



DET NORSKE VERITAS

TYPE CERTIFICATE

Vestas V112 3.0MW

TC-219701-A-2
Type Certificate number

2013-11-19
Date of issue

Manufacturer:
Vestas Wind Systems A/S
Hedeager 44
DK-8200 Aarhus N

Valid until: 2016-10-07

Conformity evaluation has been carried out according to **IEC 61400-22: 2010 "Wind Turbines - Part 22: Conformity Testing and Certification"**. This certificate attests compliance with IEC 61400-1 ed. 3: 2005 and IEC 61400-22 concerning the design and manufacture.

Reference documents:

Design Basis Conformity Statement:	DB-219701-A-2
Design Evaluation Conformity Statement:	DE-219701-A-2
Type Test Conformity Statement:	TT-219701-A-2
Manufacturing Conformity Statement:	MC-219701-A-2
Foundation Design Evaluation Conformity Statement(s):	FE-219701-A-2
Type Characteristics Measurement Conformity Statement(s):	TM-219701-A-2
Final Evaluation Report:	PD-642197-122PQ01-81Rev.3

Wind Turbine specification:

IEC WT class: 2A/3A. For further information see Appendix 1 of this Certificate.

Date: 2013-11-19

Christer Eriksson

Management Representative
Det Norske Veritas, Danmark A/S



DANAK
PROD Reg. no. 7031

Date: 2013-11-19

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APPENDIX 1 - WIND TURBINE TYPE SPECIFICATION

General:

IEC WT class acc. to IEC 61400-1 ed. 3: 2005:	IEC WT class 2A/3A
Rotor diameter:	112m
Rated power:	3075 kW
Rated wind speed V_r :	12.0 m/s
Hub height(s):	84 m (IEC 2A) 94 m (IEC 2A) 119 m (IEC 3A)
Operating wind speed range V_{in} - V_{out} :	3 – 25 m/s
Design life time:	20 years

Wind conditions:

	2A	3A
V_{ref} (hub height):	42.5 m/s	37.5 m/s
V_{ave} (hub height):	8.5 m/s	7.5 m/s
I_{ref}/I_{15} ($V_{hub}=15$ m/s) acc. to IEC 61400-1 ed. 3: 2005:	0.16	0.16
Mean flow inclination:	8°	8°

Electrical network conditions:

Normal supply voltage and range:	3 x 650 V 10-35 KV
Normal supply frequency and range:	50 Hz \pm 6% 60 Hz \pm 6%
Voltage imbalance:	IEC 61000-3-6- TR max 2%
Maximum duration of electrical power network outages:	Two 3 months periods
Number of annual electrical network outages:	52 per year

Other environmental conditions (where taken into account):

Air density:	1.225 kg/m ³
Standard	Normal: -20°C to +40°C Extreme: -30°C to +50°C
Low temperature option	Normal: -30°C to +40°C Extreme: -40°C to +50°C
Relative humidity:	100% (40% of time) and 90% (rest of time)
Solar radiation:	1000 W/m ²
Salinity:	Present
Design conditions in case of offshore WT (water depth, wave conditions etc.):	Not relevant – Onshore turbine
Description of lightning protection system:	Designed according to IEC 61400-24, Protection level 1 and 61312-1



Earthquake model and parameters:

Not relevant

Main components:

Blade type:	Vestas 55m blade
Gear box type:	Bosch Rexroth GPV 570D (i=1:113.257) Bosch Rexroth GPV 570.3 D13 (i=112) Winergy PZAB3530 (i=112.632)
Main Bearing:	SKF 240/950 CA/W33 or FAG F-582562.PRL-WPO
Generator type:	Vestas MAGPower 3.3MW DGIPM 560-12m
Transformer type:	Siemens Geafol 4GD6592-1ZY 3350 kVA-3450kVA
Tower type:	Tubular Steel Towers HH84 (dwg: 0027-8825) HH84 US RNSP (dwg: 0027-8816) HH94 (dwg: 0027-82192) HH94 US RNSP (dwg: 0005-4987) HH119 (dwg: 0027-8815)
Foundation	Gravity based concrete slab HH84, IEC2A, GWL at foundation (0014-4605) Gravity based concrete slab HH84, IEC2A, GWL at terrain (0014-4606) Gravity based concrete slab HH94, IEC2A, GWL at foundation (0014-4674) Gravity based concrete slab HH94, IEC2A, GWL at terrain (0014-4677) Gravity based concrete slab HH119, IEC3A, GWL at foundation (0014-4695) Gravity based concrete slab HH119, IEC3A, GWL at terrain (0014-4696)
Crane:	Liftket 071/95 Lifting capacity: 800 kg
Service lift:	Avanti Shark or Power Lift Sherpa-SD
Controller:	VMP Global