated wind speed V_r :	10.3 m/s
Rotor diameter:	100 m
Hub height(s):	80 m
Hub height operating wind speed range $V_{in} - V_{out}$:	3 to 22 m/s
Design life time:	20 years
Software version:	15.01

Wind conditions:

Characteristic turbulence intensity I_{ref} at $V_{hub} = 15$ m/s:	0.14
Annual average wind speed at hub height V_{ave} :	8.5 m/s
Reference wind speed V_{ref} :	42.5 m/s
Mean flow inclination:	8°
Hub height 50-year extreme wind speed V_{50} :	59.6 m/s

Electrical network conditions:

Normal supply voltage and range:	10.5 kV to 35 kV
Normal supply frequency and range:	50 Hz
Voltage imbalance:	-
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:
Normal and extreme temperature ranges:

Relative humidity of the air:
Air density:
Solar radiation:

Lightning protection system:
Earthquake model and parameters:
Other design conditions:

Major components:

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

Blade :

Type:
Material:
Blade length:
Number of blades:
Manufacturer:
Drawing / Data sheet / Part No.:

Blade bearing :

Type:
Manufacturer:
Drawing / Data sheet / Part No.:

Pitch System :

Motor / Actuator Type:
Pitch Controller Type:
Manufacturer:

Main shaft:

Type:
Manufacturer:
Material:
Drawing / Data sheet / Part No.:

NA

*Normal temperatures:
-20°C to +40°C (standard)
-30°C to +40°C (LT)

Extreme temperatures:
-30°C to +50°C (standard)
-40°C to +50°C (LT)
100 % (max 10 % of lifetime)
1.225 kg/m³

The turbine shall resist solar radiation (including UV)
with 1000 W/m² and 8000 MJ/m² per year throughout
the design lifetime

IEC 61400-24:2010, protection level 1

NA

*LT: The -30°C minimum operating temperature has
been verified for loads and structural integrity by
considering an air density of 1.325 kg/m³

Prepreg

Glass fibre and carbon fibre reinforced epoxy
49 m

3

Vestas

item number : 78132020, 29021600 with vortex
generators

2 row 4-point contact ball bearing

Rollix

13-1920-02-DD0-5

One pitch cylinder per blade

Hydraulic

LJM, Glual and Hine

Forged hollow trumpet shaft

Lucchini RS (Italy)

42CrMo4

76400581



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Major components cont.:

Main bearing :

Type:
Manufacturer:
Drawing / Data sheet / Part No.:

Two double row spherical roller bearing
SKF
230/630 CA/HM2 W33
24188 ECA/HM2 W33

Gearbox :

Type:
Gear Ratio:
Manufacturer:
Drawing / Data sheet / Part No.:

3 stage planetary gearbox
1:112.2
Winergy
PEAB 4440

Yaw System :

Drive Type:
Manufacturer:
Drawing / Data sheet / Part No.:

Planetary-/worm gear combination, 3 step planetary / 1
step wormgear
ABB
29005012

Bearing Type:
Manufacturer:
Drawing / Data sheet / Part No.:

Friction Bearing (PETP slide plate)
Vestas Wind System A/S
29011239.V1

Gear Type:
Manufacturer:
Drawing / Data sheet / Part No.:

Planetary-/worm gear combination, 3 step planetary / 1
step worm gear
Bonfiglioli
2T709T4VA79A05/06

Brake Type:
Manufacturer:
Drawing / Data sheet / Part No.:

Friction brake, motor brake included in motor unit
Bonfiglioli
2T709T4VA79A05/06

Generator :

Manufacturer:
Drawing / Data sheet / Part No.:
Type:

VND (Vestas Nacelles Deutschland)
0048-7754.V02 (2000 kW)
DVSG 500/4M (Asynchronous generator with wound
rotor)

Rated Power:
Rated Frequency:
Rated Speed:
Max. speed:
Rated Voltage:
Rated Current:
Insulation Class:
Degree of Protection:

2000 kW
50Hz
1680 rpm
2900 RPM (allowed for <2 s)
690 VAC
1505 A
H/H
IP54



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Major components cont.:

Converter :

Manufacturer:
Drawing / Data sheet / Part No.:
Type:
Rated Voltage (grid side):
Rated Current (grid side):
Degree of Protection:

Vestas Wind System A/S
0003-1610.V4
Full quadrant IGBT
480 V
233 A
IP 54

Transformer :

Manufacturer:
Drawing / Data sheet / Part No.:
Type:
Rated Voltage:

Siemens, SGB, JST
0054-7785.V3
Dry type
HV side: 10.0-36.0 [kV]
LV side: 690 [V] +/-2% & 480 [V] +/-2%
2300 kVA
IP00
Nacelle rear

Rated Power:
Degree of Protection:
Location :

Tower :

Type:
Manufacturer:
Sections:
Length:
Drawing / Data sheet / Part No.:

Tubular steel tower
GWS Galicia, O Carballiño Ourense, Spain
3
80 m
0044-7632.V0

Foundation :

Type:
Manufacturer:
Drawing / Data sheet / Part No.:

NA
NA
NA

Foundation Adaptor :

Type:
Manufacturer:
Drawing / Data sheet / Part No.:

Tubular steel
NA
NA

Manuals:

Operation & maintenance manual:
Transport manual:
Installation & commissioning. manual:

See list of manuals 0043-2818.V4*
See list of manuals 0043-2818.V4*
See list of manuals 0043-2818.V4*
* Excluding 0001-3603.V9 which is replaced by 0035-2811.V2 and including 0004-9000.V2