

Provisional Type Certificate

Certificate-No.: **TC-PR-159/125244402/2018, Rev.01**
Applicant and Manufacturer: **Para Enterprises Pvt. Ltd.**
Boopathy Buildings, No: 17-A, Virudhunagar road, Sivakasi,
626123, Tamil Nadu,
India
Wind Turbine Type(s): **Pioneer Wincon 750/49, 750.0 kW, HT24, HH 61.5 & 75.0 m, IEC III B**
The technical specifications of the wind turbine are given in the attached Annex.

The 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 61400-1:2005 + AMD1:2010

"Wind turbines - Part 1: Design requirements", class III B,

concerning the design and manufacture. It is based on the following reference documents:

Item	Reference document	Dated	Issued by
Design Evaluation Conformity Statement (HH 61.5 m)	DE-159/125244402/2018, Rev.01	2018-12-04	TÜV Rheinland
Design Evaluation Conformity Statement (HH 75.0 m)	DE-159/125188319/2018, Rev.01	2018-12-04	TÜV Rheinland
Manufacturing Evaluation Conformity Statement (HH 61.5 m)	ME-159/125244402/2018, Rev.01	2018-12-04	TÜV Rheinland
Manufacturing Evaluation Conformity Statement (HH 75.0 m)	ME-159/125188319/2018, Rev.01	2018-12-04	TÜV Rheinland
Type Testing Conformity Statement	TT-PR-159/125244402/2018, Rev.01	2018-12-04	TÜV Rheinland
Grid Connection Compatibility Conformity Statement	STC - 181201, Rev.0	2018-12-03	DEWI-OCC
Final Evaluation Report	125244402/8.9, Rev.01	2018-12-04	TÜV Rheinland

Outstanding issues are listed in Annex. This Provisional Type Certificate is valid until 2019-05-23.

Any changes in the design or the manufacturer's quality system are to be approved by TÜV Rheinland, Certification Body for Wind Turbines. Without approval the Type Certificate loses its validity.

Cologne, 2018-12-04

TÜV Rheinland Industrie Service GmbH,
Certification Body for Wind Turbines,
Am Grauen Stein,
51105 Cologne,
Germany

For PARA ENTERPRISES PVT. LTD.
(formerly Pioneer Wincon Pvt. Ltd.)
M. PRADEEP SANKAR
EXECUTIVE DIRECTOR

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Jai Prakash Narayan



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Machine Parameters

WTG Manufacturer	: Para Enterprises Pvt. Ltd.
Wind Turbine Model	: Pioneer Wincon 750/49
Wind Turbine Configuration (Drive Train)	: Geared Wind Turbine with 'three - point' Support
Wind Turbine Axis of Rotation	: Horizontal Axis
Power Regulation	: Stall with variable speed (speed controlled with power control above rated wind)
Rotor Orientation	: Upwind
Rotor Tilt	: 5.00 deg.
Rotor Cone Angle	: 0.00 deg.
Rated Power	: 750.0 kW
Rated Wind Speed, V_r	: 13.90 m/s
Rated Rotational Speed	: 22.30 rpm
Rotor Diameter	: 49.17 m
Hub Height	: 61.50 m & 75.0 m
Operating Wind Speed Range, ($V_{in} - V_{out}$)	: 3.0 ~ 25.0 m/s
Design Life Time	: 20.0 years
Generator Type	: Asynchronous Induction Generator (Squirrel Cage)
Tower Type	: Lattice Steel Tower
Primary Brake System	: Aerodynamic, Stall
Pitch/ Stall System	: Hydraulically activated (blade tip) with individual drive, central unit

Wind Conditions

Wind Class	: III (according to IEC 61400-1:2005 + AMD1:2010)
Turbulence Class	: B (according to IEC 61400-1:2005 + AMD1:2010)
Characteristic Turbulence Intensity, I_{ref}	: 0.14 (@ $V_{hub} = 15.0$ m/s)
Annual Average Wind Speed, V_{ave}	: 7.50 m/s
Reference Wind Speed, V_{ref}	: 37.50 m/s
50-year Extreme Wind Speed, V_{e50}	: 52.50 m/s
Mean Flow Inclination	: 8.00 deg.

*Wind speed values refer to hub height

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Electrical Network Conditions

Normal Supply Voltage and Range : 690.0 V \pm 10%
Normal Supply Frequency and Range : 50.0 Hz \pm 3%
Voltage Imbalance : Max. 2%
Electrical Network Outages per year : 350.0

Other Environmental Conditions

Environmental Condition : Special Climate Condition as specified below
Operating Temperature Range (Outside) : -10.0 ~ + 50.0 deg. C
Extreme Temperature Range (Outside) : -20.0 ~ + 60.0 deg. C
Air Density : 1.225 kg/m³
Solar Radiation : 1000.0 W/m²
Lightning Protection System : Protection Level 1 according to IEC 61400-24

Major Wind Turbine Components

Rotor Blade:

Manufacturer/Supplier : Zhong Hang Huiteng (HT) Wind Power Equipment Co. Ltd.
Blade Name/Model : HT24
Blade Length : 24.0 m
Rated Power : 750.0 kW
Maximum Chord : 2.25 m @ 5.7 m from blade root
Maximum Twist : 17.30 deg. @ 5.7 m
Pre-bending at Blade Tip : 0.0
Blade Material : Glass fibre reinforced plastic GFRP
Bolt Circle Diameter : 1250.0 mm
Blade Root Connection Type : Bushing concept
Bolt Details : 40*M30.0, 10.9 grade - rolled after heat treatment
Length of Bolt : 405.0 mm \pm 0.2 mm
Blade Mass : 3400.0 \pm 100.0 kg (with bolted joints, flanges and balancing masses)
Static Moment from blade root : 27860.0 kgm
Drawing Reference : Assembling - HT24-000, 1 sheet
Main Body - HT24-100, 1 sheet
Geometry - HT24-000WX, 1 sheet
Suction Side Shell - HT24-140, 2 sheets
Pressure Side Shell - HT24-150, 2 sheets

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Hub:

Manufacturing Process : Casting
Manufacturer/Supplier : Autokast Ltd. / Synergy Green Industries Pvt. Ltd.
Material : Cast GGG 40.3
Drawing Reference : Machining - 1242004; Rev. No.: h; Dated: 2015-10-05; 1 sheet
: Casting - 1242003; Rev. No.: c; Dated: 2012-02-02; 1 sheet

Main Shaft:

Manufacturing Process : Forging
Manufacturer/Supplier : Mackeill Ispat & Forging Ltd., and Tongyu Heavy Industries
Material : 34CrNiMo6
Drawing Reference : 1211005; Rev. No.: j; Dated: 2015-04-07; 1 sheet

Rotor Lock Disc:

Manufacturing Process : Fabrication
Manufacturer/Supplier : Sri Velmurugan Fabricators / Marcs Machineries Pvt. Ltd.
Material : S355 J2 G3 / SAILMA 350 HI
Drawing Reference : 1247151; Rev. No.: b; Dated: 2017-09-05; 1 sheet
: 1247152; Rev. No.: b; Dated: 2016-08-23; 1 sheet

Hydraulic System:

Type : Disc Brake and Tip Brake
Name/Model : AVN - B21 4065-01 (Disc Brake) and AVN - V48 4064-01 (Tip Brake)
Manufacturer/Supplier : AVN Energy A/S
Drawing Reference : Disc Brake - B4065; Rev. No.: 01; Dated: 2008-06-11; 1 sheet
: Tip Brake - B4064; Rev. No.: 01; Dated: 2008-06-11; 1 sheet

Main Bearing Housing:

Manufacturing Process : Casting
Manufacturer/Supplier : Autokast Ltd. / Synergy Green Industries Pvt. Ltd.
Material : EN-GJS-400-18U-LT
Drawing Reference : 1210004; Rev. No.: 0; Dated: 2012-09-26; 6 sheets

Main Bearing:

Type : Spherical Roller Bearing
Name/Model : 24076 CCW33
Manufacturer/Supplier : SKF India Ltd.
Drawing Reference : 24076 CCW33; Rev. No.: C; Dated: 2011-03-09; 1 sheet

Torque Arm Support (Gear Console):

Manufacturing Process : Fabrication
Manufacturer/Supplier : Sri Velmurugan Fabricators / Marcs Machineries Pvt. Ltd.
Material : S355 J2 G3 / SAILMA 350 HI / FE 350 B
Drawing Reference : 1215002; Rev. No.: i; Dated: 2015-10-23; 1 sheet

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Elastomer Bearing:

Type : Highly Loaded Rubber (Elastomer) Bearing
Name/Model : UB99/014
Manufacturer/Supplier : ESM Energie- und Schwingungstechnik Mitsch GmbH
Drawing Reference : UB99_014_01; Dated: 2007-11-09; 1 sheet

Main Gearbox:

Type : 3 -Stage; 1 planetary + 2 helical
Name/Model : CWTG750/49-67-50
Manufacturer/Supplier : Dalian Huarai Heavy Industry (DHHI) Group Co. Ltd.
Rated Power : 825.0 kW (rotor side) and 750.0 kW (generator side)
Rated Torque : 353.0 kNm (rotor input)
Rated Speed : 22.3 rpm (rotor side) and 1510.0 rpm (generator side)
Gear Ratio : 1:67.7
Weight : 6014.0 kg
Lubrication : ISO-VG 320 (Injection Method)
Drawing Reference : 8045; Rev. No.: E; Dated: 2013-10-16; 1 sheet

HSS Coupling:

Type : Composite Disc Coupling
Name/Model : SKC-3649
Manufacturer/Supplier : Zero-Max Motion Control Products
Drawing Reference : SKC-3649; Dated: 2017-09-06; 1 sheet

HSS Rotor Brake (Alternative 1):

Type : Hydraulic Brake Caliper Type
Name/Model : HS 075 FHM
Material : RINGSPANN GmbH
Drawing Reference : 4458.451.851.000000; Rev. No: 01; Dated: 2012-09-24; 1 sheet

HSS Rotor Brake (Alternative 2):

Type : Hydraulic Brake Caliper Type
Name/Model : BSFH330-MS20S-124
Material : Svendborg Brakes ApS
Document Reference : BSFH 300-MSXXS-124; Dated: 2002-10-21; 25 pages

HSS Rotor Brake (Alternative 3):

Type : Hydraulic Brake Caliper Type
Name/Model : NHC-931
Material : Aplicación Nuevas Tecnologías Antec SA
Document Reference : GENI0111NHC-E-EN900; Rev. No: 1; Dated: 2011-02-01; 4 pages

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Main Frame (Bottom Frame):

Manufacturing Process : Fabrication
Manufacturer/Supplier : Sri Velmurugan Fabricators / Marcs Machineries Pvt. Ltd.
Material : S355 J2 G3
Drawing Reference : Machining - 1231090; Rev. No.: s; Dated: 2016-06-07; 1 sheet
: Welded - 1231089; Rev. No.: l; Dated: 2014-09-29; 1 sheet

Generator:

Type : Asynchronous Induction Generator (Squirrel Cage)
Name/Model : 1LG8 456-4AD
Manufacturer/Supplier : Siemens India Ltd.
Rated Power : 800.0 kW
Rated Frequency : 50.0 Hz
Rated Speed : 1509.0 rpm
Rated Voltage : 690.0 V
Rated Current : 752.0 A
Insulation Class : H
Degree of Protection : IP55

Converter:

Type : Full Power IGBT Converter
Name/Model : ACS880-77LC-0860A/0800A-7
Manufacturer/Supplier : ABB Oy Drives and Controls
Rated Power : 764.0 kW (grid side)
Rated Voltage : 690.0 V \pm 10% (generator and grid side)
Rated Current : 860.0 A/800.0 A (generator and grid side)
Grid Frequency : 50.0 ~ 60.0 Hz \pm 3%
Operational conditions : -30 °C to +50 °C (above 45 °C, up to 55 °C, the rated output current have to be decreased by 2.5% per 1 °C)
Degree of Protection : IP54

Yaw System (Yaw Arm):

Manufacturing Process : Casting
Manufacturer/Supplier : Autokast Ltd. / Synergy Green Industries Pvt. Ltd.
Material : EN-GJS-400-18U-LT
Drawing Reference : Casting - 1222002; Rev. No.: d; Dated: 2011-11-07; 1 sheet
: Machining - 1222007; Rev. No.: g; Dated: 2011-11-07; 1 sheet

Yaw System (Yaw Flange):

Manufacturing Process : Forging
Manufacturer/Supplier : ABC Bearings Ltd.
Material : 42CrMo4
Drawing Reference : 1222001; Rev.: l; Dated: 2012-09-27; 1 sheet

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Yaw Drive (Alternative 1):

Type : Planetary type
Name/Model : RPR4150DCSe/9009879/A.D
Manufacturer/Supplier : Brevini Power - Transmission Spa
Rated Power : 1.50 kW
Rated Voltage : 690.0 V
Rated Speed : 0.89 rpm (Nominal) and 0.93 rpm (Max.)
Drawing Reference : SI0009588; Dated: 2010-07-14; 1 sheet

Yaw Drive (Alternative 2):

Name/Model : Planetary type
Supplier : CN GPOWER Wind Power Gearbox
Rated Power : 1.50 kW
Rated Voltage : 690.0 V
Rated Speed : 0.89 rpm (Nominal) and 0.93 rpm (Max.)
Drawing Reference : PH 750- WX (Symbol: 010080A); Dated: 2013-05-06; 1 sheet

Nacelle Cover:

Manufacturing Process : Hand layup
Manufacturer/Supplier : Venkateshwara Fibre Glass (Chennai) Pvt.Ltd. / VBK Fibreo Tech
Material : Fibre-reinforced plastic (FRP)
Drawing Reference : 1232000; Rev. No.: C; Dated: 2013-10-16; 1 sheet

Spinner (Canopy):

Manufacturing Process : Hand layup
Manufacturer/Supplier : Venkateshwara Fibre Glass (Chennai) Pvt.Ltd. / VBK Fibreo Tech
Material : Fibre-reinforced plastic (FRP)
Drawing Reference : 1233022; Rev. No.: f; Dated: 2011-09-14; 1 sheet

Tower and Tower Top Adapter (HH 61.5 m):

Manufacturer/Supplier : Associated Power Structures Pvt. Ltd. (APS)
Hub Height : 61.5 m
Tower Type : 4 - legged Lattice Steel Tower with Tower Top Adapter
Tower Length : 59.928 m (tower bottom to tower top)
Tower Top Diameter/Width : 2090.0 mm
Tower Bottom Diameter/Width : 8800.0 x 8800.0 mm
Tower Weight : 53600.0 kg (without top adapter, internals, cables and bolted connections)
Tower Top Adapter Weight : 1240.0 kg
Bolt Grade, Size and Number(s) : 10.9 x 8 x M30 (Tower - Adapter), 10.9 x 64 x M27 (Tower - Flange)
Bolt Pretension/Tightening Method : 10.9 x 64 x M24 (Flange - Adapter), 10.9 x 72 x M27 (Gear rim - Adapter)
Tightening Method : 70% ULS (where ULS = 1000 MPa)/ Torque Control Method
Tower Material : Torque Control Method
Reference Drawing : Fe 510 C (Flanges), Fe 430 C (Web members), Fe 510 C (Plates)
 : W800-I-00; Dated: 2012-10-04; 1 sheet (Lattice Part)
 : W800-I-03a; Dated: 2015-05-28; 3 sheets (Tower Top Adapter)

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Tower and Tower Top Adapter (HH 75.0 m):

Manufacturer/Supplier : Associated Power Structures Pvt. Ltd. (APS)

Hub Height : 75.0 m

Tower Type : 4 - legged Lattice Steel Tower with Tower Top Adapter

Tower Length : 73.30 m (tower bottom to tower top)

Tower Top Diameter/Width : 2090.0 mm

Tower Bottom Diameter/Width : 14366.0 mm x 14266.0 mm

Tower Weight : 68863.0 kg (without top adapter, internals, cables and bolted connections)

Tower Top Adapter Weight : 1240.0 kg

Bolt Grade, Size and Number(s) : 10.9 x 8 x M27 (Tower - Adapter), 10.9 x 64 x M27 (Tower - Flange)
: 10.9 x 64 x M27 (Flange - Adapter), 10.9 x 72 x M27 (Gear rim - Adapter)

Bolt Pretention : 70% ULS (where ULS = 1000 MPa)

Tightening Method : Torque Control Method

Tower Material : S355JR (according to EN 10025)

Reference Drawing : PW.M500.0001-R0; Dated: 2014-04-28; Rev. No.: A; 1 sheet
: PW.M541.0001-R0; Dated: 2014-04-25; Rev. No.: A; 1 sheet

Control and Safety System:

Main Controller Manufacturer : Beckhoff Automation GmbH & Co. KG

Main Controller Model/Hardware : Beckhoff CX5120-0111 (running TwinCat 2)

Main Controller Software : P-129.1-BF.RE.00.01-A, Rev. C

Manuals:

Manufacturing Process : PEPL/ W49/AM- 015; Rev. No.: 00; Dated: 2017-07-13; 29 pages

Transportation Process : PEPL/750KW/TGSI-001; Rev. No.: 01; Dated: 2018-03-27; 21 pages

Installation & Commissioning Manual : PEPL/ W49-750/IC -003; Rev. No.: 01; Dated: 2018-03-27; 61 pages

Operation Manual : PEPL/750KW/OP-001; Rev. No.: 01; Dated: 2018-04-05; 197 pages

Service Manual : PEPL/W49-750/SM-003; Rev. No.: 01; Dated: 2018-03-27; 88 pages

Personnel Safety : PEPL/750KW/SM-001; Rev. No.: 01; Dated: 2018-03-27; 24 pages

Outstanding Items (Load Measurements):

- The load comparison shall be positive evaluated for the turbine dynamics behaviour and for the fatigue load analysis (by considering also the appropriate Wöhler exponent m) according to the measurement recorded following the requirements of chapter /6.3/ of IEC 61400-13:2015.

End of Annex

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