

Type Certificate

Certificate-No.: **TC-159/125605980/2019, Rev.02**

Applicant and Manufacturer: **Pioneer Wincon Energy Systems Pvt. Ltd.**
7th floor, Tamarai Tech park, 16-20 Developed Plots
600 032, Jawaharlal Nehru Salai, Guindy, Chennai, Tamil Nadu, India

Wind Turbine Type(s): **Pioneer Wincon 750/49, 750.0 kW, HT24, HH 61.1 m & 75.3 m, IEC III A**
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",

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

Module	Reference document	Dated	Issued by
Design Evaluation - Conformity Statement	DE-159/125605980/2019; Rev.01	2019-04-05	TÜV Rheinland
Manufacturing Evaluation - Conformity Statement	ME-159/125605980/2019; Rev.01	2019-04-05	TÜV Rheinland
Type Testing - Conformity Statement	TT-159/125605980/2019; Rev.02	2019-04-05	TÜV Rheinland
Final Evaluation - Evaluation Report	125605980/8.9; Rev.02	2019-04-05	TÜV Rheinland

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.

The Type Certificate is valid until 2024-01-29.

Cologne, 2019-04-05

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

L. A. P. 2019
Federico Osvaldo

Jai
Jai Prakash Narayan



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Machine Parameters

WTG Manufacturer	: Pioneer Wincon Energy Systems 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 Controlled
Rotor Orientation	: Upwind
Rotor Tilt	: 5.0 deg. (HH 61.1 m) & 5.6 deg. (HH 75.3 m)
Rotor Cone Angle	: 0.0 deg.
Rated Power	: 750.0 kW
Rated Wind Speed, V_r	: 16.0 m/s
Rotor Diameter	: 49.0 m
Hub Height	: 61.1 m & 75.3 m (including Tower Top Adapter)
Operating Wind Speed Range, ($V_{in} - V_{out}$)	: 3.0 ~ 25.0 m/s
Design Life Time	: 20.0 years
Generator Type	: Double Winding, Asynchronous
Tower Type	: Lattice Steel Tower
Primary Brake System	: Aerodynamic, Stall
Pitch/ Stall System	: Hydraulically activated (blade tip)

Wind Conditions

Wind Class	: III (according to IEC 61400-1:2005 + AMD1:2010)
Turbulence Class	: A (according to IEC 61400-1:2005 + AMD1:2010)
Characteristic Turbulence Intensity, I_{ref}	: 0.16 (@ $V_{hub} = 15.0$ m/s)
Annual Average Wind Speed, V_{ave}	: 7.5 m/s
Reference Wind Speed, V_{ref}	: 37.5 m/s
50-year Extreme Wind Speed, V_{e50}	: 52.5 m/s
Mean Flow Inclination	: 8.0 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 ~ + 40.0 deg. C
Extreme Temperature Range (Outside) : -20.0 ~ + 50.0 deg. C
Air Density : 1.225 kg/m³
Relative Humidity of the Air : 100.0%
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 : 17.3 deg. @ 5.7 m from blade root
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 + 100.0 kg (with bolted joints, flanges and balancing masses)
Static Moment from blade root : 27060.0 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

Hub:

Manufacturing Process : Casting
Manufacturer/Supplier : Autokast Ltd.
Material : Cast GGG 40.3
Drawing Reference : 1242003; Rev. No.: c; Dated: 2012-02-02; 1 sheet

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Main Shaft:

Manufacturing Process : Forging
Manufacturer/Supplier : Mackeill Ispat & Forging Ltd.
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.: a; Dated: 2014-10-10; 1 sheet
: 1247152; Rev. No.: a; Dated: 2014-10-10; 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.
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 CC/W33
Manufacturer/Supplier : SKF India Ltd.
Drawing Reference : 24076 CC/W33; 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.: h; Dated: 2012-03-29; 1 sheet

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

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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)
Rotational Speeds : 22.30 rpm (rotor side) and 1510.0 rpm (generator side)
Rated Torque : 353.0 kNm (rotor input)
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-3023
Manufacturer/Supplier : Zero-Max Motion Control Products
Drawing Reference : AW740000; Dated: 2017-09-06; 1 sheet

HSS Rotor Brake (Option 1):

Type : Hydraulic Brake Caliper Type
Name/Model : HS 075 FHM-030
Manufacturer/Supplier : RINGSPANN GmbH
Drawing Reference : 4458.451.851.000000; Rev. No: 01; Dated: 2012-09-24; 1 sheet

HSS Rotor Brake (Option 2):

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

HSS Rotor Brake (Option 3):

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

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.: Q; Dated: 2014-10-29; 1 sheet
Welded - 1231089; Rev. No.: I; Dated: 2014-09-29; 1 sheet

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Generator:

Type : Double Winding, Asynchronous
Name/Model : 1LG8 457- 5
Manufacturer/Supplier : Siemens India Ltd.
Rated Power : 750.0 kW/2000 kW
Rated Frequency : 50.0 Hz
Rated Speed : 1500.0 rpm
Rated Voltage : 690.0 V
Rated Current : 701.0 A
Insulation Class/ Degree of Protection : H/IP55

Yaw System (Yaw Arm):

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

Yaw System (Yaw Flange):

Manufacturing Process : Forging
Manufacturer/Supplier : ABC Bearings Ltd.
Material : 12CrMo4
Drawing Reference : 1222001; Rev.: I; Dated: 2012-09-27; 1 sheet

Yaw Drive (Option 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 : SI0009580; Dated: 2010-07-14; 1 sheet

Yaw Drive (Option 2):

Type : Planetary type
Name/Model : PH 750- WX
Manufacturer/Supplier : CNG POWER 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 Pvt.Ltd. / VBK Fibreo Tech Industries
Material : Fibre-reinforced plastic (FRP)
Drawing Reference : 1232000; Rev. No.: C; Dated: 2013-10-16; 1 sheet

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Spinner (Canopy):

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

Tower and Top Adapter (HH 61.1 m):

Manufacturer/Supplier : Associated Power Structures Pvt. Ltd. (APS)
Hub Height : 61.10 m
Type : 4 - legged Lattice Steel Tower with Tower Top Adapter
Length : 59.928 m (tower bottom to tower top)
Top Diameter/Width : 2090.0 mm
Bottom Diameter/Width : 8800.0 mm x 8800.0 mm
Weight : 53600.0 kg (without top adapter, internals, cables and bolted connections)
Bolt Grade, Size and Number(s) : 10.9 x 8 x M30 (Tower - Adapter); 10.9 x 64 x M27 (Tower - Flange)
Bolt Pretension : 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)
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)

Tower and Top Adapter (HH 75.3 m):

Manufacturer/Supplier : Associated Power Structures Pvt. Ltd. (APS)
Hub Height : 75.30 m
Type : 4 - legged Lattice Steel Tower with Tower Top Adapter
Length : 73.304 m (tower bottom to tower top)
Top Diameter/Width : 2090.0 mm
Bottom Diameter/Width : 14266.0 mm x 14366.0 mm
Weight : 60003.0 kg (without top adapter, internals, cables and bolted connections)
Bolt Grade, Size and Number(s) : 10.9 x 8 x M27 (Tower - Adapter); 10.9 x 64 x M27 (Tower - Flange)
Bolt Pretension : 10.9 x 64 x M27 (Flange - Adapter); 10.9 x 72 x M27 (Gear rim - Adapter)
Tightening Method : 70% ULS (where ULS = 1000 MPa)
Tower Material : Torque Control Method
Reference Drawing : S355JR (according to EN 10025)
 : PW.M500.000 I Rev. 3; Dated: 2014-04-28; 1 sheet (Lattice Part)
 : PW.M541.0001-R3; Dated: 2014-10-16; 1 sheet (Tower Top Adapter)

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Control and Safety System:

Main Controller Manufacturer

: DEIF A/S

Main Controller Model

: WC100 or DEIF (DM-4 REC-1)

Manuals:

Operation & Maintenance

: PWPL/SM/P750-49/001; Rev. No.: 03

Assembly

: PWPL/AM/P750-49/001; Rev. No.: 02

Installation & Commissioning

: PWPL/E&CM/P750-49/001; Rev. No.: 01

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