

Data Sheet

ENERCON Wind Energy Converters

E-82 E4 / 2350 kW- WK IIA

General Design Conditions

Legal information and document details

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1 Introduction

This document lists the main design parameters for the E-82 E4 / 2350 kW wind energy converter based on the applicable official standards. In addition, it lays out the main requirements for potential installation sites with respect to the structural stability of the wind energy converter.

The parameters and values listed in this document do not make any statements with respect to the general or site-specific power performance and/or noise emissions of the wind energy converter. This information is available in separate documentation.

2 Technical specifications of wind energy converter

Tower variants		
Hub height	59 m	69 m
Design	Steel tower	

Parameter	Value	Unit
Nominal active power	2350	kW
Cut-in wind speed	2.5	m/s
Rated wind speed (simulated value, power-optimised operation)	13.9	m/s
Begin of storm control ¹ (12-second mean)	28	m/s
Cut-out wind speed ² (10-minute mean)	34	m/s
Minimum operating speed ³	5	rpm
Set rotational speed ⁴	18	rpm
Design lifetime	25	years

¹ Further information concerning the ENERCON storm control feature is available in the following document: "Technical description storm control" (D0191665).

² With activated storm control.

³ Rotational speed at which power feed starts.

⁴ Rotational speed set by the control system during full load operation. Is slightly greater than the rated speed at which nominal power is first achieved. This ensures that, in the event of brief negative fluctuations of the wind speed, the rotational speed does not drop below the speed range required for achieving nominal power. With gusty winds, the rotational speed can briefly exceed the rotational speed setpoint.

3 Wind energy converter design

3.1 Certified design requirements

The E-82 E4 / 2350 kW has been certified for the following design requirements laid out in standard IEC 61400-1 [2] (3rd Edition). These design requirements must be taken into account for the intended installation site.

Parameter	Value	
IEC Wind class (3rd Edition)	IIA	
Extreme wind speed at hub height (10-min. mean)	42.5 m/s	
	Corresponds to a load equivalent of approx. 59.5 m/s (3-sec. gust)	
Annual average wind speed at hub height	8.5 m/s	
Turbulence intensity	Wind speed at hub height	Turbulence intensity
	2	56.80 %
	4	34.40 %
	6	26.93 %
	8	23.20 %
	10	20.96 %
	12	19.47 %
	14	18.40 %
	16	17.60 %
	18	16.98 %
	20	16.48 %
	22	16.07 %
	24	15.73 %
	26	15.45 %
	28	15.20 %
	30	14.99 %
32	14.80 %	
34	14.64 %	
Wind shear	0.0 to 0.4	
Vertical wind flow	8°	
Normal temperature range	-10 °C to +40 °C	
Extreme temperature range	-20 °C to +50 °C	
Relative air humidity	≤ 95 %	

Parameter	Value
Maximum solar irradiance	1000 W/m ²
Standard air density	1.225 kg/m ³

The load calculations (normal and extreme loads) include a safety factor with corresponds to the load case group. As ENERCON wind energy converters are equipped with sensors that detect any rotor blade imbalance and stop the WEC if necessary, it is not necessary to account for unsymmetrical icing (different amounts of ice on the blades).

3.2 Other site requirements

Parameter	Value
Space of wind energy converters within wind farm ¹	≥ 5 rotor diameter in main wind direction
	≥ 3 rotor diameter in less significant wind directions
Maximum elevation above sea level ²	800 m
Survival temperature ³	-40 °C
Site acc. to corrosion protection class	Steel tower, outside: C5-I/M (acc. to EN 12944-2 [1])
	All interior components not directly exposed to the weather: comparable C3 „long“ (acc. to EN 12944-2 [1])

¹ These specifications must be considered general reference values. The wake effect must be assessed for each individual project.

² Sites at higher elevations are typically also feasible; however, a project-specific assessment is required.

³ For situations with limited stress.

3.3 Application of modified design parameters

The site conditions specified in this document are general reference values. It is also possible to install and operate the E-82 E4 / 2350 kW at sites where conditions are different. However, this requires additional project-specific assessments.

The E-82 E4 / 2350 kW is equipped with an internal closed-loop control system consisting of various monitoring sensors and mechanisms (e.g. sensors for temperature, vibration, oscillation, and loads). If the E-82 E4 / 2350 kW close-loop control system recognises that the conditions at the site are outside the acceptable range, the main control system of the wind energy converter automatically takes the appropriate protective measures (e.g. transition to a reduced-power operating mode, or stopping operation).

List of references

- [1] EN 12944-2: DIN EN ISO 12944-2:1998-07. Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 2: Classification of environments (ISO 12944-2:1998); German version EN ISO 12944-2:1998
- [2] IEC 61400-1:2005+A1:2010: Wind turbines- Part 1: Design requirements