DNV·GL

TYPE CERTIFICATE

Certificate No.:	Issued:	Valid until:
TC-DNVGL-SE-0074-00373-7	2016-12-09	2021-11-09

Issued for:

Envision EN115 2.3MW IEC IIIA

Specified in Annex 1

Issued to:

Envision Energy (Jiangsu) Co., Ltd.

No. 3 Shenzhuang Road, Lingang New City Low-Carbon Industrial Park, Jiangyin, Jiangsu, 214443 P.R. China.

According to:

IEC 61400-22:2010, Wind turbines – Part 22: Conformity Testing and Certification

Based on the document:

DB-DNVGL-SE-0074-01801-3	Design Basis Conformity Statement, dated 2016-09-14
DE-DNVGL-SE-0074-01802-5	Design Evaluation Conformity Statement, dated 2016-12-09
ME-DNVGL-SE-0074-01803-5	Manufacturing Evaluation Conformity Statement, dated 2016-11-28
TT-DNVGL-SE-0074-01804-3	Type Testing Conformity Statement, dated 2016-09-14
20628-CC-02-1	Component Certificate issued by Bureau Veritas Certification France: Rotor blade LM 56.8 P, dated 2016-05-24 *(DNV GL takes no responsibility for the work covered by this component certificate)*
CC-DNVGL-SE-0074-01249-1	Component Certificate: Gearbox Winergy PEAB 4450, dated 2016-07-06
FER-DNVGL-SE-0074-00373-6	Final Evaluation Report, dated 2016-12-09

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

ENVISION WIND POWER TECHNOLOGIES INDIA PRIVATE LIMITED

Hamburg, 2016-12-09

For DNV GL Renewables Certification

i.V.

for **Christer Eriksson**
Service Line Leader Type Certification

DAkkS Deutsche Akkreditierungsstelle D-ZE-11053-01-00

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

Hamburg, 2016-12-09

For DNV GL Renewables Certification

Dr. Wei Chen
Senior Project Manager

TYPE CERTIFICATE – ANNEX 1

General	
IEC WT class	IEC IIIA -
Power regulation	pitch-controlled
Rotor orientation	upwind
Rotor tilt	6 °
Cone angle	2.6 °
Rated power	2300 kW
Rated wind speed v_r	9.4 m/s
Rotor diameter	115.9 m
Hub height	90.324 m
Hub height operating wind speed range v_{in} - v_{out}	3 to 20 m/s
Design life time	20 years
Software version	ExtCon_Version EN23_LM115 BH 2015R1.112 & Para_Version EN23_LM115 BH 2015R1.DB121
Wind conditions	
Characteristic turbulence intensity I_{ref} at v_{hub} = 15 m/s	0.16
Annual average wind speed at hub height v_{ave}	7.5 m/s
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	690 V (±10%)
Normal supply frequency and range	50 Hz (±5%)
Maximum duration of electrical power network outages	6 h acc. To IEC 61400-1
Number of electrical network outages	20 per year acc. To IEC 61400-1
Other environmental conditions	
Normal temperature ranges	-10 °C to 40 °C
Extreme temperature range	-20 °C to 50 °C
Relative humidity of the air	Up to 95%
Air density	1.225 kg/m^3
Description of lightning protection system	Designed acc. to IEC 61400-24, Protection Level I

TYPE CERTIFICATE – ANNEX 1

Major components

Blade	Type	LM 56.8 P
	Manufacturer	LM Wind Power
	Blade length	56800 mm ±0.1%
	Number of blades	3
	Specification	BS-00350/A6
Blade bearing	Type	Rothe Erde 46-94251
	Manufacturer	Rothe Erde
	Drawing / Data sheet / Part no.	092.50.2418/00.050116.1
Pitch system	Type	C081-300-005
	Manufacturer	MOOG
	Controller type	MSC-R
	Motor / Actuator	PMC6-L45/G970-E40
Main shaft	Type	Flanged shaft
	Material	Forged steel
	Drawing / Data sheet / Part no.	ENV22110002, Rev. 0
Main bearing	Type	Sperical roller bearing
	Manufacturer	SKF
	Drawing / Data sheet / Part no.	240/750ECA/CNLW 33
Gearbox	Type	One planetary stage and two helical gear stages
	Manufacturer	Winergy
	Gear ratio	1:80,861
	Drawing / Data sheet / Part no.	6407854, Rev. F
Yaw system	Drive type	4 stage planetary helical gear
	Drive manufacturer	NGC
	Drawing / Data sheet / Part no.	FDX206B08-02-00R1
	Bearing type	plain bearing
	Bearing manufacturer	JHS
	Drawing / Data sheet / Part no.	VA001306 & VA001287
	Gear type	helical gear
	Gear manufacturer	Rothe Erde
	Drawing / Data sheet / Part no.	401.22.1599.042.03.0132
	Brake type	motor brake
	Brake manufacturer	JHS
	Drawing / Data sheet / Part no.	FDX206B08-02-00R1
Generator	Type	AML 560M6A BAFT Doubly-fed induction generator (DFIG)
	Manufacturer	ABB
	Rated power	2600 kW
	Rated frequency	50 Hz
	Rated speed	1200 rpm
	Rated voltage	690 V / 394 V (Stator/Rotor)
	Rated current	1822 A / 704 A (Stator/Rotor)
	Insulation class	F
	Degree of protection	IP 54/23 (Machine/Slipring)

TYPE CERTIFICATE – ANNEX 1

	Drawing / Data sheet / Part no.	3GYB3843180, Rev.B
	Type	JFRA-560MQ-06A Doubly-fed induction generator (DFIG)
	Manufacturer	Siemens
	Rated power	2600 kW
	Rated frequency	50 Hz
	Rated speed	1200 rpm
	Rated voltage	690 V / 690 V (Stator/Rotor)
	Rated current	1800 A / 640 A (Stator/Rotor)
	Insulation class	F
	Degree of protection	IP 54/23 (Machine/Slipring)
	Drawing / Data sheet / Part no.	AGT395607-4A , Rev.AA
Converter	Type	ENVERT-1DA-2.X
	Manufacturer	Envision
	Rated voltage	690 V
	Rated current	grid side: 450 A generator side: 900 A
	Degree of protection	Power cabinet: IP20 Control cabinet: IP54 Drive cabinet: IP20
	Drawing / Data sheet / Part no.	YJ11110005, Rev. 0
Tower	Type	Tubular steel tower
	Number of sections	4
	Length	87.3 m
	Drawing / Data sheet / Part no.	EN25-110-90HH-V03
Manuals	Maintenance manual	PRC-2MP0011 rev 1.1
	Operation manual	PRC-2CS0009 rev 1.1
	Transport manual	2LT0007 rev A 2LT0006 rev A 2LT0008 rev A 2LT0009 rev A
	Installation	PRC-2RD0037 rev 1.3 TS-0004950 rev B
	Commissioning manual	PRC-3IM001110 rev D

ENVISION WIND POWER TECHNOLOGIES INDIA PRIVATE LIMITED