Type Certificate

Certificate

TC-240121 Rev.2

Issue date

2024-05-06

Expiration date

2029-03-26

DAkkS
Deutsche
Akkreditierungsstelle
D-ZE-11326-01-00

This certificate is issued to

Suzlon Energy Limited

One Earth, Opp. Magarpatta City
Hadapsar (Pune), 411028
India

for the wind turbine

S144-3.0 / 3.15 MW

This certificate attests compliance with the wind turbine class and main standard

S, IEC 61400-1:2005+AMD1:2010

The conformity evaluation was carried out in accordance with the rules and procedures of

IEC 61400-22 Ed.1.0:2010
IS/IEC 61400-22:2018

The certificate is based on the reference documents listed in the subsequent pages.

The main wind turbine type characteristics are specified in the annex of this certificate.

This certificate is valid subject to the prescribed maintenance.

Changes in the system design or the manufacturer's quality system are to be approved by the Certification Body. Without approval, the certificate loses its validity.

Approved for issue on
behalf of DEWI-OCC GmbH

Jörn Gerlach
Vice Head of Certification Body
Bremen, 2024-05-06

Suzlon Energy Limited

UL Solutions

DEWI-OCC Offshore and Certification Centre GmbH
Contrescarpe 45
28195 Bremen, Germany

This Certificate is based on the following reference documents:

Design evaluation conformity statement
DEWI-OCC GmbH: Conformity Statement
"Design evaluation conformity statement",
Doc. No. STC-230017 Rev. 1, 2024-03-26

Manufacturing evaluation conformity statement
DEWI-OCC GmbH: Conformity Statement
"Manufacturing evaluation conformity statement",
Doc. No. STC-240119 Rev. 2, 2024-05-06

Type test evaluation conformity statement
DEWI-OCC GmbH: Conformity Statement
"Type test evaluation conformity statement",
Doc. No. STC-240120 Rev. 1, 2024-05-06

Final evaluation report
DEWI-OCC GmbH: Evaluation Report
"Final evaluation report",
Doc. No. R14610726-12 Rev. 6, 2024-05-06



DEWI-OCC Offshore and Certification Centre GmbH
Contrescarpe 45
28195 Bremen, Germany

Annex I - Wind turbine type characteristics

Machine parameters:

Power regulation:	Independent electromechanical pitch system for each blade
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	6°
Cone angle:	4.5° 3.7° (S144-3.0 MW HH105 m variant)
Rated power:	3.0 MW 3.15 MW
Rated wind speed V_r:	9.2 m/s (3.0 MW) 9.35 m/s (3.15 MW)
Rotor diameter:	144 m
Hub height(s):	140 m (Hybrid lattice tower) 160 m (Hybrid lattice tower) 105 m (Tubular steel tower)
Hub height operating wind speed range V_{in} – V_{out}:	3 m/s – 18 m/s
Design life time:	25 years

Wind conditions:

Characteristic turbulence intensity I_{ref} at V_{hub} = 15 m/s:	14 %
Annual average wind speed at hub height V_{ave} :	7.2 m/s
Reference wind speed V_{ref} :	35 m/s
Hub height 50-year extreme wind speed V_{e50}:	49 m/s

Electrical network conditions:

Normal supply voltage and range:	690 V (-15% / +10%)
Normal supply frequency and range:	50 Hz (-6% / +5%)

Other environmental conditions (where taken into account):

High Temperature Variant light (HTV light)

Normal and extreme temperature ranges:	Operation: 0°C to +45°C Survival: 0°C to +50°C

Standard Temperature Variant (STV)

Normal and extreme temperature ranges:	Operation: -10°C to +40°C Survival: -20°C to +50°C
Air density:	1.15 kg/m³
Lightning protection system (standard and protection class):	IEC 61400-24:2010, LPL I
Other design conditions :	NA

Suzlon Energy Limited

Annex II - Wind turbine configurations

Wind turbine	Rotor blade	Power output	IEC class	Hub height (m)
S144-3.0 / 3.15 MW	SB70S1	3 MW	S	105 m (tubular steel tower)
		3 MW 3.15 MW	S	140 m (hybrid lattice tower)
		3 MW 3.15 MW	S	160 m (hybrid lattice tower)

Annex III – Major components

*If not otherwise stated, the certificate holder is the manufacturer

Blade:

Type:	SB70 (SB70S1)
Material:	Glass reinforced epoxy, vacuum-infused. Carbon prefabricated pultruded planks
Blade length:	70.5 m
Designer:	Suzlon Energy Limited
Manufacturer:	Suzlon Energy Ltd. (Rotor Blade Unit)

Blade bearing (option 1):

Type:	Double row four-point bearing
Designer:	Laulagun Bearings, S.A.
Manufacturer:	Laulagun Bearings S.L.
Drawing / Data sheet / Part No.:	F3180M16DTTE125WN Rev. 03

Blade bearing (option 2):

Type:	Double-row 4-point-contact slewing bearing
Designer:	Shanghai Ouji Kete Slewing Bearing Co., Ltd.
Manufacturer:	Shanghai Ouji Kete Slewing Bearing Co., Ltd.
Drawing / Data sheet / Part No.:	032.60.2861 Rev. V1.1

Pitch drive:

Type:	7T07W
Ratio:	i = 157.1
Designer:	Bonfiglioli Transmittal
Manufacturer:	Bonfiglioli Transmissions Pvt Ltd.
Drawing / Data sheet / Part No.:	CD00021053 Rev. C (Product code: JB00024563)

Hub (option 1):

Type:	Machined
Designer:	Suzlon Energy Limited
Manufacturer:	SEFORGE Limited Tongyu Heavy Industry Co., Ltd
Material:	EN-GJS-400-18-LT
Drawing / Data sheet / Part No.:	M414.030699-05, Rev 05 M414.030744-02 Rev. 02

Hub (option 2):

Type:	Machined
Designer:	Suzlon Energy Limited
Manufacturer:	SEFORGE Limited Tongyu Heavy Industry Co., Ltd.
Material:	EN-GJS-400-18-LT
Drawing / Data sheet / Part No.:	M414.030737-01 Rev. 01 M414.030737-03 Rev. 03

Main shaft:

Type:	Machined
Designer:	Suzlon Energy Limited
Manufacturer:	SEFORGE Limited Tongyu Heavy Industry Co., Ltd
Material:	EN-GJS-400-18-LT
Drawing / Data sheet / Part No.:	M334.330741-02 Rev.02

Main bearing (option 1):

Type:	Single Row Tapered Roller Bearing
Designer:	Schaeffler Technologies AG & Co. KG
Manufacturer:	Schaeffler Technologies AG & Co. KG
Drawing / Data sheet / Part No.:	EDD F-624497.02.TR1 000 Rev. AA (Front) EDD F-624800.01.TR1 000 Rev. 00 (Rear) EDD F-624497.03.TR1-WPOS 000 Rev.00 (Front) EDD F-624800.03.TR1-WPOS 000 Rev.00 (Rear)

Main bearing (option 2):

Type:	Single Row Tapered Roller Bearing
Designer:	SKF
Manufacturer:	SKF Engineering and Lubrication India Private Limited
Drawing / Data sheet / Part No.:	BT1-8266 Rev. 2 (Front bearing) BT1-8267 Rev. 2 (Rear bearing)

Gearbox (option 1):

Type:	2 planetary gear stages & 1 helical gear stage (EF0953A)
Gear Ratio:	i = 113.850
Designer:	ZF Wind Power
Manufacturer:	ZF Wind Power Coimbatore Private Ltd.
Drawing / Data sheet / Part No.:	097-EF0953A001 Rev. E

Gearbox (option 2):

Type:	2 planetary gear stages & 1 helical gear stage (SMG282ADT113-0209)
Gear Ratio:	i = 113.54
Designer:	NGC
Manufacturer:	Nanjing High Speed Gear Manufacturing Co, Ltd
Drawing / Data sheet / Part No.:	W289000135 Rev. R1

Gearbox Mount:

Designer:	Suzlon Energy Limited
Manufacturer:	Changzhou Dahua Huanyu Machinery & Manufacture Co.,Ltd
Material:	EN-GJS-400-18-LT
Drawing / Data sheet / Part No.:	M334.333592-01 Rev. 01 (Upper Yoke) M334.333594-01 Rev. 01 (Lower Yoke) M334.333593-02 Rev. 02 (Side Pillar)

Suzlon Energy Limited

Elastomer bearing:

Type:	Multilayer Sandwich Mount
Designer:	ESM
Manufacturer:	ESM Energie- und Schwingungstechnik Mitsch GmbH
Drawing / Data sheet / Part No.:	ML05_009_046_002_KD

Main frame:

Type:	Machined
Designer:	Suzlon Energy Limited
Manufacturer:	SEFORGE Limited Tongyu Heavy Industry Co., Ltd.
Material:	EN-GJS-400-18-LT
Drawing / Data sheet / Part No.:	M314.001230-03 Rev. 03

Generator frame (Girder assembly):

Designer:	Suzlon Energy Limited
Manufacturer:	Changzhou Dahua Huanyu Machinery & Manufacture Co.,Ltd
Material:	EN-GJS-400-18-LT
Drawing / Data sheet / Part No.:	M321.330566-03 Rev. 03

Mechanical brake:

Type:	HE-2-90/96
Designer:	ANTEC, S.A.U
Manufacturer:	ANTEC Braking Systems (Tianjin) Co., Ltd.
Drawing / Data sheet / Part No.:	20.103.944 Rev. C

Rotor lock:

Designer:	Suzlon Energy Limited
Material:	34CrNiMo6 (Pin) S355NL (Disc)
Drawing / Data sheet / Part No.:	M331.330198-01 Rev. 01

HSS coupling (option 1):

Type:	019W-00029-SS20 (Flexible coupling)
Designer:	CENTA Antriebe Kirschey GmbH
Manufacturer:	CENTA Antriebe Kirschey GmbH
Drawing / Data sheet / Part No.:	019-64768-000-000 Rev. – 019-64204-000-000 Rev B 019-64204-100-000 Rev. -

HSS coupling (option 2): **(*)**

Type:	Flexible coupling
Designer:	Zhuzhou Times New Materials Technology Co., Ltd. (TMT)
Manufacturer:	Zhuzhou Times New Material Technology Co., Ltd.
Drawing / Data sheet / Part No.:	TX0100737 Rev. F

Suzlon Energy Limited

Yaw system:	
Drive Type:	6 active electrical yaw drives with yaw motor brake
Bearing Type:	Friction Pads/ Friction Bearing
Designer:	Suzlon Energy Limited
Drawing / Data sheet / Part No.:	M310.330536-01 Rev. 01
Brake Type:	No explicit brake. The Yaw drive and friction bearing pads acts as yaw brake
Yaw drive:	
Type:	7T12W
Ratio:	i = 1971.1
Designer:	Bonfiglioli Trasmital Ltd.
Manufacturer:	Bonfiglioli Transmissions Pvt Ltd.
Drawing / Data sheet / Part No.:	CD00019771 Rev. B (Product code: JB00024827)
Gear rim:	
Type:	Forged
Designer:	Suzlon Energy Limited
Manufacturer:	Dalian United Wind Power Generation Bearing Co.Ltd.
Material:	42CrMo4+HH+QT
Drawing / Data sheet / Part No.:	M314.001127-04 Rev.04
Tower top flange (option 1):	**(**)**
Designer:	Suzlon Energy Limited
Material:	S355NL-Z35
Drawing / Data sheet / Part No.:	M214.002083-03 Rev. 03
Tower top flange (option 2):	**(***)**
Designer:	Suzlon Energy Limited
Material:	S355NL-Z35
Drawing / Data sheet / Part No.:	M214.002094-03 Rev. 03

Tower (option 1):

Designer:	Suzlon Energy Limited
Manufacturer (Tubular steel section, transition piece and adapter plate):	Suzlon Energy Ltd, (Tubular Tower Unit) Barakath Engineering Industries (P) Limited Bharakath Industries Cu-Built Renewable Energy Pvt. Ltd. Cu-Built Engineers Pvt. Ltd. Toolfab Engineering Industries Pvt. Ltd. Master Fab Engineering Industries Anawil Wire and Engineering Pvt. Ltd. Altec Fabricators
Manufacturer (Lattice section):	Transrail Lighting Limited Associated Power Structures Pvt. Ltd. Valmont Structures Private Limited Sanvijay Infrastructures Private Limited
Tower type:	Hybrid lattice tower (HH160 m)
Main drawing No.:	M200.000292-00 M200.000292-01
Tower total length:	157586 mm

Tower (option 2):

Designer:	Suzlon Energy Limited
Manufacturer (Tubular steel section, transition piece and adapter plate):	Suzlon Energy Ltd, (Tubular Tower Unit) Barakath Engineering Industries (P) Limited Bharakath Industries Cu-Built Renewable Energy Pvt. Ltd. Cu-Built Engineers Pvt. Ltd. Toolfab Engineering Industries Pvt. Ltd. Master Fab Engineering Industries Anawil Wire and Engineering Pvt. Ltd. Altec Fabricators
Manufacturer (Lattice section):	Transrail Lighting Limited Associated Power Structures Pvt. Ltd. Valmont Structures Private Limited Sanvijay Infrastructures Private Limited
Tower type:	Hybrid lattice tower (HH140 m)
Main drawing No.:	M200.000293-00 M200.000293-01
Tower total length:	136463 mm

Tower (option 3):

Designer:	Suzlon Energy Limited
Manufacturer (Tubular steel section, transition piece and adapter plate):	Suzlon Energy Ltd, (Tubular Tower Unit) Barakath Engineering Industries (P) Limited Bharakath Industries Altec Fabricators Anawil Wire and Engineering Pvt. Ltd. Cu-Built Renewable Energy Pvt. Ltd. Cu-Built Engineers Pvt. Ltd. Toolfab Engineering Industries Pvt. Ltd. Master Fab Engineering Industries
Manufacturer (Lattice section):	Transrail Lighting Limited Associated Power Structures Pvt. Ltd. Valmont Structures Private Limited Sanvijay Infrastructures Private Limited
Tower type:	Hybrid lattice tower (HH140 m)
Main drawing No.:	M200.000286-01
Tower total length:	136463 mm

Tower (option 4):

Designer:	Suzlon Energy Limited
Manufacturer:	Barakath Engineering Industries (P) Limited Bharakath Industries Cu-Built Renewable Energy Pvt. Ltd. Cu-Built Engineers Pvt. Ltd. Toolfab Engineering Industries Pvt. Ltd. Master Fab Engineering Industries Anawil Wire and Engineering Pvt. Ltd. Altec Fabricators
Tower type:	Tubular steel tower (HH105 m)
Main drawing No.:	M200.000264-04
Tower total length:	102551 mm

Generator

Designer:	Suzlon Energy Limited
Manufacturer:	CG Power and Industrial Solutions Ltd. Elinwg India Private Limited
Type:	SG055D06

Converter (option 1):

Designer:	VERTIV
Manufacturer:	Vertiv Tech (Mianyang) Co., Ltd.
Type:	WF1000-06L0270-CPN-A

Converter (option 2):

Designer:	Shenzhen Hopewind Electric Co., Ltd.
Manufacturer:	Suzhou Hopewind Electric Co., Ltd.
Type:	HWDFM0693150

Suzlon Energy Limited

Lightning protection system

Lightning protection system	LPL I according to IEC 61400-24 Ed.1

(*) HSS coupling option 2 has its validity limited for its use in conjunction with the hybrid lattice towers option 1 (HH160 m / M200.000292-00/01) and option 2 (HH140 m / M200.000293-00/01).

(**) Tower top flange option 1 has its validity limited for its use in conjunction with the tubular steel tower option 4 (HH105 m / M200.000264-04).

(***) Tower top flange option 2 has its validity limited for its use in conjunction with the hybrid lattice towers option 1 (HH160 m / M200.000292-00/01), option 2 (HH140 m / M200.000293-00/01) and option 3 (HH140 m / M200.000286-01).

Suzlon Energy Limited

DEWI-OCC Offshore and Certification Centre GmbH
Contrescarpe 45
28195 Bremen, Germany