

# MASTER MAINTENANCE

### Wind energy converter master data

Serial number	921	WEC	E-92
Project number	S-07925	Control system type	CS8
Site	Dizy-		

### Details on order

Order type	MASTER MAINTENANCE
Order number	9912
Final date of order completion	Dec 8, 2023
Completion date of report	Dec 6, 2023
Inspection lot number	94000351
Document number	D084 6.0
Nominated person in control of the electrical installation during work activities	
Nominated person in control of the work activity	
Performing team	Team1 ESG FR
Performing company	ESG Energy Service Group Sarl

### Inspection checklist

#### Summary of the test results

Free of defects	196	With defects	20	Total	216
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#### Details

No.	Check item	Result
<b>Electrical system – Tower base</b>		
1	Check tower base warning systems	1 Done - No defects
2	Check software level	2 Done - Defects detected
3	Check access control	3 Not done - Not necessary
4	Testing ice detection system	1 Done - No defects
5	Check function of Labkotec ice detection system	3 Not done - Not necessary

No.	Check item	Result
6	Measuring blade heating system currents on tower base	3 Not done - Not necessary
7	Checking smoke detection system	3 Not done - Not necessary
<b>Electrics - External transformer station</b>		
8	Check cooling system of external transformer station transformer	3 Not done - Not necessary
9	Check external transformer station transformer room	3 Not done - Not necessary
10	Check ENERCON transformer protection on external transformer station	3 Not done - Not necessary
11	Perform visual inspection of transformer in external transformer station	3 Not done - Not necessary
12	Take oil sample from external transformer station	3 Not done - Not necessary
13	Check external transformer station's mediumvoltage switchgear	3 Not done - Not necessary
14	Check HV HRC fuse on external transformer station	3 Not done - Not necessary
15	Checking torques on low-voltage distribution system external station	3 Not done - Not necessary
16	Check external transformer station's low-voltage distribution system	3 Not done - Not necessary
17	Check external transformer station basement	3 Not done - Not necessary
<b>Electrics - WEC medium voltage area</b>		
18	Checking the ENERCON transformer protection system	1 Done - No defects
19	Checking the smoke detectors in the transformer room	3 Not done - Not necessary
20	Checking the transformer room	1 Done - No defects
21	Visually inspect the transformer	1 Done - No defects
22	Taking and oil sample	3 Not done - Not necessary
23	Checking medium-voltage switchgear	1 Done - No defects
24	Checking HV HRC fuses	3 Not done - Not necessary
25	Checking torques on low-voltage distribution system	3 Not done - Not necessary
26	Checking the low-voltage distribution system	1 Done - No defects
27	First inspection of tensioning basement	3 Not done - Not necessary
28	Checking the foundation basement	1 Done - No defects
29	Checking AC busbar system V3	1 Done - No defects
<b>Electrical system – Tower base</b>		
30	Checking fan housing air filter	3 Not done - Not necessary
31	Check the tower base earthing system	1 Done - No defects
32	Check tower base electrical cabinets	1 Done - No defects

No.	Check item	Result
33	Check electrical cabinet overvoltage limitation on tower base	1 Done - No defects
34	Checking DC distribution system	1 Done - No defects
35	Checking the SCADA interface backup battery	1 Done - No defects
<b>Electrics - External transformer station</b>		
36	Check RCD and lighting on external transformer station	3 Not done - Not necessary
<b>Electrical system – Tower base</b>		
37	Checking the tower cooling system	1 Done - No defects
38	Checking the UPS	1 Done - No defects
39	Check RCD and emergency lights in tower base	2 Done - Defects detected
40	Checking upstream RCD	1 Done - No defects
41	Checking the LV earth fault detection system current sensor	1 Done - No defects
42	Checking the RCD and emergency lighting system for the service hoist	1 Done - No defects
<b>Electrics - Tower</b>		
43	Checking and measuring the flexible power cables	1 Done - No defects
<b>Measured values for item 43</b>		
	reduction factor fR	0.98
<b>Electrical system – Machine house</b>		
44	Check warning systems for nacelle	1 Done - No defects
45	Checking the horns	1 Done - No defects
46	Checking the telephone connection	1 Done - No defects
47	Performing an electrical test for the nacelle crane	1 Done - No defects
48	Check RCD and emergency lights on machine house	1 Done - No defects
49	Checking the yaw drives	1 Done - No defects
50	Checking smoke detector in machine house	1 Done - No defects
51	Check earthing system on machine house	1 Done - No defects
52	Check electrical cabinets on machine house	1 Done - No defects
53	Checking generator filter cabinet	1 Done - No defects
54	Check electrical cabinet overvoltage limitation on machine house	1 Done - No defects
55	Check torque monitoring system on machine house	1 Done - No defects
<b>Electrics - Rotor head</b>		
56	Check earthing system on rotor head	1 Done - No defects
57	Check rotor head electrical cabinets	2 Done - Defects detected
58	Checking the pitch transformer box	1 Done - No defects

No.	Check item	Result
59	Check electrical cabinet overvoltage limitation on rotor head	1 Done - No defects
60	Check RCD and emergency lights in rotor head	1 Done - No defects
61	Checking the Cobham slip ring unit and Label slip ring unit	3 Not done - Not necessary
62	Checking the ENERCON slip ring unit	1 Done - No defects
63	Checking the bearing seal on the ENERCON	2 Done - Defects detected
64	Checking the torque support and drive mechanism	1 Done - No defects
65	Checking the generator	1 Done - No defects
66	Checking rotor monitoring system	1 Done - No defects
67	Checking rotor head noise sensor	1 Done - No defects
68	Checking the air gap switch	1 Done - No defects
69	Checking rotor blade A's limit switch	1 Done - No defects
70	Checking rotor blade B's limit switch	1 Done - No defects
71	Checking rotor blade C's limit switch	1 Done - No defects
72	Checking the rotor head discharge box	1 Done - No defects
73	Checking discharge box of rotor blade A	1 Done - No defects
74	Checking discharge box of rotor blade B	1 Done - No defects
75	Checking discharge box of rotor blade C	1 Done - No defects
76	Checking blade heating, rotor blade A	3 Not done - Not necessary
77	Checking blade heating, rotor blade B	3 Not done - Not necessary
78	Checking blade heating, rotor blade C	3 Not done - Not necessary
<b>Electrical - components outside nacelle</b>		
79	Check precipitation sensor	1 Done - No defects
<b>Electrical system – Machine house</b>		
80	Checking the rectifier earth fault monitoring system	1 Done - No defects
81	Checking generator residual current monitoring	1 Done - No defects
<b>Electrical system – emergency shutdowns</b>		
82	Checking the nacelle control cabinet EMERGENCY STOP buttons	1 Done - No defects
83	Testing the control cabinet EMERGENCY STOP button	1 Done - No defects
84	Testing the tower entrance door EMERGENCY STOP button	1 Done - No defects
85	Testing the E-module EMERGENCY STOP button	1 Done - No defects
86	Checking the main safety circuit relay K4 emergency shutdown	1 Done - No defects
87	Checking emergency shutdown MSC relay K3	1 Done - No defects

No.	Check item	Result
88	Checking the rotor lock emergency shutdown	1 Done - No defects
89	Checking the vibration sensor emergency shutdown	1 Done - No defects
<b>Electrical system – Machine house</b>		
90	Check resistances in the heating element of the blade heating system	3 Not done - Not necessary
<b>Electrics-country-specif. maint. items</b>		
91	Check low-voltage distribution system terminal lugs annually	3 Not done - Not necessary
92	Stopping the WEC	1 Done - No defects
<b>Electrical system – Finishing steps</b>		
93	Resetting warning messages and parameters	1 Done - No defects
<b>Mechanical - Tower base</b>		
94	Checking foundation	1 Done - No defects
95	Checking bolt connections on bolt cage with load ring	3 Not done - Not necessary
96	Checking fire extinguisher in tower base	2 Done - Defects detected
97	Visual inspection of tower base	2 Done - Defects detected
<b>Mechanical - Tower</b>		
98	Checking the tower anchorage points	1 Done - No defects
99	Checking the tower ventilation system	1 Done - No defects
100	Checking the tower bolt connections	1 Done - No defects
101	Checking the concrete tower	1 Done - No defects
102	Checking the prestressing system	1 Done - No defects
103	Checking steel tower	3 Not done - Not necessary
104	Checking steel section	1 Done - No defects
105	Visually inspecting the tower	1 Done - No defects
<b>Mechanical - Safety ladder</b>		
106	Checking the safety ladder stickers	1 Done - No defects
107	Checking the start and end of the climbing path of the safety ladder	1 Done - No defects
108	Checking the C-profile and fall arrest noses on the safety ladder	1 Done - No defects
109	Checking the mounting of the safety ladder	1 Done - No defects
110	Checking the rungs of the safety ladder	1 Done - No defects
111	Checking gap widths on ladder sections	2 Done - Defects detected
112	Visually inspecting safety ladder	1 Done - No defects
<b>Measured values for item 112</b>		
	manufacturer / type safety ladder	LMB (SCS) - Tr280

No.	Check item	Result
113	Checking the safety catches of the safety ladder	1 Done - No defects
114	Checking the lateral rail exits of the safety ladder	1 Done - No defects
115	Checking the small rest platforms of the safety ladder	1 Done - No defects
116	Checking the safety ladder fasteners	1 Done - No defects
117	Performing a test climb of the safety ladder	1 Done - No defects
118	Checking the 'Next Check' inspection label on the safety ladder	2 Done - Defects detected
<b>Mechanical - Service hoist</b>		
119	Checking the completeness of document pouch on service hoist	1 Done - No defects
	<b>Measured values for item 119</b>	
	next (third-party) inspection - month	5
	next (third-party) inspection - year	2024
120	Checking safety signs on service hoist	1 Done - No defects
	<b>Measured values for item 120</b>	
	Service hoist type	ENERCON EL1 V2.0
	serial number service hoist	10-7553
121	Checking the hoist cage of the service hoist	2 Done - Defects detected
	<b>Measured values for item 121</b>	
	Opening dimension of door profile, measuring point 1	1 mm
	Opening dimension of door profile, measuring point 2	2 mm
	Opening dimension of door profile, measuring point 3	3 mm
	Opening dimension of door profile, measuring point 4	3 mm
122	Checking anchorage points on service hoist	1 Done - No defects
123	Checking the wire rope guides on service hoist	1 Done - No defects
124	Checking the key-operated switch in the lift cage	1 Done - No defects
125	Checking the safety guard and cable pulley in the lift cage	1 Done - No defects
126	Checking the hoist cage crossbeam of the service hoist	1 Done - No defects
127	Checking the door safety switches on service hoist	1 Done - No defects
128	Checking the top end-of-travel system in the parked position	1 Done - No defects
129	Checking the service hoist floor cut-off switch	1 Done - No defects
130	Checking the service hoist outside sensor in the parked position	1 Done - No defects
131	Checking the service hoist emergency stop button	1 Done - No defects
132	Checking the service hoist emergency control unit	1 Done - No defects
133	Checking the hoist cable and safety cable at the hoist touchdown platform	1 Done - No defects
134	Checking the cable fasteners with landing box	1 Done - No defects

No.	Check item	Result
135	Checking the tension of guide ropes on service hoist	1 Done - No defects
136	Checking the indicator lights on service hoist	1 Done - No defects
137	Checking service hoist winch	1 Done - No defects
<b>Measured values for item 137</b>		
	Operating hours	14 h
	YOM of winch	2017
	serial number winch	212-w819331
138	Checking the service hoist safety catch	1 Done - No defects
<b>Measured values for item 138</b>		
	Safety catch designation	Goracon G-Lock 600 (60955)
	serial number safety catch	F827178
139	Checking the automatic operation of the service hoist	2 Done - Defects detected
140	Checking the steel cable for the service hoist	1 Done - No defects
141	Oiling the steel cable for the service hoist	1 Done - No defects
142	Checking the wire rope guide on landing platform service hoist	1 Done - No defects
143	Checking the trailing cable and the restraint	1 Done - No defects
144	Checking the landing platform switches on the platforms	1 Done - No defects
145	Checking the guardrail locking device on service hoist	1 Done - No defects
146	Checking the top end-of-travel system and cut-off device on the hoist exit platform	1 Done - No defects
147	Checking the upper tower crossbeam on service hoist	1 Done - No defects
148	Performing a service hoist test run	1 Done - No defects
149	Completing work on the service hoist	1 Done - No defects
<b>Mechanical - Machine house</b>		
150	Checking the machine house anchorage points	1 Done - No defects
151	Inspect nacelle crane mechanically with chain hoist	1 Done - No defects
<b>Measured values for item 151</b>		
	YOM of winch	2017
	HERSTELLER WINDE	DEMAG Cranes & Components GmbH
	serial number winch	94741590
152	Checking the machine house first aid kit	1 Done - No defects
153	Checking the machine house fire extinguisher	2 Done - Defects detected
154	Checking the Firespy fire-extinguishing system in the machine house	3 Not done - Not necessary
155	Checking the machine house fitted parts	1 Done - No defects



No.	Check item	Result
156	Checking the machine house casing	1 Done - No defects
157	Checking the main carrier and the axle pin	1 Done - No defects
158	Checking yaw gears	2 Done - Defects detected
159	Checking yaw bearing	1 Done - No defects
160	Checking the stator shield	1 Done - No defects
161	Checking the rotor lock	2 Done - Defects detected
162	Checking the electromechanical brake	1 Done - No defects
163	Checking the shaft sleeve	1 Done - No defects
164	Checking the machine house bolt connections	1 Done - No defects
165	Visual inspection of machine house	2 Done - Defects detected
<b>Mechanical system – Rotor head</b>		
166	Checking the rotor head anchorage points	1 Done - No defects
167	Taking a front and rear main bearing grease sample	1 Done - No defects
168	Greasing the rear and front rotor bearing	1 Done - No defects
169	Perform a visual inspection of the generator rotor	1 Done - No defects
170	Checking the rotor head casing	1 Done - No defects
171	Checking the rotor hub and the blade adapters	1 Done - No defects
172	Checking rotor head seals	2 Done - Defects detected
173	Checking the pressure switch for the rotor head central lubrication system	2 Done - Defects detected
174	Checking central lubrication system on rotor head	1 Done - No defects
175	Checking pitch gear rotor blade A	2 Done - Defects detected
176	Checking the pitch gear for rotor blade B	2 Done - Defects detected
177	Checking the pitch gear for rotor blade C	2 Done - Defects detected
178	Checking rotor blade A blade flange bearings	1 Done - No defects
179	Checking the blade flange bearings of rotor blade B	1 Done - No defects
180	Checking the blade flange bearings of rotor blade C	1 Done - No defects
181	Check lightning protection system of rotor blade A	1 Done - No defects
182	Check lightning protection system of rotor blade B	1 Done - No defects
183	Check lightning protection system of rotor blade C	1 Done - No defects
184	Checking the rotor head bolt connections	1 Done - No defects
185	Visual inspection of rotor head	2 Done - Defects detected

No.	Check item	Result
<b>Mechanical - Rotor blade</b>		
186	Checking the rotor blade A bolt connections	1 Done - No defects
187	Checking the rotor blade B bolt connections	1 Done - No defects
188	Checking the rotor blade C bolt connections	1 Done - No defects
189	Check rotor blade A base plate	3 Not done - Not necessary
190	Check rotor blade B base plate	3 Not done - Not necessary
191	Check rotor blade C base plate	3 Not done - Not necessary
192	Check rotor blade A reinforcing ring	1 Done - No defects
193	Check rotor blade B reinforcing ring	1 Done - No defects
194	Check rotor blade C reinforcing ring	1 Done - No defects
195	Check the connection between the lightning protection cable and the discharge ring on rotor blade A	1 Done - No defects
196	Check the connection between the lightning protection cable and the discharge ring on rotor blade B	1 Done - No defects
197	Check the connection between the lightning protection cable and the discharge ring on rotor blade C	1 Done - No defects
198	Check rotor blade A on outside nacelle	1 Done - No defects
199	Check rotor blade B on outside nacelle	1 Done - No defects
200	Check rotor blade C on outside nacelle	1 Done - No defects
201	Check flange spoiler reinforcement laminate for rotor blade A	1 Done - No defects
202	Check flange spoiler reinforcement laminate for rotor blade B	1 Done - No defects
203	Check flange spoiler reinforcement laminate for rotor blade C	1 Done - No defects
<b>Mechanical - Nacelle exterior</b>		
204	Checking anchorage points nacelle exterior	1 Done - No defects
205	Checking fitted parts nacelle exterior	1 Done - No defects
<b>Mechanical-country-specif. maint. items</b>		
206	Checking rescue barrel	3 Not done - Not necessary
<b>Mechanical system – finishing steps</b>		
207	Repair paint	3 Not done - Not necessary
208	Acoustic check of WEC	1 Done - No defects

### Report overview

No.	Defect location	Defect type	Report
2	tower, tower base - Cabinet, control cabinet inside	special, control system - Software version incorrect	920079187006

No.	Defect location	Defect type	Report
39	tower, tower base - cabinet, lighting	special, electrical component - battery discharged	920079187005
57	blade system A - cabinet, capacitor	testing/safety - label/sign missing	920061438810
63	rotor system - slip ring unit	special, sealing - sealing missing	920079187015
96	tower, tower base - fire extinguisher	material, plastic - crack	920074061850
96	tower, tower base - fire extinguisher	testing/safety - inspection date missing/exceeded	920079187008
97	outside, concrete tower - concrete body	material, concrete / mortar - crack vertical	920079187009
97	inside, concrete tower - concrete body	material, concrete / mortar - crack vertical	920079187007
111	tower, safety ladder, concrete tower - ladder support	connection, screwing - washer damage	920079187027
118	tower, safety ladder, concrete tower - ladder support	connection, screwing - washer damage	920079187026
121	tower, service hoist - cage	connection, intermediate part - support/angle broken off	920079187017
139	tower, service hoist - cage	special entries - Retrofit missing	920079187013
153	nacelle, machine house - fire extinguisher	testing/safety - inspection date missing/exceeded	920079187019
158	nacelle, yaw system - drive, gear, oil filtering valve	special, drive system - Oil level too low	920079187011
158	nacelle, yaw system - drive, gear, oil filtering valve	special, drive system - oil leakage	920079187021
161	generator, stator, fitted part - rotor lock, connection hose	special, tube/hose - damage, leak	920079187018
165	nacelle, machine house - casing, top	special entries - Retrofit missing	920079187012
172	rotor system - front main bearing	special, bearing - grease leakage	920079187010
172	all blade systems - bearing	special, bearing - grease leakage	920079187014
172	rotor system - rear main bearing	special, drive system - oil leakage	920079187020
173	rotor system - central lubrication, pressure gauge	special, grease system - not working	920079187025
175	main component, screwing - Hub adapter – blade flange bearing, bl A	fit/gap size - wrong alignment	920079187024
176	main component, screwing - rotor hub - blade flange bearing B	fit/gap size - wrong alignment	920079187023
177	main component, screwing - rotor hub - blade flange bearing C	fit/gap size - wrong alignment	920079187022
185	rotor system - front, casing	special, sealing - sealing missing	920079187016

### Signature

08.12.2023 , ESG Energy Service Group Sarl