



NATIONAL INSTITUTE OF WIND ENERGY

(Formerly "Centre for Wind Energy Technology")

(An Autonomous Institution of Ministry of New and Renewable Energy,
Government of India)

PROVISIONAL TYPE CERTIFICATE(*)

Certificate No.: PTC III - 004 – R15

This certificate is issued to

Company : **M/s. SOUTHERN WIND FARMS LIMITED**
Address : **No. 15, Soundarapandian Street, Ashok Nagar
Chennai – 600 083, India**

For the wind turbine **GWL 225**

The certificate attests compliance with "Type Approval - Provisional Scheme – 2000 (TAPS-2000) (amended)" – Provisional Type Certification Scheme for WT in India, **Category-III**, concerning the design and manufacturing system. It is based on the following reference documents:

DE- (PTC III-004/2003-CS1)	: Design Evaluation Conformity Statement
Dated	: 25.11.2003
MC- (PTC III-004-R15-CS2)	: Manufacturing Conformity Statement
Dated	: 05.01.2019
PTT- (PTC III-004/2003-CS3)	: Provisional Type Test Conformity Statement
Dated	: 30.09.2003
TC- (PTC III-004-CS4)	: Type Characteristics Measurements Conformity Statement
Dated	: 03.12.2002
ER- (PTC III-004-R15-FER)	: Final Evaluation Report
Dated	: 07.01.2019

The conformity evaluation was carried out according to TAPS – 2000 (amended) – Provisional Type Certification Scheme for WT in India. The WT type is specified on page 2 of this certificate. Changes in the wind turbine design or the manufacturer's quality system are to be approved by NIWE. If any changes are carried out without approval, the Certificate loses its validity.

This Provisional Type Certificate is valid from 01.01.2019 to 31.03.2019.

Place : Chennai
Date : 07.01.2019


S. Arulselvan

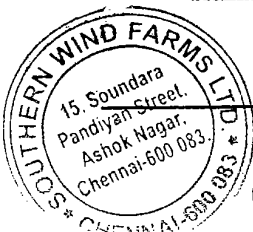
Asst. Exe. Engineer, Certification


S.A. Mathew

Director & Div Head, Certification & IT

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Remark (*) The recognition of the Certificate in India is subject to the conditions stipulated in the guidelines / documents issued by MNRE from time to time.



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Website : <http://niwe.res.in>

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SPECIFICATIONS

Certificate Number	PTC III – 004 – R15
WT Type Specification¹ :	
Machine Parameters:	
Model	: GWL 225
WT manufacturer and country	: SOUTHERN WIND FARMS LIMITED, INDIA
Rated power	: 225/40 [kW]
Rated wind speed V_r	: 15 [m/s]
Rotor diameter	: 29.8 [m]
Hub height(s)	: 45 [m]
Hub height operating wind speed range $V_{in}-V_{out}$: 4 - 25 [m/s]
Design lifetime	: 20 [y]
Wind conditions²	
Characteristic turbulence intensity I	: 18 [%]
Annual average wind speed at hub height V_{ave}	: 7.2 [m/s]
Reference wind speed V_{ref}	: 44.8 [m/s]
Average inclined flow	: 10 [degree]
Hub height 50-year extreme wind speed V_{e50}	: 59.2 [m/s] (2 sec. gust)
Electrical network conditions:	
Normal supply voltage and range, V_{phase}	: 230 V/ +10/-13 % [V]
Normal supply frequency and range	: 50 Hz/ + 1/-2.5 [Hz]³
Voltage imbalance	: 2% [V]
Maximum duration of electrical power network outages	: 7 [days]
Number of electrical network outages	: 350 per annum
Other environmental conditions (where taken into account):	
Normal temperature range	: 0 to + 50 [°C]
Extreme temperature range	: - 5 to +60 [°C]
Relative humidity of the air	: 99 [%]
Air density	: 1.225 [kg/m³]
Solar radiation	: 1000 [W/m²]⁴
Major components:	
Blade type	: LM 13.4
Gear box type	: Two stage coaxial gearbox
Kirloskar	: OH2C 418 / 650.101
Ratio	: 1: 39.981
Generator type	: Asynchronous three phase dual, Kirloskar
Tower	: Tubular Steel
Type	: 43.80 [m]
Height	
Manuals:	
Installation manual	: Manual 05, Issue No.1, Rev.0, 02.11.2000
Operating manual	: Manual 01, Issue No.1, Rev.2, 14.11.2003
	: Manual 02, 04 Issue No.1, Rev.0, 02.11.2000
	: Manual 03, Issue No.1, Rev.1, 13.10.2003
	: Manual 01, Issue No.1, Rev.2, 14.11.2003
	: Manual 02, 04, Issue No.1, Rev.0, 02.11.2000
	: Manual 01, Issue No.1, Rev.2, 14.11.2003
	: Manual 02, Issue No.1, Rev.0, 02.11.2000
Electrical maintenance Manual	
Mechanical Maintenance manual	

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¹ During the site evaluation, the following specifications must be considered.
² Compliance with IS 875 (Part 3) for site selection and installation shall be ensured.
³ As per TAPS-2000, frequency range of +1/-3 Hz must be considered.
⁴ As per TAPS-2000, global solar radiation intensity of 1500 W/m² must be considered.

List of Outstanding Issues

1. Design calculations (fatigue)
 - Main bearing
 - Connection between tower sections and foundation & tower connections
2. Fatigue loads for the foundation design requirements
3. Design calculations on yaw drive and yaw braking torque
4. Clarifications on the following:
 - Gear material and reference of the allowable bending and contact stress values for gearbox
 - Rpm - rotor / generator at which protection system is activated
5. Verification of power curve (for max. power) in the field test and clarifications.

Disclaimer:

The Provisional Type Certificate (PTC) as per the requirements of TAPS-2000 (amended) is issued based on the documentation provided by M/s. Southern Wind Farms Limited. NIWE shall not be responsible for any consequences arising out of any issues related to the submitted documentation.

NIWE shall not be responsible for any legal issues between any individual/company and third parties arising from the facts presented in the Provisional Type Certificate (PTC).

The PTC is issued based on MNRE OM No. 293/8/2017-Wind dated 01.01.2019 and shall be used for intended purposes only.

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