DET NORSKE VERITAS

COMPONENT CERTIFICATE

Vestas V90 3MW Offshore Rotor-Nacelle Assembly

IEC CC-205704-1	28-09-2006
Component Certificate number	**Date of issue**

Manufacturer:
Vestas Wind Systems A/S
Alsvej 21
DK-8900 Randers

Valid until: 2009-06-07

This certificate attests compliance with IEC 61400-1 ed. 3: 2005 concerning the design and manufacture. The conformity evaluation was carried out according to IEC WT 01: 2001 "IEC system for conformity testing and certification of wind turbines - Rules and procedures."

Reference documents:

Design Evaluation Conformity Statement:	IEC DE-205703-4
Type Test Conformity Statement:	IEC TT-205703-3
Manufacturing Conformity Statement:	IEC MC-205703-3
Type Characteristics Measurement Conformity Statement(s):	IEC TM-205703-2
Final Evaluation Report:	WTDK-2554 and WTDK-3077

Wind Turbine Component specification:
See Appendix 1 of this Certificate.

Date:2006-09-28

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Date: 2006-09-28

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APPENDIX 1 - ROTOR-NACELLE ASSEMBLY SPECIFICATION

General Characteristics:

IEC WT class:	S
Rotor diameter:	90 m
Rated power:	3000 kW
Rated wind speed V_r:	13.4 m/s
Operating wind speed range V_{in}-V_{out}:	4 – 25 m/s
Design life time:	20 years

Component Description:

Vestas V90 3MW Rotor-Nacelle Assembly with the following main components:

Blade type:	Vestas 44m blade
Gear box alternatives:	Hansen EF901CE55-K1, i=104.6 Hansen EF901DE55-K1, i=104.6
Main bearing alternatives:	FAG: U60-807110QFAG SKF: BT2-8125/HA1
Generator alternatives:	Leroy Somer G54-10/4P: Mk 4, Mk 5 & Mk 6 (50 Hz VCS) Weier DVSGM 560/4L: MK 2 &MK 3 (50 Hz VCS) Leroy Somer G54-9/4P: Mk 7 (60 Hz VCRS)
Transformer alternatives:	Siemens AG 4GB6580-9KA SGB DTTHIL 2500/30
Yaw gear	SOM PG 1604 R=1391/1
Tower type:	Not part of certification
Crane and service load	Integrated, 800kg
Service Lift	Avanti, type Shark, max working load 240 kg
Controller	VMP 6000

The tower top module (370 mm high tower top neck flange) and its bolted connection to the nacelle is included as part of the certification

Wind conditions:

According to IEC 61400-1 Ed.3 class 1A

Design Loads:

Design Load Documents are listed in WTDK-2554

Electrical network conditions:

According to IEC 61400-1 Ed.3 class 1A

Other environmental conditions:

The below parameters are intended to cover a typical offshore location.

Normal ambient temperature range	-20 to 40 °C
Extreme ambient temperature range	-40 to 50 °C
Relative humidity	100 % (max 10% of lifetime)
Solar radiation	The turbine shall resist solar radiation (including UV) with 1000 W/m² and 8000 MJ/m² per year throughout the design lifetime.
Salinity	Offshore conditions
Description of lightning protection system	Protection level 1 according to IEC 61024