



Certificate No.

**IECRE.WE.TC.19.0028-R0**

IECRE - IEC System for Certification  
to Standards Relating to Equipment  
for Use in Renewable Energy  
Applications

## TYPE CERTIFICATE

### Wind Turbine

This certificate is issued to

GE Wind Energy GmbH  
Holsterfeld 16  
48499 Salzbergen  
Germany

for the wind turbine

GE3.8-130

wind turbine class (class, standard, year)

IIB, IEC 61400-1 Ed. 3:2005-08 incl. Amendment 2010-10

This certificate is transferred from IEC 61400-22 to IECRE (according to WE-OMC/316/DV and WE-OMC/321/RV) and attests compliance with IEC 61400 Series as specified in subsequent pages. It is based on the following reference documents:

Design basis evaluation conformity statement  
Dated

Included in the Design Evaluation Conformity Statement

Design evaluation conformity statement  
Dated

44 220 18561075-D-IEC  
Rev. 4, 2018-12-21

Type test conformity statement  
Dated

44 220 18617152-T-IEC  
Rev. 1, 2018-12-21

Manufacturing conformity statement  
Dated

44 220 18617152-M-IEC  
Rev. 2, 2018-12-21

Component certificate Rotor Blade LM63.7P  
Dated

44 220 16020796-CC-IEC  
Rev. 0, 2017-07-04, valid until 2022-07-03

Final evaluation report  
Dated

8115 617 152-20 E  
Rev. 3, 2018-12-21

The conformity evaluation was carried out in accordance with the rules and procedures of the IECRE System  
[www.iecre.org](http://www.iecre.org)

The wind turbine type specification begins on page 2 of this certificate.

Changes in the system design or the manufacturer's quality system are to be approved by the TÜV NORD CERT GmbH.  
Without approval, the certificate loses its validity.

This certificate is valid until:  
2023-03-22

Approved for issue on behalf of the IECRE  
Certification Body:

Dipl.-Ing., Dr. M. Broschart  
Deputy of Specialist Manager Wind Energy  
Essen, 2018-12-21



TÜV NORD CERT GmbH  
Langemarckstraße 20  
45141 Essen



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#### Machine parameters:

Power regulation:	Independent electromechanical pitch system for each blade
Rotor orientation:	Upwind
Number of rotor blades:	3
Rotor tilt:	4°
Cone angle:	5°
Rated power:	3430 – 3830 kW (variable rating)
Rated wind speed $V_r$ :	11.4 m/s
Rotor diameter:	130 m
Hub height(s):	85 m, 110 m
Hub height operating wind speed range $V_{in} - V_{out}$ :	3 – 25 m/s
Design life time:	20 years
Software version:	V05.05.01.6C
Controller Features:	mLRIC

#### Wind conditions:

Characteristic turbulence intensity $I_{ref}$ at $V_{hub} = 15$ m/s:	0.14
Annual average wind speed at hub height $V_{ave}$ :	8.5 m/s
Reference wind speed $V_{ref}$ :	42.5 m/s
Mean flow inclination:	8°
Hub height 50-year extreme wind speed $V_{e50}$ :	59.5 m/s

#### Electrical network conditions:

Normal supply voltage and range:	10 kV or 33 kV (range 90 %-110 %)
Normal supply frequency and range:	50 Hz (range 47-53 Hz)
Voltage imbalance:	4 %
Maximum duration of electrical power network outages:	6 hours
Number of electrical network outages	20 per year



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#### **Other environmental conditions (where taken into account):**

Design conditions in case of offshore WT :	N/A
Normal and extreme temperature ranges:	Normal: -15°C - +35°C (derated above 35°C) Extreme: -20°C - +50°C
Relative humidity of the air:	Up to 95%
Air density:	1.225 kg/m <sup>3</sup> (Max. operation air density: 1.341 kg/m <sup>3</sup> )
Solar radiation:	1000 W/m <sup>2</sup>
Lightning protection system (standard and protection class):	IEC 61400-24, LPL I
Earthquake model and parameters (standard and key parameters e.g. spectrum, model, seismic zone, soil class, etc.):	N/A
Other design conditions :	N/A



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#### **Major components:**

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

#### **Blade LM63.7P:**

Type:	Vacuum infusion
Material:	Glass fibre reinforced polyester
Blade length:	63.67 m
Number of blades:	3
Manufacturer:	LM Wind Power
Drawing / Data sheet / Part No.:	GE Part No.: 444W2320P001-P006 Outline Drawing No.: DR-07521/A3, Rev. A3 Drawing No. (Vortex Gen.): 444W7445, dated 2016-08-11 Drawing No. (TE Serrations): 444W2335, dated 2016-01-12 Specification: 444W1143, dated 2016-01-25

#### **Blade bearing:**

Type:	Ball bearing slewing ring
Manufacturer:	TMB Tianma (Chengdu) Railway Bearing Co. Ltd., Chengdu, China
Drawing / Data sheet / Part No.:	Vendor Specific Part No.: 445W5246P001/P002 GE Generic Part No.: 445W5233P001/P002 Drawing No.: B033.82.2750K, Rev. A

#### alternative:

Manufacturer:	GE Renewable Energy (Design) (1) CS Bearing Co. Ltd., Kyoungnam, South-Korea (2) TMB Tianma (Chengdu) Railway Bearing, Chengdu, China (3) Shilla Corporation, Cheonan City, South-Korea (4) Seohan-NTN Bearing, Gyeongbuk, South-Korea
Drawing / Data sheet / Part No.:	GE Part No.: 445W9236G001 Drawing No.: 445W9236

#### **Pitch System:**

Motor / Actuator Type:	Electrical motors (DC) with battery backup and individual blade pitch control
Pitch Controller Type:	Mark VIe UCSB
Manufacturer:	GE Renewable Energy



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#### Main shaft:

Type: Forged part  
Manufacturer: GE Renewable Energy (Design)  
(1) Hyunjin Materials Co. Ltd., Busan, South-Korea  
(2) Shandong Laiwu Jinlei Wind Power Technology Co.,  
Ltd., Shandong, China  
(3) Taewoong, Co. Ltd., Busan, South Korea  
(4) Tongyu Heavy Industry Co. Ltd., Shandong, China  
Material: 34CrNiMo6 + HH, WTG-113  
30CrNiMo8+HH  
Drawing / Data sheet / Part No.: GE Part No.: 444W7167P001/P002  
Drawing No.: 444W7167, Rev.-

#### Main bearing (rotor side):

Type: Double row tapered roller bearing  
Manufacturer: NTN Bearing Corporation of America (Design)  
(1) NTN Houdatsushimizu Corporation, Ishikawa,  
Japan  
(2) NTN Corporation (Kuwana Works), Kuwana-shu,  
Mie-ken, Japan  
Drawing / Data sheet / Part No.: Designation: CRD-18601 CS1150PX1 S30,  
alternative: CRD-18601 CS1150PX2V3S30  
Drawing No.: 15-06675-B, alternative: 16-10229

#### alternative:

Manufacturer: Schaeffler Technologies AG & Co. KG, Herzogenaurach,  
Germany  
Drawing / Data sheet / Part No.: Trade designation: F-632022.TR2-WPO GE Part No.:  
444W1051P001  
Drawing No.: EDD F-632022.TR2-WPO 000, Rev. AC

#### Main bearing (generator side):

Type: Cylindrical roller bearing  
Manufacturer: NTN Bearing Corporation of America (Design)  
(1) NTN Houdatsushimizu Corporation, Ishikawa,  
Japan  
(2) NTN Corporation (Kuwana Works), Kuwana-shu,  
Mie-ken, Japan  
Drawing / Data sheet / Part No.: Designation: RNU17801CS385PX1S30,  
alternative: RNU17801PX1V1S30  
Drawing No.: 15-06676-B, alternative: 16-04756-A

#### alternative:

Manufacturer: Schaeffler Technologies AG & Co. KG, Herzogenaurach,  
Germany  
Drawing / Data sheet / Part No.: Trade designation: F-632021.NU-WPO  
GE Part No.: 444W1052P001  
Drawing No.: EDD F-632021.NU-WPO 000, Rev. AC



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#### **Gearbox:**

Type: Planetary helical gearbox  
Gear Ratio: 143.77  
Manufacturer: Nanjing High Speed Gear Manufacturing Co., Ltd., Nanjing, China  
Drawing / Data sheet / Part No.: Designation: NGC FDM5C-00R1  
Drawing No.: FDM5C-00R1, Rev.-

#### **Yaw System:**

*Drive Type:* Active, yaw bearing slewing ring with 4 active yaw drives and 5 hydraulic brakes  
4 stage planetary gearbox  
Manufacturer: Liebherr Components Biberach GmbH, Biberach, Germany  
Drawing / Data sheet / Part No.: Trade Designation: DAT 450/2494  
GE Part No.: 444W2139P001  
Vendor Part No.: 444W0090P001  
Drawing No.: 268 494 4000 99 0, Index 1.2

#### alternative:

Manufacturer: Bonfiglioli Trasmital (Design)  
Bonfiglioli Riduttori S.p.A., Bologna, Italy  
Drawing / Data sheet / Part No.: Trade Designation: 714T4W(MT714T040)  
GE Part No.: 444W0090P001  
GE Vendor Part No.: 444W2140P001  
Drawing No.: I7140T008200, Rev. H

#### *Bearing Type:*

Manufacturer: Ball bearing slewing ring  
GE Renewable Energy (Design)  
(1) Seohan-NTN Bearing Co., Ltd., Gyeongbuk, South-Korea  
(2) Shilla Corporation, Cheonan-si, Chungnam, South-Korea  
(3) Samhyun Engineering Co. Ltd., Kyoungnam, South-Korea  
(4) Tianma (Chengdu) Railway Bearing Co. Ltd., Chengdu, China  
Drawing / Data sheet / Part No.: GE Part No.: 444W0622G001  
Drawing No.: 444W0622

#### *Brake Type:*

Manufacturer: Hydraulic active brakes  
Svendborg Brakes A/S, Melle, Germany  
Drawing / Data sheet / Part No.: Designation: BSAB 120-S-550  
GE Part No.: 444W4359P001  
Drawing No.: 490-6132-801



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#### Generator:

Type: Doubly-fed induction

Manufacturer: GE Power Conversion (Design)  
GE Power Conversion Group, Nancy, France

Drawing / Data sheet / Part No.: Designation: DF1NXS120-95/4GH/5 (E95S16A055A)  
GE Generic Part No.: 444W7266P001  
alternative:  
Designation: DF1NXS120-95/4GH/5 (E95S16A055D)  
GE Generic Part No.: 444W7266P002

Rated Power: 3988 kW

Rated Frequency: 50 Hz

Rated Speed: 1741 rpm

Rated Voltage: 6000 V (stator)  
690 V (rotor)

Rated Current: 391 A (40°C ambient temperature, stator)  
376 A (50°C ambient temperature, stator)  
1486 A (40°C ambient temperature, rotor)  
1415 A (50°C ambient temperature, rotor)

Insulation Class: F

Degree of Protection: IP 34 (generator)  
IP 23 (slip ring)

#### Converter:

Type: MMW DFIG Converter

Manufacturer: GE Power and Water, Hai Phong City, Vietnam

Drawing / Data sheet / Part No.: Designation: 151X1249KA01SA04  
GE Part No.: 109W3000P005

Rated Voltage (grid side): 690 V

Rated Current (grid side): 700 A

Degree of Protection: IP 53 (control and bridge cabinet)  
IP 22 (filter and inductor cabinet)  
IP 32 (AC entry cabinet)  
IP 21 (heat exchanger cabinet)

#### Transformer:

Type: Dry type

Manufacturer: Hainin Jinpan Electric (JST), Haikou, China

Drawing / Data sheet / Part No.: Designation: 3161152301  
Vendor Specific Part No.: 445W2509P012  
GE Generic Part No.: 445W2508P012

Rated Voltage: 33 kV (high)  
6 kV (medium)  
690 V (low)



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Rated Power: 4300 kVA  
Degree of Protection: IP 00 (not defined)  
Location (e.g. tower bottom): Tower bottom

alternative:

Manufacturer: Hainin Jinpan Electric (JST), Haikou, China  
Drawing / Data sheet / Part No.: Designation: 3161001301  
Vendor Specific Part No.: 444W5865P001  
GE Generic Part No.: 444W5864P001  
Rated Voltage: 10 kV (high)  
6 kV (medium)  
690 V (low)  
Rated Power: 4779 kVA  
Degree of Protection: IP 00 (not defined)

alternative:

Manufacturer: Hainin Jinpan Electric (JST), Haikou, China  
Drawing / Data sheet / Part No.: Designation: 3161176301  
Vendor Specific Part No.: 444W8961P014  
GE Generic Part No.: 444W8962P014  
Rated Voltage: 35 kV (high)  
6 kV (medium)  
690 V (low)  
Rated Power: 4779 kVA  
Degree of Protection: IP 00 (not defined)

**Tower (HH 85m):**

Type: Tubular steel  
Manufacturer: GE Renewable Energy (Design)  
(1) Chengxi Shipyard Co., Ltd., Jiangsu Province, China  
(2) Ates Celik Insaat Taahhtüt, Bergama/Izmir, Turkey.  
(3) Ambau GmbH, Graefenhainichen, Germany  
(4) CS Wind Corporation, Tau Province, Vietnam  
(5) CS Wind Corporation, Kunshan, Lianyungang, China  
(6) CS Wind Corporation, Kuantan, Malaysia  
Sections: 3  
Length: 80.86 m





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Drawing / Data sheet / Part No.:

Drawing No.: 445W1675, Rev. 0

Foundation specification: Foundation\_Load\_Drawing\_3.8-130\_50Hz\_85mHH\_EN\_r01, Rev.01

alternative (HH 85m):

Type:

tubular steel

Manufacturer:

See above

Sections:

4

Length:

80.86 m

Drawing / Data sheet / Part No.:

Drawing No.: 44444W2393, alternative: 444W9034, Rev. A

Foundation specification: Foundation\_Load\_Drawing\_3.8-130\_50Hz\_85mHH\_EN\_r01, Rev.01

alternative (HH 110m):

Type:

tubular steel

Manufacturer:

See above

Sections:

5

Length:

105.86 m

Drawing / Data sheet / Part No.:

Drawing No.: 444W9561

Foundation specification: Foundation\_Load\_Drawing\_3.8-130\_50Hz\_60Hz\_110mHH\_EN\_r03, Rev.03

#### Foundation Adaptor:

Type:

Tower base ring

Manufacturer:

GE Renewable Energy (Design)

(1) Chengxi Shipyard Co., Ltd., Jiangsu Province, China

(2) Ates Celik Insaat Taahhtüt, Bergama/Izmir, Turkey.

(3) Ambau GmbH, Graefenhainichen, Germany

(4) CS Wind Corporation, Tau Province, Vietnam

(5) CS Wind Corporation, Kunshan, Lianyungang, China

(6) CS Wind Corporation, Kuantan, Malaysia

Drawing / Data sheet / Part No.:

Drawing No. (for HH 85m): 444W2312

Drawing No. (for HH 110m): 444W4509



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### **Wind Turbine**

#### **Manuals:**

Operation & maintenance manual:

Operating\_Manual\_3MW-xxHz\_Operating\_EN\_r05  
Maintenance\_Manual\_Generic-xxHz\_Foundation\_Tower\_EN\_r01

Maintenance\_Manual\_3MW-xxHz\_DFIG\_EN\_r02  
Maintenance\_Manual\_Generic-xxHz\_MachineHead\_EN\_r02  
Maintenance\_Manual\_Generic-xxHz\_Hub\_EN\_r01  
Maintenance\_Manual\_Generic-xxHz\_MVSG\_EN\_r01

Transport manual:

Transport\_Documents\_3.2-3.8-xxHz\_3MW\_DTA\_SCADA\_TM1\_EN\_r01

Transport\_Documents\_3.2-3.8-xxHz\_3MW\_TBR\_Tower\_TM2\_EN\_r01

Transport\_Documents\_3.2-3.8-xxHz\_3MW\_Nacelle\_Hub\_TM3\_EN\_r01

Transport\_Documents\_3.2-3.8-xxHz\_3MW\_Rotor\_Blades\_TM4\_EN\_r01

Installation & commissioning. manual:

Installation\_Manual\_3MW-DFIG-xxHz\_EN\_r02

Commissioning\_Checklist\_3MW-DFIG-xxHz\_uptower\_EN\_r03

Commissioning\_Checklist\_3MW-DFIG-xxHz\_downtower\_EN\_r03