



Certificate No.

**IECRE.WE.TC.19.0010-R0**

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

## PROVISIONAL TYPE CERTIFICATE

### Wind Turbine

This certificate is issued to

Enercon GmbH  
Dreekamp 5  
26605 Aurich  
Germany

for the wind turbine

ENERCON E-126 EP3

wind turbine class (class, standard, year)

IIA/S, 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 Design Evaluation Conformity Statement

Provisional Design evaluation conformity statement  
Dated

IECRE.WE.CS.19.0004-R0,  
2019-03-31

Provisional Type test conformity statement  
Dated

44 220 18995926-PT-IEC, Rev. 0,  
2018-07-05

Provisional Manufacturing conformity statement  
Dated

44 220 18995926-PM-IEC, Rev. 0,  
2018-07-05

Final evaluation report  
Dated

8115 995 926-20 E, Rev. 0,  
2018-07-05

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:  
04.07.2019

Approved for issue on behalf of the IECRE  
Certification Body:

Dipl.-Ing./M.Sc. M. Lange  
Deputy Specialist Manager Wind Energy  
Essen, 2019-03-31



TÜV NORD CERT GmbH  
Langemarckstraße 20  
45141 Essen



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#### Machine parameters:

|   |  |
|---|--|
| Power regulation:                               | Independent electromechanical<br>pitch system for each blade |
| Rotor orientation:                              | Upwind   |
| Number of rotor blades:                         | 3  |
| Rotor tilt:                                     | 7°   |
| Cone angle:                                     | -2.5°  |
| Rated power:                                    | 3000 kW, 3500 kW, 4000 kW                                    |
| Rated wind speed $V_r$ :                        | 12.1 m/s   |
| Rotor diameter:                                 | 127 m  |
| Hub height(s):                                  | 86 m, 99 m, 116 m,<br>135 m (loads only)                     |
| Operating wind speed range $V_{in} - V_{out}$ : | 2 m/s – 30 m/s   |
| Design life time:                               | 25 years   |
| Software version:                               | I/O1 Control Cabinet Version<br>6.19                         |

#### Wind conditions IEC IIA (E-126 EP3-ST-116-FB-C-01):

|  |          |
|--|----------|
| Characteristic turbulence intensity $I_{ref}$ at $V_{hub} = 15$ m/s: | 16 %     |
| 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 deg    |
| Hub height 50-year extreme wind speed $V_{e50}$ :                    | 59.5 m/s |



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## PROVISIONAL TYPE CERTIFICATE

### Wind Turbine

#### Wind conditions IEC S (E-126 EP3-HT-99-IS-C-01):

Characteristic turbulence intensity  $I_{ref}$  at  $V_{hub} = 15$  m/s:

|                |                |
|----------------|----------------|
| Extreme loads: | 16 %           |
| Fatigue loads: | 2 m/s 33.10 %  |
|                | 4 m/s 23.50 %  |
|                | 6 m/s 17.55%   |
|                | 8 m/s 16.20 %  |
|                | 10 m/s 15.45 % |
|                | 12 m/s 14.30 % |
|                | 14 m/s 13.40 % |
|                | 16 m/s 12.60 % |
|                | 18 m/s 12.25 % |
|                | 20 m/s 12.20 % |
|                | 22 m/s 11.95 % |
|                | 24 m/s 11.85 % |
|                | 26 m/s 11.25 % |
|                | 28 m/s 11.10 % |
|                | 30 m/s 11.50 % |

|   |          |
|---|----------|
| Annual average wind speed at hub height $V_{ave}$ : | 8.0 m/s  |
| Reference wind speed $V_{ref}$ :                    | 42.5 m/s |
| Mean flow inclination:                              | 8 deg    |
| Hub height 50-year extreme wind speed $V_{e50}$ :   | 59.5 m/s |



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**PROVISIONAL TYPE CERTIFICATE**

**Wind Turbine**

**Wind conditions IEC S (E-126 EP3-ST-86-FB-C-01):**

Characteristic turbulence intensity  $I_{ref}$  at  $V_{hub} = 15$  m/s,  
Annual average wind speed at hub height  $V_{ave}$  and Upflow:

|  | <b>Group A</b>           | <b>Group B</b>           | <b>Group C</b>           | <b>Group D</b>           |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| Wind speed [m/s]   | Effective turbulence [%] | Effective turbulence [%] | Effective turbulence [%] | Effective turbulence [%] |
| 3  | 38.80                    | 42.60                    | 42.60                    | 30.80                    |
| 5  | 26.60                    | 26.80                    | 27.60                    | 24.50                    |
| 7  | 24.70                    | 25.50                    | 24.60                    | 23.40                    |
| 9  | 22.90                    | 23.10                    | 21.70                    | 23.50                    |
| 11   | 19.30                    | 21.30                    | 20.40                    | 22.30                    |
| 13   | 17.00                    | 19.50                    | 18.10                    | 19.90                    |
| 15   | 15.30                    | 17.20                    | 14.90                    | 18.30                    |
| 17   | 14.50                    | 15.60                    | 14.40                    | 17.00                    |
| 19   | 13.60                    | 14.90                    | 13.70                    | 15.90                    |
| 21   | 13.90                    | 14.80                    | 13.20                    | 15.10                    |
| 23   | 14.10                    | 14.90                    | 13.70                    | 14.70                    |
| 25   | 13.30                    | 14.70                    | 12.50                    | 14.40                    |
| 27   | 12.20                    | 14.40                    | 12.10                    | 14.00                    |
| 29   | -                        | -                        | 12.20                    | -                        |
| Fitted annual average wind speed and shape parameter (Weibull) | 8.67 m/s, k = 1.6        | 8.45 m/s, k = 1.7        | 8.77 m/s, k = 1.7        | 7.95 m/s, k = 1.8        |
| Upflow   | -2.60°                   | -0.52°                   | -0.96°                   | -0.82°                   |

Reference wind speed  $V_{ref}$ : 42.5 m/s

Mean flow inclination: 8 deg

Hub height 50-year extreme wind speed  $V_{e50}$ : 59.5 m/s



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

|   |   |
|---|---|
| Normal and extreme temperature ranges:  | -10 °C - +40 °C (operational)<br>-20 °C - +50 °C (survival) |
| Relative humidity of the air:   | up to 95 %  |
| Air density:  | 1.225 kg/m <sup>3</sup>                                     |
| Solar radiation:  | 1000 W/m <sup>2</sup>                                       |
| Lightning protection system (standard and protection class):  | LPC 1   |
| 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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### **Wind Turbine**

#### **Major components:**

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

#### **Blade:**

|                                  |  |
|----------------------------------|--|
| Type:                            | Vacuum infusion  |
| Material:                        | E-glass fibre reinforced epoxy   |
| Blade length:                    | 61.8 m   |
| Manufacturer:                    | Rothenseer Rotorblattfertigung GmbH,<br>Magdeburg, Germany<br>TPI Komposit Kanat 2, Izmir, Turkey (this<br>site has to be reinspected as soon as the<br>first blades are manufactured) |
| Drawing / Data sheet / Part No.: | Designation: E-126 EP3-RB-05<br>Drawing No.: R1265.110.10000 Rev.0<br>Specification: D0664490-0 Rev.0  |

#### **Blade bearing:**

|                                  |   |
|----------------------------------|---|
| Type:                            | 2-row ball slewing ring   |
| Manufacturer:                    | Liebherr Components Biberach GmbH   |
| Drawing / Data sheet / Part No.: | Designation: 12588115<br>Drawing No.: KUD02800-055WJ18-001-<br>900 Rev.01.1 |



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### **Wind Turbine**

#### **Pitch System:**

|                                  |  |
|----------------------------------|--|
| Motor / Actuator Type:           | Rotary drives with pitch motor                                       |
| Motor / Actuator Manufacturer:   | Emod   |
| Motor / Actuator Designation:    | Emod GKFB132M/4-150  |
| Pitch Controller Type:           |  |
| Manufacturer:                    |  |
| Gear Type:                       | 3-stage planetary gearbox  |
| Manufacturer:                    | Liebherr Components Biberach GmbH                                    |
| Drawing / Data sheet / Part No.: | Designation: 12587200<br>Drawing No.: 368 445 2000 99 0,<br>Rev.02.3 |

#### **Main shaft (Axle Pin):**

|                                  |   |
|----------------------------------|---|
| Type:                            | Cast part   |
| Manufacturer:                    | Heger Guss GmbH, Enkenbach-<br>Alsenborn, Germany |
| Material:                        | EN-GJS-400-18-LT                                  |
| Drawing / Data sheet / Part No.: | Drawing No.: EP3.01.053-5 Rev.05                  |

#### **Rotor bearing:**

|                                  |   |
|----------------------------------|---|
| Type:                            | Tapered roller bearing in O arrangement   |
| Manufacturer:                    | PSL, a.s., Povazska Bystrica, Slovakia  |
| Drawing / Data sheet / Part No.: | Designation:<br>PSL612-415 (Hub side)<br>PSL612-416 (Generator side)<br>Drawing No.:<br>PSL612-415-PV_4 Rev.4 (Hub side)<br>PSL612-416-PV_5 Rev.5 (Generator<br>side) |



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### Wind Turbine

#### Yaw System:

*Drive Type:*

Active, yaw bearing slewing ring with 12  
active yaw drives and integrated motor  
brakes. 4 stage planetary gearbox  
Liebherr Components Biberach GmbH

Manufacturer:

Drawing / Data sheet / Part No.:

Designation: DAT 400/3446  
Drawing No.: 368 446 4000 99 00  
Rev.01.3

alternative:

Designation: DAT 400/2432-4000  
Drawing No.: 268 432 4000 99 2 Rev.0.3

*Bearing Type:*

2-row ball slewing ring

Manufacturer:

Liebherr Components Biberach GmbH

Drawing / Data sheet / Part No.:

Designation: 12587508  
Drawing No.: KUD03203-070WA18-001-  
900 Rev.01.3

*Brake Type:*

N/A

Manufacturer:

N/A

Drawing / Data sheet / Part No.:

N/A

#### Generator:

Type

synchronous

Manufacturer:

Windgeneratorenfertigung Magdeburg  
GmbH, Magdeburg, Germany

Drawing / Data sheet / Part No.:

Designation: E-126 EP3-GE-01

Rated Power:

4330 kW

Rated Frequency:

11.8 Hz

Rated Speed:

12.4 rpm

Rated Voltage:

4x 2Y x 530 V AC

Rated Current:

590 A

Insulation Class:

F

Degree of Protection:

IP23





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#### Converter:

Type:

Manufacturer:

Drawing / Data sheet / Part No.:

Designation: Leistungsschrank 300 kW

Article No.: 600600

Rated Voltage (grid side):

400 V AC

Rated Current (grid side):

475 A

Degree of Protection:

IP00 (installed IP20)

#### Transformer:

Type:

Oil-filled

Manufacturer:

J. Schneider Elektrotechnik

Drawing / Data sheet / Part No.:

Designation: HPNW 4500A-1802T10001

Rated Voltage:

20000 V (HV side)

400 V (LV side)

Rated Power:

4500 kVA

Degree of Protection:

IP00

Location:

tower base

#### Tower E-126 EP3-ST-86-FB-C-01:

Type:

Tubular steel tower

Manufacturer:

ENERCON GmbH

Sections:

5

Length:

81.3 m

Drawing / Data sheet / Part No.:

Drawing No.: D0596579-0 Rev.0

Foundation specification: D0685500-0b

Rev.0



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## **PROVISIONAL TYPE CERTIFICATE**

### **Wind Turbine**

#### **Tower E-126 EP3-HT-99-IS-C-01:**

|                                 |  |
|---------------------------------|--|
| Type:                           | Prestressed concrete tower with steel part                                     |
| Manufacturer:                   | ENERCON GmbH   |
| Sections:                       | several  |
| Length:                         | 96.69 m  |
| Drawing / Data sheet / Part No: | Drawing No.: D0692119-0 Rev.0<br>Foundation specification: D0674603-0<br>Rev.0 |

#### **Tower E-126 EP3-ST-116-FB-C-01:**

|                                  |  |
|----------------------------------|--|
| Type:                            | Tubular steel (series and strengthened)  |
| Manufacturer:                    | ENERCON GmbH   |
| Sections:                        | 7  |
| Length:                          | 111.18 m   |
| Drawing / Data sheet / Part No.: | Drawing No.: D0596596-2 Rev.2<br>Foundation specification: D0684184-0<br>Rev.0 |

#### **Manuals:**

|                                       |                                      |
|---------------------------------------|--------------------------------------|
| Operation & maintenance manual:       | 3135191889 Rev.0<br>D0665658-0 Rev.0 |
| Installation & commissioning. manual: | D0707840-Rev000                      |