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NoordzeeWind

NUON

Near Shore Windpark

Wbr/Wm vergunningaanvraag NSW

Bijlage VI:

- Onderhoudsplan -

Bijlage V

Installation & Service Data
NM80/2750 & NM92/2750

Near Shore Windpark

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- Onderhoudsplan -

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Installation & Service Data
NM80/2750 & NM92/2750

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

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Installation & Service Data

NM80/2750 & NM92/2750

TIC 270'001 GB

General – NM80 & NM92

NOTE: This installation & service data document is only valid for standard types. For project specific turbines please see project specific documentation.

Oil, Lubrication & Coolant Table – NM80 & NM92

Gearbox & Main bearing

Component (manufacturer)	Oil / grease type	Quantity	
		Initial	Service
Gearbox (Winergy)	Mobilgear SHC XMP 320	510 L Fill up to level indicator	Acc. To level indicator
Main bearing – automatic lubrication	Tribol 1510/680	25 L	Renew every 5 years.
Sealing ring	FAG Arcanol L186V	Appr. 150g	30g

Generator

Component (manufacturer)	Oil / grease type	Quantity	
		Initial	Service
Bearings – automatic lubrication	Mobilith SHC100	Lubricant unit mounted	Acc. To level indicator (Appr. 160g/bearing)

Yaw system

Component (manufacturer)	Oil / grease type	Quantity	
		Initial	Service
Yaw ring bearing – manual lubrication (R. Erde)	Molykote LT2 +		App. 500g (25 g/nipple)
Yaw ring	Omega 73 grease		
Yaw gear oil	Shell Tivela SC 320	5 L	
Hydraulic oil for yaw brake unit (AVN)	Mobil SHC 524	App. 11 L	Acc. To level indicator

Disc brake unit

Component (manufacturer)	Oil / grease type	Quantity	
		Initial	Service
Hydraulic oil disc brake unit (AVN / Svendborg)	Mobil SHC 524	1,5 L	Acc. to level indicator

Other components

Component (manufacturer)	Oil / grease type	Quantity	
		Initial	Service
Hinges etc.	Novosol spray (RUKO lock oil)		
Tower door	Novosol spray (RUKO lock oil)		

Cooling system

Component (manufacturer)	Coolant	Quantity	
		Initial	Service
Generator cooling system	44% glycol / 56 % demineralized water	65 L	

Hydraulic Pressure Table – NM80 & NM92

Yaw brake unit – AVN-K09

Component / function	Reference pressure
Start hydraulic	154 bar
Stop hydraulic	165 bar
Yaw brake pressure too high	170 bar
Yaw brake pressure too low	135 bar
Relief valve	180 bar / 16 bar
Accumulator pre-charge (0.32 L)	139 bar

Disc brake unit – AVN-B16

Component / function	Reference pressure
Start hydraulic	130 bar
Stop hydraulic	140 bar
Shaft brake pressure too high	160 bar
Shaft brake pressure too low	70 bar
Start pressure reduction	185 bar
Hysteresis pressure reduction	5 bar
Relief valve	155 ± 2 bar
Accumulator pre-charge (0.07 L)	117 ± 2 bar

Bolt Torque Tables – NM80 & NM92

Torque tables are defined according to QI 09.374 rev. C (Preliminary)

General

Placement	Dim.	Quality	Surface treatment	Torque [Nm]	Lubrication etc.
General	M8	A4-70 A2-70		15	Mobiltac 81
General	M10	A4-70 A2-70		30	Mobiltac 81
General	M10	8.8	TZn	38	Mobiltac 81
General	M12	8.8	TZn	65	Mobiltac 81
General	M16	10.9	TZn	220	Mobiltac 81

Nacelle

Placement	Dim.	Quality	Surface treatment	Torque [Nm]	Lubrication etc.
Main bearing housing /main frame	M60	8.8	HDG	9000 (1200kN)	Mobiltac 81
Main frame / sub frame	M36	10.9	TZn	2375	Mobiltac 81
Shrink disc / main shaft	M33	DIN 933 10.9 MoS2	Black	2650	Mobiltac 81
Rotor lock disc / main shaft	M16	ISO 4014 – 8.8	TZn	180	Mobiltac 81
Gearbox suspension / main frame	M30	10.9	TZn	1565 (400kN)	Mobiltac 81
Gearbox suspension, axial disc / shaft	M20	ISO 4017 - 8.8	TZn	300	Mobiltac 81
Main frame / sub frame	M30	10.9	TZn	1370	Mobiltac 81
Main frame / sub frame	M24	DIN 931 – 8.8	TZn		Mobiltac 81
Rotor blocking / gearbox	M30	DIN 931 – 10.9	TZn	1450	Mobiltac 81
Mechanical brake / gearbox	M20	ISO 4014 - 8.8	TZn	300	Loctite 243
Brake disc / shrink disc (Winergy)	M20	DIN 931 – 10.9	TZn	430	Mobiltac 81
Flange / shrink disc (Winergy)	M20	ISO 4762 – 10.9		430	Mobiltac 81
Shrink disc (Winergy) / Generator	M16	ISO 4762 – 10.9		300	Mobiltac 81

	Schrink disc (Winergy) / high speed shaft gear box	M16	ISO 4762 – 10.9		300	
	Coupling / plate pack / brake disc	M16	Winergy		300	None
	Coupling / plate pack / flange	M16	Winergy		300	None
	Centa coupling incl. Centa Flanges & shrink discs.					
	Brake disc / shrink disc	M24	ISO 4014-10.9	tZn	820	Mobiltac 81
	Flange / shrink disc	M24	ISO 4014-10.9	tZn	820	Mobiltac 81
	Coupling (Centa) / brake disc	M27	ISO 4014-10.9	tZn	1070	Mobiltac 81
	Coupling (Centa) / flange	M27	ISO 4014-10.9	tZn	1070	Mobiltac 81
	Coupling (Centa) (link/hollow shaft)	M27	ISO 4014-10.9	tZn	1070	Mobiltac 81
	Centa coupling with Stuwe shrink discs and NEGM discs					
	Shrink disc (Centa) / brake disc (Centa) / HSS gearbox	M20	ISO 4014-10.9	tZn	490	Mobiltac 81
	Shrink disc (Centa) / flange (Centa) / HSS generator	M24	ISO 4014-10.9	tZn	850	Mobiltac 81
	Coupling (Centa) / brake disc (Centa)	M27	ISO 4014-10.9	tZn	1070	Mobiltac 81
	Coupling (Centa) / flange (Centa)	M27	ISO 4014-10.9	tZn	1070	Mobiltac 81
	Coupling (Centa) (link/hollow shaft)	M27	ISO 4014-10.9	tZn	1070	Mobiltac 81
	Generator / support beam	M24	8.8	TZn	530	Mobiltac 81
	Generator support beam / rubber damper	M24	8.8	TZn	530	Mobiltac 81
	Generator, rubber damper / sub frame	M16	8.8	TZn	180	Loctite 243
	Yaw bearing / nacelle	M30	DIN 931 – 10.9	TZn	1370	Mobiltac 81 Loctite 640 on contact surface
	Yaw gear / main frame	M16	ISO 4762-10.9	TZn	220	Mobiltac 81
	Yaw brake caliper / main frame	M27	ISO 4014 – 10.9	TZn	1070	Mobiltac 81

Rotor

Placement	Dim.	Quality	Surface treatment	Torque / Tension	Lubrication etc.
Hub / main shaft	M36	ISO 4014 – 10.9	TZn	2710 Nm	Mobiltac 81
Hub / blade bearing (NM80 proto)	M36	ISO 4014 – 10.9	Delta GZ	2600 Nm	None
Hub / blade bearing (standard)	M36		Delta Gz	2300 Nm	None
Blade bearing / blade (standard)	M36		Delta GZ	434 kN	None
Blade bearing / blade (NM80 proto)	M36	Special 10.9	Delta GZ	1900 Nm	None
Corner plate (fixed) / hub	M12		A4-70	50 Nm	
Corner plate (floating) / hub	M12		A4-70	50 Nm	
Metacone mounts / frame	M16		A4-70	120 Nm	
Axis box / frame	M10		A4-70	30 Nm	
Control box / nut plate	M12		A4-70	50 Nm	
Gearbox / hub	M12	10.9	Delta GZ	96Nm	
Motor / gearbox	M12		A4-70	50Nm	

Tower

Placement	Dim.	Quality	Surface treatment	Torque [Nm]	Lubrication etc.
Welding bolts on tower wall	M16	4.6		75	None
Top flange / yaw bearing Nacelle	M30	10.9	HDG	1370	Mobiltac 81 Loctite 640
Tower sections flange joints	M36	DIN 6916	TZn	2800	Mobiltac 81
Bottom / foundation joint	Welded				

General Electrical Parts

Placement	Dim.	Quality	Surface treatment	Torque [Nm]	Lubrication etc.
Generator terminals	See label on terminals in terminal box				

DCE Electrical Parts

Placement	Dim.	Quality	Surface treatment	Torque [Nm]	Lubrication etc.
General	M6	Std.		6	None
General	M8	Std.		24	None
General	M10	Std.		48	None

Miscellaneous Service Data – NM80 & NM92

Component / function	Renew / Test
Minimum thickness of generator slipring brushes	Indicator via controller
Exchange of gear oil filter filter	After 3 weeks and after 3 months – then every 12 months
Exchange of main bearing oil filter	After 3 weeks and after 3 months – then every 12 months
Svendborg brake wear-switch, standard measure with no change	3 mm
Thickness of brake pad	Indicator via controller
Thickness of brake disc	Min. 27 mm
Distortion brake disc	Max. 0,5 mm
Exchange of slip rings	> 20 years
Minimum thickness of slipring brushes	-
Inductive sensor distance	1,5 – 3,0 mm

Controller Settings – NM80 & NM92

DCE controller No.

TAC 84 settings acc. to QI 19.011GB
TAC 85 settings acc. to QI 19.022GB

Critical Wind Speed Values – NM80 & NM92

Refering to activity

Activity	Maximum wind speed, average 10 min.
Lift of nacelle	10 m/s
Rotor installation	10 m/s

Refering to system design

System design	
Yaw lock designed wind speed during service (operation)	15 m/s
Bolt through brake disc and 2 blades in brake position	15 m/s
Rotor lock and 1 blade i brake position	15 m/s
Rotor lock and 3 blades in brake position	25 m/s
Notice: The supervisor has the last word considering other circumstances wich may worsen the situation	

	Erection of tower without immediate installation of nacelle and rotor		
	Hub height	**10 min. mean value at hub height**	**10 min. mean value at 10m**
	NM80 HH 60m	20 m/s	25 m/s
	NM92 HH 70m	18 m/s	20 m/s
	For tower heights not given in the table, make an estimation based on the critical wind speeds of neighboring tower heights.		
	Notice: The supervisor has the last word considering other circumstances wich may worsen the situation		