

1287-97



NoordzeeWind



## Near Shore Windpark

### Wbr/Wm vergunningaanvraag NSW

#### Bijlage VI:

- Onderhoudsplan -

#### Bijlage IV

Service Plan & Check list – NM80 & NM92

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# Near Shore Windpark

## Wbr/Wm vergunningaanvraag NSW

### Bijlage VI:

#### - Onderhoudsplan -

### Bijlage IV

#### Service Plan & Check list – NM80 & NM92

Document opgemaakt ten behoeve van Wbr/Wm vergunningaanvraag Near Shore Windpark.

Opgemaakt door:  
NoordzeeWind consortium


Bestaande uit:

Shell Wind Energy BV  
NV NUON Duurzame Energie

Aangeboden aan:  
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Title: <b>Service Plan &amp; Check list</b>		Turbine Type: <b>NM80 &amp; NM92</b>			
Prep. by: PKR	Appr. by: KHG	CN no.:	Date: 20.01.03	Page 1 of 14	No.: QR 19.023 GB Rev.: -

Service ID & Turbine data	
Turbine No.	Park No.
Service Life Year.	Service Car No.
Owner.	
Site Location.	

Conclusion	Yes	No
WTG ready for operation <i>(IMPORTANT: If the Wind Turbine is left without being operational the Service Department must be contacted and a note must be placed at the control cabinet )</i>		
All points in this Service Checklist are carried out		
The Logbook in the WTG is filled in		
Deviation Report ( QSF 1301.2) is used		

Signature (initials)	
Service technician 1	Service technician 2:

Approval	
Date:	Service manager:

## Instruction using the Service Life Plan & Checklist

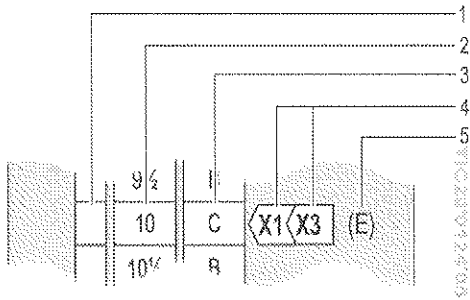
### Attention

This Service Plan & Checklist must be handled in accordance with the internal procedures of the responsible Service Department.

Note the necessary preparation which is described under "0 Preparation prior to service".

### Service Life Plan

The Service Life Plan is a helping tool showing which service tasks from the Service Checklist has to be executed and when to be executed. Service Life Plan specifies service tasks in a period of 20 years after commissioning of the Wind Turbine.



1. Check field. Set a mark to indicate the actual year on the Service Life Plan
2. Number of years after commissioning. Here 10 years, indicating actual service
3. Service Code C, indicating that all service points marked C has to be executed at this service
4. Code for returning or single service extensions. Codes indicate that all single or returning service extension must be executed at this service.
5. Indication of where the old D and E services were located on the service life plan

### Service Checklist

The Service Checklist shows all service tasks for the Wind Turbine. The checklist points are divided into groups, corresponding to the sections in the Service & Maintenance Manual and I&S Data.

The first field of each point in the Checklist contains a description of the service task.

The second field shows the service code. All points in the checklist with a service code that match the one found in the Service Life Plan, has to be executed. Note that one point can contain several service codes.

The third field shows where to find the document in which the acceptance criteria data or text is written.

In this field the service technician must also verify used acceptance criteria for particularly critical tasks.

The last fields are for checking the checkpoints. Following codes are used for checking these fields:

- ◆ Use ✓ if the point is carried out and acceptable
- ◆ Use R if there are any remarks
- ◆ Use ÷ if the point due to any reason has not been carried out
- ◆ Use Ø if the point is not valid for the WTG type (variant)

### Service Extensions

Service Extensions are described in this document after the standard Service Checklist. For each indication of a Service Extension both X, D and E on the Service Plan, there is an extension Checklist. Service Extension X2 in the Service Life Plan refers to X2 in the Service Checklist.

### Page for remarks


The "remarks to the check list points" sheet is used for noting remarks on the individual points of the checklist. Errors and adjustments (only if out of tolerance) must be noted here. The remarks can later be used as a basis for the service report.



**Service Life Plan - NM 80**

✓	Year	Code	Addition	Description of Service
	3 months	A		<p><b>A – Service</b>            A – Service is executed 1 to 3 months after commissioning. A – Service is a single event service, and will be executed only once in the Service Life Time of the Wind Turbine.            A – Service is executed ±1 month according to Service Life Plan</p> <p><b>B – Service</b>            B – Service is executed 6 months after commissioning, and repeated with one-year intervals in the Service Lifetime of the Wind Turbine.            B – Service is executed ±1 month according to Service Life Plan</p> <p><b>C – Service</b>            C – Service is executed 6 months after commissioning, and repeated with one-year intervals in the Service Lifetime of the Wind Turbine.            C – Service is executed ±1 month according to Service Life Plan</p> <p><b>X – Service Extensions</b>            In some occasions an extension to service is needed. Extensions can be executed only once, or repeated through out the Service Life Time of the Wind Turbine.</p> <p><b>NOTE – (D) &amp; (E)</b> refers to old naming of service visits at this point in turbine life.</p>
	½	B		
	1	C	X1	
	1½	B		
	2	C	X2	
	2½	B		
	3	C	X3	
	3½	B		
	4	C	X2	
	4½	B		
	5	C		
	5½	B		
	6	C	X2 X3	
	6½	B		
	7	C		
	7½	B		
	8	C	X2	
	8½	B		
	9	C	X3	
	9½	B		
	10	C	X2 X4	
	10½	B		
	11	C		
	11½	B		
	12	C	X2 X3	
	12½	B		
	13	C		
	13½	B		
	14	C	X2	
	14½	B		
	15	C	X3	
	15½	B		
	16	C	X2	
	16½	B		
	17	C		
	17½	B		
	18	C	X2 X3	
	18½	B		
	19	C		
	19½	B		
	20	C	X2 X4	

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**Service Checklist – NM92**

0	Preparation prior to service	List Service Car no.		Technician	
.1	Check hot line for logged data regarding e.g.: - Redundant components - Condition monitoring system - Errors and alarms - Software needing updating	A-B-C	S&M Manual		

1	ID of calibrated tools	List Service Car no. (or tool no.)		Technician	
.1	Manometer	Car No.:			
.2	Wattmeter	Car No.:			
.3	Torque wrench	Car No.:			
.4	Gear wrench	Car No.:			
.5	Hydraulic torque equipment	Car No.:			
.6	Hydraulic torque equipment	Car No.:			


2	Test of safety equipment	Service level	Accept criteria ref. / verify	Technician	
.1	Check of all fall protection harnesses	A-B-C	S&M Manual		
.2	Steel Rail inspected and tested	A-B-C	S&M Manual		
.3	Rescue equipment and Descent device inspected (Not standard)	A-B-C	S&M Manual		
.4	Fire extinguisher, manometer pressure inspected (Not standard)	A-B-C	S&M Manual		
.5	Visual check of signs and instructions	A-B-C	S&M Manual		
.6	Check fixing points, eye bolts, handrails and screens	A-B-C	S&M Manual		
.7	Test the emergency lighting function (Not standard)	A-B-C	S&M Manual		
.8	Check of Service Crane	A-B-C	S&M Manual		
.9	Check the yaw lock	A-B-C	S&M Manual		
.10	Check the brake disc lock	A-B-C	S&M Manual		
.11	Check pitch lock	A-B-C	S&M Manual		

3	Tower	Service level	Accept criteria ref. / verify	Technician	
.1	Visual check of foundation	A-B-C	S&M Manual		
.2	Re-torque bolt joint: Nacelle / tower 10% of the bolts?	A-C	S&M Manual I&S data / _____ Nm		
.3	Re-torque bolt joint between the sections of the tower 10% of the bolts?	A-C	S&M Manual I&S data / _____ Nm		
.4	Visual inspection of structure around hole just below top flange	A-C			

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.5	Re-torque bolt joint: Bottom section / embedded section.	A-C	S&M Manual I&S data / _____ Nm		
.6	Visual inspection of the galvanization and paint work for damage.	A-B-C	QI 09.031		
.7	Lubricate door hinges and door lock	C	I&S data		
.8	Check bolts in platforms for tightening	A-C	S&M Manual		
.9	Check bolts in ladders for tightening	A-C	S&M Manual		
.10	Visual check of tower dampers	B-C	S&M Manual		
.11	Re-torque bolt joints between the different steel parts supporting the tower dampers	A-C	S&M Manual I&S data / _____ Nm		

4.1	Nacelle - Yaw system	Service level	Accept criteria ref. / verify	Technician	
.1	Visual check of seals	A-B-C	S&M Manual		
.2	Yaw ring internal gearing checked for damages	A-B-C	S&M Manual		
.3	Check seals and gaskets on yaw gears for leakage	B-C	S&M Manual		
.4	Visual check of yaw pinion	A-B-C	S&M Manual		
.5	Check wear on brake pads	A-B-C	I&S data		
.6	Check cleanness of brake flange (ring) and clean with if necessary	A-B-C	S&M Manual		
.7	Check grease level in reservoir of the automatic lubrication system	A-B-C	S&M Manual ; I&S data		
.8	Check that lubricant is reaching the lubrication points	A-B-C	S&M Manual		
.9	Check fittings and feed lines of lubrication system for damage or leakage	A-B-C	S&M Manual		
.10	Lubricate yaw bearing (manually if no automatic lubrication system is installed)	A-C	S&M Manual ; I&S data		
.11	Lubricate yaw ring	A-B-C	S&M Manual ; I&S data		
.12	Lubrication and oil level of yaw gear	A-B-C	S&M Manual ; I&S data		
.13	Re-torque bolt joint: Yaw bearing / base frame	A-C	S&M Manual I&S data / _____ Nm		
.14	Re-torque bolt joint: Yaw gear / base frame	A-C	S&M Manual I&S data / _____ Nm		
.15	Re-torque bolt joint: Yaw brake caliper / base frame	A-C	S&M Manual I&S data / _____ Nm		
.16	Check tightening of bolt joint: Hydraulic unit / base frame	A-C	S&M Manual		


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4.2	Nacelle – Yaw brake Hydraulics	Service level	Accept criteria ref. / verify	Technician
.1	Check oil level and refill if necessary	A-B-C	S&M Manual ; I&S data	
.2	Inspect filter in hydraulic station	B-C	S&M Manual	
.3	Check set pressures for valves on display	B-C	S&M Manual ; I&S data	
.4	Check accumulator pressure	A-B-C	S&M Manual ; I&S data	
.5	Check seals of hydraulic system	A-B-C	S&M Manual	

4.3	Nacelle - Main shaft & Bearing	Service level	Accept criteria ref. / verify	Technician
.1	Inspection of main shaft	A-B-C	S&M Manual	
.2	Check main bearing, bearing housing and lip seal	A-B-C	S&M Manual	
.3	Take an oil sample	A-C	S&M Manual	
.4	Change oil filter	A-C	S&M Manual ; I&S data	
.5	Lubricate main bearing (If no automatic lubrication system is installed)	A-B-C	S&M Manual ; I&S data	
.6	Check oil level in reservoir of the automatic lubrication system	A-B-C	S&M Manual ; I&S data	
.7	Check fittings and feed lines of lubrication system for damage or leakage	A-B-C	S&M Manual	
.8	Re-torque bolt joint: Hub / main shaft	A-C	S&M Manual I&S data / _____ Nm	
.9	Re-torque bolt joint: Bearing housing / base frame	A-C	S&M Manual I&S data / _____ Nm	

4.4	Nacelle - Gear box	Service level	Accept criteria ref. / verify	Technician
.1	Visual check of seals	A-B-C	S&M Manual	
.2	Check ventilation filter and clean if necessary	A-B-C	S&M Manual	
.3	Visual inspection of gearwheels	A-B-C	S&M Manual	
.4	Visual check of gear mounting	A-B-C	S&M Manual	
.5	Re-torque bolts in taper bushing	A-C	S&M Manual I&S data / _____ Nm	
.6	Re-torque bolt joint: Gear suspension / base frame	A-C	S&M Manual I&S data / _____ Nm	
.7	Check gear oil level	A-B-C	S&M Manual ; I&S data	
.8	Replace oil filter	A-B-C	S&M Manual	
.9	Take oil sample	A-B-C	S&M Manual	
.10	Check oil pump	A-B-C	S&M Manual	
.11	Visual check of heat exchanger	A-B-C	S&M Manual	




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4.5	Nacelle – Disc Brake system	Service level	Accept criteria ref. / verify	Technician
.1	Check brake disc thickness	C	S&M Manual ; I&S data	
.2	Check brake disc throw out	C	S&M Manual ; I&S data	
.3	Check clearance between brake linings and brake disc	A-B-C	S&M Manual	
.4	Check brake lining thickness	A-B-C	S&M Manual	
.5	Re-torque bolt joint: Brake disc/shrink disc	A-C	S&M Manual I&S data / _____ Nm	
.6	Re-torque bolt joint: Mechanical brake/gearbox	A-C	S&M Manual I&S data / _____ Nm	
.7	Re-torque bolt joint: Mechanical brake/brake bracket	A-C	S&M Manual I&S data / _____ Nm	

4.6	Nacelle – Disk brake hydraulics	Service level	Accept criteria ref. / verify	Technician
.1	Check level of hydraulic oil	A-B-C	S&M Manual ; I&S data	
.2	Visual check for leakage in hydraulic system	A-B-C	S&M Manual	
.3	Check overflow valve	A-B-C	S&M Manual	
.4	Check accumulator	A-B-C	S&M Manual	
.7	Check filter / suction strainer	C	S&M Manual	
.8	Check cables for softness and damage	A-B-C	S&M Manual	

4.7	Nacelle – Coupling	Service level	Accept criteria ref. / verify	Technician
.1	Visual check of rubber elements for cracks	A-B-C	S&M Manual	
.2	Visual inspection of the galvanization and paint work for damage	A-B-C	S&M Manual	
.3	Re-torque bolt joint: Coupling / brake disc	A-C	S&M Manual I&S data / _____ Nm	
.4	Re-torque bolt joint: Coupling / generator flange	A-C	S&M Manual I&S data / _____ Nm	
.5	Visual check of cover	B-C	S&M Manual	


4.8	Generator	Service level	Accept criteria ref. / verify	Technician
.1	Check generator alignment	A	S&M Manual ; I&S data	
.2	Check and lubricate lip seal	A-B-C	S&M Manual	
.3	Clean the generator	A-B-C	S&M Manual	
.3	Lubricate generator bearings	A-B-C	I&S data	
.4	Re-torque bolt joint: Generator / rubber damper	A-C	S&M Manual I&S data / _____ Nm	
.5	Re-torque bolt joint: Rubber damper / sub frame	A-C	S&M Manual I&S data / _____ Nm	
.6	Re-torque bolts in main cable terminals	A-C	S&M Manual I&S data / _____ Nm	
.7	Check of tear and wear of insulation on	A-C	S&M Manual	

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	generator cables inside cable box				
.8	Visual inspection to see if the cable is still fixed in the glands	A-C	S&M Manual		
.9	Check of slip rings – visual inspection - Take a digital photo of inside in the slip ring compartment – to be used for investigation	A-B-C	S&M Manual		
.10	Clean slip ring system for dust	A-B-C	S&M Manual		
.11	Change brushes – length of replaced brushes shall be measured.	A-B-C	S&M Manual		
.12	Datasheet in “Operating Instructions N-R 432 en 06.00” and on NMCSs extranet and digital photo needs to send to JBE for investigations (statistics on brush wear)	A-B-C	S&M Manual		
.13	Visual inspection of the brush wear contacts	A-B-C	S&M Manual		
.14	Check of bearings	A-B-C	S&M Manual		
.15	Check bearings for leakage.	A-B-C	S&M Manual		
.16	Empty container for old lubrication	A-B-C	S&M Manual		
.17	Check of automatic lubrication works and replace the lubrication unit.	A-B-C	S&M Manual		
.18	Check vibration level of the generator – when running	A-B-C	S&M Manual		


4.9	Cooling system	Service level	Accept criteria ref. / verify	Technician
.1	Check water cooler and hoses for leakage	A-B-C	S&M Manual	
.2	Check pressure level on manometer	A-B-C	S&M Manual	
.3	Check pump, seals and fittings for leakage	A-B-C	S&M Manual	
.4	Test coolant liquid with spectrometer	A-C	I&S data / Freeze level	

4.10	Nacelle – Base frame, enclosure	Service level	Accept criteria ref. / verify	Technician
.1	Visual inspection of welds and corrosion protection	B-C	S&M Manual	
.2	Re-torque bolt joint: Base frame cast part / welded part	A-C	S&M Manual I&S data / _____ Nm	
.3	Re-torque bolt joint: Enclosure / rubber dampers	A-C	S&M Manual ; I&S data	
.4	Re-torque bolt joint: Rubber dampers / base frame	A-C	S&M Manual ; I&S data	
.5	Check met mast bolts joints for tightening	A-C	S&M Manual ; I&S data	

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5.1	Rotor – Blades and Hub	Service level	Accept criteria ref. / verify	Technician
.1	Visual inspection of hub connection for damage on metallized parts	B-C	S&M Manual	
.2	Visual inspection of hub surface	C	S&M Manual	

5.2	Rotor – Variable Pitch System	Service level	Accept criteria ref. / verify	Technician
.1	Check hub for serious rust and cracks	A-B-C	S&M Manual	
.2	Check that rotor lifting holes are greased and plugged	A-B-C	S&M Manual	
.3	Re-torque stud joint: Hub/pitch bearing joint where tensioner can not be used	A-B-C	S&M Manual I&S data / _____ Nm	
.4	Re-tension bolt joint: Pitch bearing / blade	A-B-C	S&M Manual I&S data / _____ Nm	
.5	Re-torque bolted joint: Control box frame/ hub	A-B-C	S&M Manual I&S data / _____ Nm	
.6	Re-torque 10% of bolt connections: Control box frame to hub	A-B-C	S&M Manual I&S data / _____ Nm	
.7	Re-torque 10% of Bolt on axis Box frames (1, 2 &3)	A-B-C	S&M Manual I&S data / _____ Nm	
.8	Re-torque 10% of bolts on control box to frame connections	A-B-C	S&M Manual I&S data / _____ Nm	
.9	Re-torque 10% of Bolts on axis box to frame connections	A-B-C	S&M Manual I&S data / _____ Nm	
.10	Re-torque 10% of studs on gearbox to hub connections	A-B-C	S&M Manual I&S data / _____ Nm	
.11	Re-torque 10% of bolts on motor to gearbox	A-B-C	S&M Manual I&S data / _____ Nm	
.12	Re-torque 10% of grease pump & bracket bolts	A-B-C	S&M Manual I&S data / _____ Nm	
.13	Re-torque 10% of fasteners for grease manifolds / pipe clips	A-B-C	S&M Manual I&S data / _____ Nm	
.14	Re-torque 10% of electrical loom clips	A-B-C	S&M Manual I&S data / _____ Nm	
.15	Check condition of AV mounts on the three axis boxes	A-B-C	S&M Manual	
.16	Check the inner & outer blade bearing seals for rust, wear or leaking grease	A-B-C	S&M Manual	
.17	Take a grease sample from the blade bearing	C	S&M Manual	
.18	Remove, empty and refit the grease collectors bottles	A-B-C	S&M Manual	
.19	Check and record the grease level in the reservoir	A-B-C	S&M Manual	
.20	Check that lubricant is reaching the lubrication points	A-B-C	S&M Manual	
.21	Refill the grease pump reservoir and check the grease pump	A-B-C	S&M Manual	

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.22	Check grease lines for leaks	A-B-C	S&M Manual		
.23	Visually inspect the pinion and bearing gear teeth	A-B-C	S&M Manual		
.24	Check the backlash between the teeth on the pinion and on the bearing gear	A-B-C	S&M Manual		
.25	Grease Pinion and Bearing Gear	A-B-C	S&M Manual I&S data		
.26	Grease bearing gear	A-B-C	S&M Manual I&S data		
.27	Check oil level for bearing gear	A-B-C	S&M Manual		
.28	Visually check the condition of the limit switches, fasteners and brackets	A-B-C	S&M Manual		
.29	Test the limit switches by means of the TAC test facility	A-B-C	S&M Manual		
.30	Check fasteners and parts for: <ul style="list-style-type: none"> <li>• Hub hatches</li> <li>• Tread plates</li> <li>• Floor plates</li> <li>• Clip on points</li> </ul>	A-B-C	S&M Manual		
.31	Visually inspect cabling	A-B-C	S&M Manual		
.32	Inspect the condition of all cables in the hub	A-B-C	S&M Manual		
3	Visually inspect connectors: <ul style="list-style-type: none"> <li>• All connectors on the hub control box.</li> <li>• All connectors on the axis boxes on each blade.</li> <li>• Connectors on the motor of each blade</li> </ul>	A-B-C	S&M Manual		
.34	Visually inspect the hub axis and control panels for loose components, moisture ingress, loose internal cabling or any other damages	A-B-C	S&M Manual		
.35	Check the motor cooling fans	A-B-C	S&M Manual		
.36	Check the battery voltage and record result for each blade		Ua = _____ V Ub = _____ V Uc = _____ V		
.37	Check that all lights are operational and undamaged.	A-B-C	S&M Manual		

<b>6.1</b>	<b>Tower – Cables and lighting</b>	<b>Service level</b>	<b>Accept criteria ref. / verify</b>	<b>Technician</b>
.1	Check cables and cable mountings	A-C	S&M Manual	
.2	Check lighting and fittings	A-C	S&M Manual	

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6.2	Tower – Stator filter panel AT4	Service level	Accept criteria ref. / verify	Technician
.1	Check filters at ventilating fan	A-B-C	S&M Manual	
.2	Visual check of panel	A-B-C	S&M Manual	
.3	Visual check electrical components	A-B-C	S&M Manual	
.4	Random check of bolts/terminals	A-B-C	S&M Manual	
.5	Re-tightening of bolts/terminals	A-X3	S&M Manual & NMCS DOC. 4002134	

6.3	Tower – Main panel AT1	Service level	Accept criteria ref. / verify	Technician
.1	Check filters at ventilating fan	A-B-C	S&M Manual	
.2	Visual check of panel	A-B-C	S&M Manual	
.3	Visual check electrical components	A-B-C	S&M Manual	
.4	Random check of bolts/terminals	A-B-C	S&M Manual	
.5	Re-tightening of bolts/terminals	A-X5	S&M Manual & NMCS DOC. 4002134	

6.4	Tower – Operation panel AT2	Service level	Accept criteria ref. / verify	Technician
.1	Check filters at ventilating fan	A-B-C	S&M Manual	
.2	Visual check of panel	A-B-C	S&M Manual	
.3	Visual check electrical components	A-B-C	S&M Manual	
.4	Random check of bolts/terminals	A-B-C	S&M Manual	
.5	Re-tightening of bolts/terminals	A-X3	S&M Manual & NMCS DOC. 4002134	

6.5	Tower – UPS panel AT5 (if present)	Service level	Accept criteria ref. / verify	Technician
.1	Check filters at ventilating fan	A-B-C	S&M Manual	
.2	Visual check of panel	A-B-C	S&M Manual	
.3	Visual check electrical components	A-B-C	S&M Manual	
.4	Random check of bolts/terminals	A-B-C	S&M Manual	
.5	Re-tightening of bolts/terminals	A-X3	S&M Manual & NMCS DOC. 4002134	
.6	Replace battery pack	X5	S&M Manual	

6.6	Nacelle – Control panel A700	Service level	Accept criteria ref. / verify	Technician
.1	Check filters at ventilating fan	A-B-C	S&M Manual	
.2	Visual check of panel	A-B-C	S&M Manual	
.3	Visual check electrical components	A-B-C	S&M Manual	
.4	Random check of bolts/terminals	A-B-C	S&M Manual	
.5	Retighten bolts/terminals	A-X3	S&M Manual & NMCS DOC. 4002134	
.6	Replace back up batteries	X2	S&M Manual	

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6.7	Tower – Frequency converter	Service level	Accept criteria ref. / verify	Technician
.1	Visual inspection	A-B-C	S&M Manual	
.2	Clean air filters	A-B-C	S&M Manual	


6.8	Tower - Transformer	Service level	Accept criteria ref. / verify	Technician
.1	Visual inspection	A-B-C	S&M Manual	
.2	Re-torque bolts	A-C	S&M Manual I&S data / _____ Nm	
.3	Check ventilators for forced cooling	A-B-C	S&M Manual	

6.9	Tower – Switch gear	Service level	Accept criteria ref. / verify	Technician
.1	Visual inspection of cables	A-B-C	S&M Manual	
.2	Visual inspection of cable suspensions	A-B-C	S&M Manual	
.3	Re-torque bolts	A-C	S&M Manual I&S data / _____ Nm	

6.10	Nacelle – wiring & sensors	Service level	Accept criteria ref. / verify	Technician
.1	Visual check of junction boxes	A-B-C	S&M Manual	
.2	Visual check of cables and wiring	A-B-C	S&M Manual	
.3	Visual check of sensors	A-B-C	S&M Manual	
.4	Visual check of connectors	A-B-C	S&M Manual	
.5	Check of connections inside slip ring	A	S&M Manual	
.6	Check of wind sensors	A-B-C	S&M Manual	
.7	Check vibration ball vibration sensor	A-B-C	S&M Manual	

7.1	System testing	Service level	Accept criteria ref. / verify	Technician
.1	Check sensor "gear oil level"	A-B-C	S&M Manual	
.2	Check pumps: Start – stop	A-B-C	S&M Manual	
.3	Test of Pitch system	A-B-C	S&M Manual	
.4	Check settings of TAC 84	A-B-C	S&M Manual	
.5	Check settings of TAC 85	A-B-C	S&M Manual	

7.2	Safety testing	Service level	Accept criteria ref. / verify	Technician
.1	Visual check of connections at hub hatch	A-B-C	S&M Manual	
.2	Visual check of connections at shaft brake	A-B-C	S&M Manual	
.3	Test of emergency line via controller. Note: Shaft brake must not be activated during test	A-B-C	S&M Manual	
.5	Test main circuit breaker	A-B-C	S&M Manual	
.6	Check emergency stop circuit	A-B-C	S&M Manual	
.7	Test of over speed via controller	A-B-C	S&M Manual	
.8	Test under normal WTG operation	A-B-C	S&M Manual	

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<b>Service Extensions - NM92</b>
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<b>Extension X1</b>					
	Service task	Service code	Accept criteria ref. / verify	Technician	
4.5	Replace filter / suction strainer on brake disc hydraulics	X1	S&M Manual		
5.1	Visual check of blades from ground	X1	S&M Manual		

<b>Extension X2</b>					
	Service task	Service code	Accept criteria ref. / verify	Technician	
4.2	Take an oil sample from yaw brake hydraulics	X2	S&M Manual		
4.2	Exchange filter of yaw brake hydraulics	X2	S&M Manual ; I&S data		
4.7	Check of generator alignment	X2	S&M Manual ; I&S data		
4.8	Check the expansion tank of cooling system	X2	S&M Manual, NMCS		
5.1	Visual check of blades from ground	X2	S&M Manual		
7.2	Check collector rings	X2	S&M Manual		
7.3	Re-push all sockets in cabinets	X2	S&M Manual		
7.4	Replace back up batteries	X2			

<b>Extension X3</b>					
	Service task	Service code	Accept criteria ref. / verify	Technician	
4.4	Change gear oil	X3	S&M Manual		
	Check the pitch motor brushes and replace brushes	X3	S&M Manual		
6.2.5	Retighten bolts/terminals	X3	S&M Manual, NMCS DOC. 4002134		
6.3.5	Retighten bolts/terminals	X3	S&M Manual, NMCS DOC. 4002134		
6.4.5	Retighten bolts/terminals	X3	S&M Manual, NMCS DOC. 4002134		
6.5.5.	Retighten bolts/terminals	X3	S&M Manual, NMCS DOC. 4002134		
6.6.5	Retighten bolts/terminals	X3	S&M Manual, NMCS DOC. 4002134		

<b>Extension X4</b>					
	Service task	Service code	Accept criteria ref. / verify	Technician	
3	Visual inspection of doorframe and welds between door frame and tower shell	X4	S&M Manual		

