Type Certificate*

Registration-No.	**44 220 19503696-TC-IEC, Rev. 0**
This Certificate is issued to	**ENERCON GmbH** Dreekamp 5 26605 Aurich Germany
For the wind turbine	**ENERCON E-115 EP3 E3**
WT Class	**Diverse IEC** **(Details see Annex)**

This Certificate attests compliance with the below cited standards concerning the Design, Testing and Manufacturing. It is based on the following reference documents:

44 220 19142915-TDB-IEC, Rev. 2	Design Basis Conformity Statement on the Wind Turbines ENERCON EP3, TÜV NORD, dated 2021-03-16
44 220 19503696-D-IEC, Rev. 3	Design Evaluation Conformity Statement on the Wind Turbine ENERCON E-115 EP3 E3, TÜV NORD, dated 2021-11-30
44 220 19142915-M-IEC, Rev. 7	Manufacturing Conformity Statement on the Wind Turbines ENERCON EP3, TÜV NORD, dated 2021-09-01
44 220 19503696-T-IEC, Rev. 0	Provisional Type Test Conformity Statement on the Wind Turbine ENERCON E-115 EP3 E3, TÜV NORD, dated 2021-11-30
8116 503 696-20 E, Rev. 0	Final Evaluation Report, TÜV NORD, dated 2021-11-30

Normative references:	**Certification scheme:** **IEC 61400-22 "Wind turbines - Part 22: Conformity testing and certification", Edition 1.0, 2010-05** in combination with: **IEC 61400-1 "Wind Turbines - Part 1: Design requirements", Third Edition, 2005-08 and Amendment 1, 2010-10**

The wind turbine type is specified on pages 3 - 17 of this Certificate.

This Certificate is provisional for configurations E-115 EP3 E3-ST-87-FB-C-01 and E-115 EP3 E3-ST-96-FB-C-02 due to the outstanding tower internals. For E-115 EP3 E3-ST-92-FB-C-02, the final generator cover drawings and documentation of the yaw power backup system shall be submitted and evaluated.
This provisional Certificate is valid until 2022-03-31.
Every wind turbine erected under the provisional Certificate shall be reported to TÜV NORD CERT GmbH.
All other configurations covered by this Certificate are not affected by the date of validity.

Any change in the design, the production and erection or the manufacturer's quality system has to be approved by TÜV NORD CERT GmbH. Without approval this Certificate loses its validity.

This Type Certificate is valid until: 2026-11-29 (First issue: 2021-11-30)
(under the condition of regular maintenance according to chapter 6.5.2 of IEC 61400-22)

TÜV NORD CERT GmbH
Certification Body
Wind Energy

Dipl.-Ing., Dr. M. Breschart

Deutsche Akkreditierungsstelle D-ZE-12007-01-02

Am TÜV 1 • 45307 Essen • email: windenergy@tuev-nord.de

Essen, 2021-11-30

Wind turbine type specification:

Machine parameters:

Model	ENERCON E-115 EP3 E3 (in configurations acc. to table 1)
Type	Horizontal axis direct drive wind turbine with variable rotor speed
Wind turbine manufacturer and country	ENERCON GmbH, Germany
Power regulation	Independent electromechanical pitch system for each blade
Rated power	From 500 kW to 4200 kW
Rotor diameter	115.710 m (prebend and coned)
Rotor orientation	Upwind
Number of rotor blades	3
Rotor tilt	7°
Cone angle	2.5°
Hub height(s)	67 m, 87 m, 92 m, 122 m, 135 m, 149 m
IEC WT class	Diverse, see table 1
Rated wind speed V_r	13.2 m/s
Rated rotational speed	12.9 rpm
Operating wind speed range V_{in} – V_{out}	2.5 to 34 m/s (with soft-cut-off above 25 m/s)
Operating range rotational speed n_1 – n_3	6 to 14.85 rpm for configurations 1 and 2 4.4 to 14.85 rpm for configurations 3 – 7
Design life time	25 years 20 or 25 years for configuration 7 depending on wind conditions (see table 3)
Lightning protection class	1
Safety system software version	V1.08

Table 1: Wind turbine configurations

No.	IEC class	Tower	Associated Tower Report
1	SA[1]	E-115 EP3 E3-ST-92-FB-C-01	8116 503 696-6 E I
2	IIA	E-115 EP3 E3-HT-135-ES-C-01	8116 503 696-6 E II
3	SA[2]	E-115 EP3 E3-ST-67-FB-C-01	3288891-1-e
4	IA	E-115 EP3 E3-ST-87-FB-C-01	3248103-1-e
5	SA[3]	E-115 EP3 E3-HST-122-FB-C-01	8116 503 696-6 E IV
6	SA[3]	E-115 EP3 E3-HST-149-FB-C-01	3293115-1-e
7	See table 3	E-115 EP3 E3-ST-92-FB-C-02	8116 503 696-6 E III

[1]SA (based on IA with reduced V_{ave} for tower/foundation fatigue loads), covering IIA
[2]SA (based on IA with reduced V_{ave}), covering IIA
[3]SA (based on IIA with reduced V_{ave}), covering IIIA

Table 2: Wind conditions for configuration 1 – 6

Config. No.	Annual average at HH V_{ave}	Reference wind speed V_{ref}	50-year extr. at HH V_{e50}	Char. turb. int. I_{15} at V_{hub} = 15 m/s	Mean flow inclination
1	9.1 m/s (*)	50 m/s	70 m/s	16 %	8 deg.
2	8.5 m/s	42.5 m/s	59.5 m/s		
3	8.8 m/s	50 m/s	70 m/s		
4	10.0 m/s	50 m/s	70 m/s		
5	7.8 m/s	42.5 m/s	59.5 m/s		
6	7.9 m/s	42.5 m/s	59.5 m/s		

(*) 9.1 m/s for tower and foundation fatigue loads, 10 m/s for blade and machinery fatigue loads

Table 3: Wind conditions for configuration 7 (Japan version, E-115 EP3 E3-ST-92-FB-C-02)

	IEC S (with load set-dependent wind and turbulence parameters)					
Load Set	**Z**	**A**	**B**	**C**	**D**	**E**
IEC class	IA	S[1]	S[2]	S	S	S
Annual average at HH, V_{ave}	10 m/s	8.5 m/s	7 m/s	n/a[3]		
Reference turb. intensity at V_{hub} = 15 m/s, I_{ref}	16 %	18 %	20 %			
Wind shear exponent, α	0.0* , 0.2 , 0.3*					
Wind shear exponent, α (for EWM)	0.11			0.15	0.35	0.20
Reference wind speed, V_{ref}	50 m/s			60.42 m/s	59.06 m/s	49.56 m/s
50-year extreme at HH, V_{e50}	70 m/s			89 m/s	87 m/s	73 m/s
Mean Flow Inclination	8 deg.					
Design Lifetime	25 years	20 years	20 years	25/20 years[4]		

[1] S (based on IA with reduced V_{ave} and increased I_{ref}), covering IIA

[2] S (based on IA with reduced V_{ave} and increased I_{ref})

[3] C, D, E: Turbines in idling mode, dedicated design load cases (6.1, 6.2, 6.3, 7.1) considered; for C and D a yaw system power backup is required.

[4] Lifetime depending on applied basic load configuration (Z, A or B)

* Turbines in production mode, values 0.0 and 0.3 for dedicated design load cases (1.1, 1.3, 1.5) considered; design load case 1.1 considers additionally fatigue calculation.

Electrical network conditions:

Normal supply voltage and range	20 kV and 30 kV (no range given)
Normal supply frequency and range	50/60 Hz (no range given)
Voltage imbalance	not defined
Maximum duration of electrical power network outages	not defined
Number of electrical network outages	20 per year

Other environmental conditions:

Normal Climate Conditions:

Operating temperature range*	-10 °C - +40 °C
Survival temperature range	-20 °C - +50 °C

*Note: An extended operating temperature range for unlimited operation down to -15 °C is verified. Between -15 to -25 °C linear power reduction up to 25%.

Cold Climate Conditions:

Operational temperature range**	-25 °C - +40 °C
Survival temperature range	-40 °C - +50 °C

**Note: Loads and components have been verified for operation down to -40 °C with linear power reduction starting at -30 °C up to 25% at -40 °C. Some electrical components are not yet qualified for the complete cold climate operational range.

Air densities:

Annual average	1.225 kg/m³
Max. operation	1.341 kg/m³
Max. survival	1.394 kg/m³
Relative humidity of the air	up to 95%
Solar radiation	1000 W/m^2
Earthquake model and parameters	See note at tower component.
Ice conditions	No ice on rotor blades considered, therefore ice detection system must be installed.

Major components:

Nacelle cover	Designed by:	ENERCON GmbH
	Main drawing no.:	D1003316-1, Rev.1
	Manufacturer/Site:	Fassmer GmbH & Co. KG, Berne, Germany
	alternative for turbine config.1 – 6:	
	Main drawing no.:	D0860520-0, Rev.0
Generator cover (rotor&stator)	Designed by:	ENERCON GmbH
	For turbine config. 1 – 6:	
	Main drawing no.:	D0860520-0, Rev.0
	Drawing no. (alternative stator cover):	D0938784-0, Rev.0
	Manufacturer/Site:	Fassmer GmbH & Co. KG, Berne, Germany
	For turbine config. 7 (provisional):	
	Main drawing no.:	D1018374-3, Rev.3
Manufacturing site for hub and nacelle assembly:		Rothenseer Anlagenbau GmbH, Magdeburg, Germany
Rotor blade	Designed by:	ENERCON GmbH
	Designation:	E-115 EP3-RB-03
	Manufacturer/Site:	Rothenseer Rotorblattfertigung GmbH and Groß Rotorblattfertigung GmbH, Magdeburg, Germany
	Material:	E-glass fibre reinforced epoxy
	Blade length:	56.22 m
	Number of blades:	3
	Overview drawing no.:	R1153.110.10000, Rev.1
	Specification:	D0801490-0c, Rev.0c
	Attachments:	Special blade tips, vortex generators (VG) and trailing edge serrations (TES).
Blade bearing	Type:	Triple row roller slewing ring
	Designed by:	Liebherr Components Biberach GmbH
	Manufacturer/Site:	Liebherr Components Biberach GmbH, Biberach, Germany
	Designation:	13401303
	Drawing no.:	ROD02994-032DJ18-002-000, Rev.01.1
	alternative (for turbine config.1 and 2):	
	Designed by:	Liebherr Components Biberach GmbH
	Designation:	12889944
	Drawing no.:	ROD02994-032DJ18-001-000, Rev.03.2
	Designation:	12889944
	Drawing no.:	ROD02994-032DJ18-001-000, Rev.03.2

	alternative (for turbine config.1 and 2):	
	Designed by:	IMO GmbH & Co. KG
	Manufacturer/Site:	IMO, Gremsdorf, Germany
	Designation:	32.362998/4-12874, Rev. A
	Note:	Min. operating temperature -30°C.
Pitch system	Type:	Electromechanical with one DC compound motor per blade.
	Motor manufacturer/designation:	EMOD GmbH / GKFB160L/4-220
Pitch drive	Type:	3-stage planetary gearbox
	Designed by:	Liebherr Components Biberach GmbH
	Manufacturer/Site:	Liebherr Components Biberach GmbH, Biberach, Germany
	Designation:	DAT 250/3457-3000 (article code: 1285 6338* / 1294 0474)
	Drawing no. (*):	368 447 2000 99 0, Rev.03
	Drawing no.:	368 447 2000 99 2, Rev.00
	alternative:	
	Designed by:	Bonfiglioli Trasmital
	Manufacturer/Site:	Bonfiglioli Trasmital, Forli, Italy
	Designation:	707 T3N (article code: JB00009063 / JB00013488*)
	Drawing no.:	I7070T003600, Rev.-, dated 2020-01-08
	Drawing no. (*):	I7070T04700, Rev.-, dated 2020-08-31 (cold climate version)
Pitch lock	Type:	Mechanical locking device
	Designed/manufactured by:	ENERCON GmbH
	Drawing no.:	EP3.99.055-0, Rev.0
	Application note:	Min. operating temperature -20 °C
Hub	Type:	Cast part
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	* see below
	Designation:	Rotor hub EP3-ROH-08
	Material:	EN-GJS-400-18-LT
	Drawing no.:	EP3.01.138-0, Rev.0

Rotor bearing	Type:	Tapered roller bearing in O arrangement
	Designed by:	PSL, a.s. (ThyssenKrupp)
	Manufacturer/Site:	PSL Považská Bystrica, Slovakia
	Designation:	
	Hub side:	PSL612-415
	Generator side:	PSL612-416
	Drawing no.:	
	Hub side:	PSL612-415-PV_4, Rev.4
	Generator side:	PSL612-416-PV_5, Rev.5
	alternative:	
	Designed by:	SKF GmbH
	Manufacturer/Site:	SKF GmbH, Schweinfurt, Germany
	Designation:	
	Hub side:	BT1-8212 A/VK443
	Generator side:	BT1-8213 A/VK443
	Drawing no.:	
	Hub side:	BT1-8212 A/VK443, Rev.1
	Generator side:	BT1-8213 A/VK443, Rev.1
	alternative (for turbine config.1 and 2):	
	Designed by:	FAG Schaeffler Technologies AG & Co. KG
	Manufacturer/Site:	FAG Schaeffler Technologies, Schweinfurt, Germany
	Designation:	
	Hub side:	F-627880.TR1-WPOS-H113
	Generator side:	F-627881.TR1-WPOS-H113
	Drawing no.:	
	Hub side:	EDD F-627880.TR1-WPOS 000, Rev. AB
	Generator side:	EDD F-627881.TR1-WPOS 000, Rev. AB
Rotor support	Type:	Cast part
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	* see below
	Material:	EN-GJS-400-18-LT
	Drawing no.:	EP3.01.105-4, Rev.4
Axle pin	Type:	Cast part
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	* see below
	Material:	EN-GJS-400-18-LT
	Drawing no.:	EP3.01.097-0, Rev.0

Axle cap	Type:	Steel part
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	* see below
	Material:	C45 (DIN EN 10083)
	Drawing no.:	EP3.01.059-3, Rev.3
Rotor brake	Type:	Active, hydraulic disc brake
	Designed/manufactured by:	KTR Brake Systems GmbH
	Manufacturer/Site:	KTR, Schloß Holte-Stuckenbock, Germany
	Designation:	KTR-STOP YAW L C-70
	Quantity of calipers:	3
	Drawing no.:	M 802402, Rev.2
Rotor lock	Type:	Hole disc rotor lock with 3 pins
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	Hilgenberg GmbH, Essen, Germany (production at H.Honert jr. oHG, Balve, Germany)
	Drawing no. locking bolt:	EP3.09.198-2, Rev.2
	Application note:	Min. operating temperature -30 °C
Main carrier	Type:	Cast part
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	* see below
	Designation:	Main carrier EP3-MC-06
	Material:	EN-GJS-400-18-LT
	Drawing no.:	EP3.03.880-3, Rev.3
Generator stator	Type:	Casted and steel structure
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	* see below
	Material:	EN-GJS-400-18-LT / S355 J2+N
	Drawing no. support star half:	EP3.02.829-1, Rev.1
	Drawing no. support star half:	EP3.02.830-1, Rev.1
	Drawing no. support 2 o'clock:	EP3.02.1114-1, Rev.1
	Drawing no. support 4 o'clock:	EP3.02.1118-1, Rev.1
	Drawing no. support 6 o'clock:	EP3.02.1119-1, Rev.1
	Drawing no support 8 o'clock:	EP3.02.1120-1, Rev.1
	Drawing no. support 10 o'clock:	EP3.02.1121-1, Rev.1
	Drawing no. support 12 o'clock:	EP3.02.1108-1, Rev.1
	Drawing no. stator ring P1:	EP3.02.1006-0, Rev.0
	Drawing no. stator ring P2:	EP3.02.1011-0, Rev.0

Generator rotor	Type:	Welded part
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	Rothenseer Anlagenbau GmbH, Magdeburg, Germany
	Designation:	Rotor 780.6356
	Material:	S355 J2+N (DIN EN 10025)
	Drawing no. rotor middle part:	EP3.02.1008-5, Rev.5
	Drawing no. rotor side part:	EP3.02.1009-5, Rev.5
	Drawing no. rotor side part:	EP3.02.1010-5, Rev.5
Manufacturer/Site of above (*) cast components:		(1) Heger Guss GmbH, Enkenbach-Alsenborn, Germany (2) Heger Ferrit GmbH, Sembach, Germany (3) GZO Gusszentrum Ostfriesland GmbH, Südbrookmerland, Germany
Yaw system	Type:	Active, yaw bearing slewing ring with 12 active yaw drives and integrated motor brakes.
	Application note:	For configuration 7, a yaw power backup system is required that fulfills the evaluated ENERCON specification document no. D0993727-0, Rev. 0.
Yaw drive	Type:	4 stage planetary gearbox
	Designed by:	Liebherr Components Biberach GmbH
	Manufacturer/Site:	Liebherr Components Biberach GmbH, Biberach, Germany
	Designation:	DAT 400/3446 (article code: 1258 8010* / 1287 9245)
	Drawing no. (*):	368 446 4000 99 0, Rev.03.8
	Drawing no.:	368 446 4000 99 1, Rev.01.2
	Yaw motor manufacturer/designation:	Getriebebau NORD / SK112MH/4 BRE60 PT1000 (yaw motor applicable for min. operating temperature -25°C)
	alternative:	
	Designed by:	Bonfiglioli Trasmital
	Manufacturer/Site:	Bonfiglioli Trasmital, Forli, Italy
	Designation:	711 T4F (article code: 2T100142860)
	Drawing no.:	I7110T003400, Rev. B
	Yaw motor manufacturer/designation:	Getriebebau NORD / SK112MH/4 BRE60 PT1000 (yaw motor applicable for min. operating temperature -25°C; yaw gear for min. -30°C)

Yaw bearing	Type:	Double row ball slewing ring
	Application for turbine config. 1 – 6	
	Designed by:	Liebherr Components Biberach GmbH
	Manufacturer/Site:	Liebherr Components Biberach GmbH, Biberach, Germany
	Designation:	13401289
	Drawing no.:	KUD03203-070WA18-003-000, Rev.01.1
	Application for turbine config. 7	
	Designed by:	Liebherr Components Biberach GmbH
	Designation:	13442808
	Drawing no.:	KUD03203-070WA18-004-000, Rev.00.7
	alternative (for turbine config. 1 – 6*):*	
	Designed by:	Thyssenkrupp Rothe Erde GmbH
	Manufacturer/Site:	Thyssenkrupp Rothe Erde GmbH, Lippstadt, Germany
	Designation:	36974980
	Drawing no.:	091.70.3202.020.48.150D, Rev. A
	Application for turbine config. 7	
	Designation:	37007970
	Drawing no.:	091.70.3202.030.48.150D, Rev. B
	alternative (for turbine config. 1 – 6*):*	
	Designed by:	TMB Tianma (Chengu) Precision Machinery Co., Ltd.
	Manufacturer/Site:	TMB Tianma (Chengu) Precision Machinery Co., Ltd., Chengdu, China
	Designation:	Y031.69.3212K
	Drawing no.:	Y031.69.3212K, Rev. 1
	alternative (for turbine config.1 and 2):	
	Designed by:	Thyssenkrupp Rothe Erde GmbH
	Manufacturer/Site:	See above
	Designation:	36887260
	Drawing no.:	091.70.3202.011.48.150D, Rev. A
	alternative (for turbine config.1 and 2):	
	Designed by:	Liebherr Components Biberach GmbH
	Manufacturer/Site:	See above
	Designation:	12587508
	Drawing no.:	KUD03203-070WA18-001-900, Rev.02.3
Yaw lock / brake	Function achieved by the motor brakes of the yaw drives.	

Hydraulic system	Designed by:	HAWE Hydraulik SE (formerly Hörbiger Automatisierungstechnik GmbH)
	Manufacturer/Site:	HAWE Hydraulik SE, Freising, Germany
	Designation:	HB14122-601A
	Hydraulic diagram no.:	HB14122-601A, Rev. -, dated 2018-05-23
	Note:	Application with rotor lock for min. operating temperature -30°C.
Generator	Type:	Synchronous, high-pole
	Designed by:	ENERCON GmbH
	Manufacturer:	(1) Windgeneratorenfertigung Magdeburg GmbH, Magdeburg, Germany (2) ATEŞ ÇELİK İNŞAAT TAAH. PROJE MÜHENDİSLİK SAN. VE TİC. A.Ş., Bergama/Izmir, Turkey (3) GPO Generator Produkcja Opole Sp.zo.o., Opole, Poland
	Designation:	E-115 EP3-GE-01
	Rated power:	4675 kW (@ cos_phi=0.85)
	Rated frequency:	11.8 Hz
	Rated speed:	12.9 rpm
	Rated voltage:	4 x 2Y x 780 V (AC)
	Rated current:	600 A
	Insulation class:	F
	Degree of protection:	IP23
	Note:	Installation height of 1000 m m.s.l. considered.
Converter	Type:	Liquid cooled, 4-Q-converter system
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	Elektric Schaltanlagenfertigung GmbH, Aurich, Germany
	Designation:	Cabinet power - B2B V2 (article no. 676555, 716670)
	Rated power (grid side):	365 kVA
	Rated frequency:	50 / 60 Hz ± 7 Hz
	Rated voltage (machine side):	740 V (AC)
	Rated current (machine side):	335 A
	Rated voltage (grid side):	630 v
	Rated current (grid side):	335 A
	Degree of protection:	IP01 (installed IP21)
	Note:	Installation height of 1000 m m.s.l. considered.

Transformer	Type:	Oil-filled
	Designed by:	J. Schneider Elektrotechnik GmbH
	Manufacturer/Site:	J. Schneider Elektrotechnik GmbH, Offenburg, Germany
	Designation:	HPNW 4500A-1802T10001 / HPNW 5000A
	Rated power:	4500 kVA / 5000 kVA
	Rated voltage (HV-side):	20 kV / 30 kV
	Rated voltage (LV-side):	400 V / 630 V
	Degree of protection:	IP00
	Location:	Tower base (enclosed in the E-Module)
	Note:	Project specific transformers can be installed that fulfill the ENERCON specifications, see Evaluation Report 8116 503 696-5 E; installation height of 1000 m m.s.l. considered.
Medium voltage switchgear	Designed by:	Driescher KG
	Manufacturer/Site:	Driescher KG, Wegberg, Germany
	Designation:	Minex ABS® zero 12-24 kV
	Rated frequency:	50/60 Hz
	Rated voltage:	12 kV | 17.5 kV | 24 kV
	Rated current:	630 A
	Location:	Tower base (enclosed in the E-Module)
	Note:	Project specific switchgears can be installed that fulfill the ENERCON specification, see Evaluation Report 8116 503 696-5 E; installation height of 1000 m m.s.l. considered.
Tower HH 67 m	Type:	Tubular steel tower
	Designation:	E-115 EP3 E3-ST-67-FB-C-01
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	ATEŞ ÇELIK INŞAAT TAAHHÜT PROJE MÜH. SAN. CE, TIC A.Ş., Bergama/Izmir, Turkey
	Sections:	3
	Length:	64.829 m
	Main drawing no.:	D02109655-0, Rev.0
	Tower top flange drawing no.:	115.03.003-4, Rev.4
	Foundation specification:	D0933584-4a, Rev.4a
	Foundation connection:	T-base flange and anchor cage (included in evaluation)
	Drawing no., anchor cage:	D02110569/2.0-de.en, Rev.2.0
	Earthquake model and parameters:	Considered, for details and parameters see tower Evaluation Report.

Tower (provisional) **HH 87 m**	Type:	Tubular steel tower
	Designation:	E-115 EP3 E3-ST-87-FB-C-01
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	ATEŞ ÇELIK INŞAAT TAAHHÜT PROJE MÜH. SAN. CE, TIC A.Ş., Bergama/Izmir, Turkey
	Sections:	4
	Length:	81.955 m
	Main drawing no.:	D02013965, Rev.1.0
	Tower top flange drawing no.:	115.03.003-4, Rev.4
	Foundation specification:	D0872934-1, Rev.1
	Foundation connection:	T-base flange and anchor cage (included in evaluation)
	Drawing no., anchor cage:	D02038913/0, Rev.1.0
	Earthquake model and parameters:	Considered for seismic zone 3 acc. to DIN EN 1998-1/NA with all soil classes for site conditions in Germany.
Tower **HH 92 m**	Type:	Tubular steel tower
	Designation:	E-115 EP3 E3-ST-92-FB-C-01
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	ATEŞ ÇELIK INŞAAT TAAHHÜT PROJE MÜH. SAN. CE, TIC A.Ş., Bergama/Izmir, Turkey
	Sections:	4
	Length:	88.975 m
	Main drawing no.:	D0847518-0, Rev.0
	Tower top flange drawing no.:	115.03.003-1, Rev.1
	Foundation specification:	D0825372-4, Rev.4
	Foundation connection:	T-base flange and anchor cage (included in evaluation)
	Drawing no., anchor cage:	EP3.13.123-2, Rev.2
	Earthquake model and parameters:	Not considered.
Tower (provisional) **HH 92 m (Japan)**	Type:	Tubular steel tower
	Designation:	E-115 EP3 E3-ST-92-FB-C-02
	Designed by:	L&T Technology Services Ltd. and H+P Ingenieure GmbH & Co. KG (for ENERCON GmbH)
	Manufacturer/Site:	ATEŞ ÇELIK INŞAAT TAAHHÜT PROJE MÜH. SAN. CE, TIC A.Ş., Bergama/Izmir, Turkey
	Sections:	6
	Length:	87.405 m

	Main drawing no.:	D1024604-2.1, Rev.2.1
	Tower top flange drawing no.:	EP3.05.005-0, Rev.0
	Foundation specification:	D0852531-3.2, Rev.3.2
	Foundation connection:	T-base flange and anchor cage (included in evaluation)
	Drawing no., anchor cage:	EP3.13.350-3, Rev.3
	Earthquake model and parameters:	Not considered.
Tower HH 122 m	Type:	Tubular steel tower
	Designation:	E-115 EP3 E3-HST-122-FB-C-01
	Designed by:	H+P Ingenieure GmbH & Co. KG (for ENERCON GmbH)
	Manufacturer/Site:	(1) SAM Stahlturm- & Apparatebau Magdeburg GmbH, Magdeburg,Germany (2) ATEŞ ÇELIK INŞAAT TAAHHÜT PROJE MÜH. SAN. CE, TIC A.Ş., Bergama/Izmir, Turkey
	Sections:	8
	Length:	117.266 m
	Main drawing no.:	D0988631-1, Rev.1
	Tower top flange drawing no.:	115.03.003-4, Rev.4
	Foundation specification:	D0887269-5.1, Rev.5.1
	Foundation connection:	T-base flange and anchor cage (included in evaluation)
	Drawing no., anchor cage:	D0993199-1, Rev.1
	Earthquake model and parameters:	Considered for seismic zone 3 and site type C-T and C-R acc. to DIN EN 1998-1/NA.
Tower HH 135 m	Type:	Hybrid tower (precast concrete / steel)
	Designation:	E-115 EP3 E3-HT-135-ES-C-01
	Designed by:	H+P Ingenieure GmbH & Co. KG (for ENERCON GmbH)
	Manufacturer/Site (concrete):	WEC Turmbau Emden GmbH, Emden, Germany
	Manufacturer/Site (steel):	SAM Stahlturm- & Apparatebau Magdeburg GmbH, Magdeburg, Germany
	Sections:	Several concrete and 3 steel sections
	Length:	130.635 m
	Main drawing no. (incl. concrete):	D0836461-4, Rev.4
	Drawing no. (steel)	D0837179-2, Rev.2
	Drawing no. (steel)	D0837229-1, Rev.1
	Drawing no. (steel)	D0691929-5, Rev.5
	Prestressing manuals:	D0865033-1, Rev.1 D0392329-4, Rev.4

	Tower top flange drawing no.:	115.03.003-4, Rev.4
	Foundation loads:	D0862298-1, Rev.1
	Foundation connection:	The prestressing system including tendons and anchors are evaluated with the tower; the concrete foundation corbel and the grout under the tower wall are considered with the foundation.
	Earthquake model and parameters:	Calculation for seismic zone 3 and soil class C-T covers all seismic zones and soil classes acc. to DIN EN 1998-1/NA.
Tower **HH 149 m**	Type:	Tubular steel tower
	Designation:	E-115 EP3 E3-HST-149-FB-C-01
	Designed by:	ENERCON GmbH
	Manufacturer/Site:	SAM Stahlturm- & Apparatebau Magdeburg GmbH, Magdeburg,Germany
	Sections:	10
	Length:	144.375 m
	Main drawing no.:	D0980840-1, Rev.1
	Tower top flange drawing no.:	115.03.003-4, Rev.4
	Foundation specification:	D0907419-3, Rev.3
	Foundation connection:	T-base flange and anchor cage (included in evaluation)
	Drawing no., anchor cage:	EP3.13.231-1, Rev.1
	Earthquake model and parameters:	Considered for seismic zone 3 with all soil classes for site conditions in Germany acc. to DIN EN 1998-1/NA.
	Note:	Before turbines of the configuration E-115 EP3 E3-HST-149-FB-C-01 are set into operation, test validation reports of the HRC-bolts shall be verified by an accredited Certification Body as per design evaluation report 3293115-1-e, referenced to in the Design Evaluation Conformity Statement.

Manuals	Operating manual:	D0876392-1, Rev.1
	Maintenance manual:	D0948248-1, Rev.1
	Installation manuals:	TD-esc-08-de-de-19-051 Rev000, Rev.0 (Nacelle) TD-esc-08-de-de-16-015 Rev003b, Rev.3b (Steel tower and E-module) TD-esc-08-de-de-15-001 Rev013, Rev.13 (Hybrid tower) TD-esc-08-de-de-21-079 Rev000, Rev.0 (Hybrid-steel tower, HST)
	Commissioning manuals:	D0859071-1, Rev.1 (mechanical) D0858931-Rev000, Rev.0 (electrical)
	Transportation manual:	PLM-TES-DC032-VH_E-115E3_E-126_E-138E1E2_EP3-Rev001de-de, Rev.1
Control and safety system	Designed by:	ENERCON GmbH
	Designation safety system:	EP-SCS-02 (safety system) EP3-CS-02 (control system)
	Document no.:	D0830549-0a / DB, Rev.0a
	Controller:	Bachmann MX220/CF

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