13	Heat Exchange Unit (Water/Oil)		
		50 Hz	**60 Hz**
	Cooling capacity	41.3 kW	41.3 kW

14	Oil Cooler		
		50 Hz	**60 Hz**
	Cooling capacity	37.5 kW	37.5 kW

15	Water Pump		
		50 Hz	**60Hz**
	Voltage	1 x 230 V	3 x 480 V

16	Water Cooler/ Radiator		
		50 Hz	**60 Hz**
	Cooling capacity	46.2 kW	46.2 kW

17	Electrical Nacelle Heater - for Arctic Version only		
		50 Hz	**60Hz**
	Voltage	3 x 690 V	3 x 600 V
	Power	20 kW	20 kW
	Number of heaters	2 pieces	2 pieces

18	Mechanical Shaft Brake		
		50 Hz	**60Hz**
	Type description	Active Brake	Active Brake
	Brake disc	Steel, mounted on high speed shaft	Steel, mounted on high speed shaft
	Number of calipers	2 piece	2 piece

19	Hydraulic Power Unit for Mechanical Shaft Brake		
		50 Hz	**60Hz**
	Voltage	3 x 690 V	3 x 480 V
	Working pressure range	140-150 bar	140-150 bar
	Oil capacity	11 l	11 l

20	Coupling		
		50 Hz	**60Hz**
	Type description	Flexible coupling, constant rpm	Flexible coupling, constant rpm

21	Generator			
			50 Hz	**60 Hz**
	Type description		1 speed generator, water cooled	1 speed generator, water cooled
	Rated power	P_N	1650 kW	1650 kW
	Apparent power	S_N	1805 kVA	1808 kVA
	Rated current	I_N	1510 A	1740 A
	Max power at Class F	P_{Fmax}	1815 kW	1815 kW
	Max current at Class F	I_{Fmax}	1661 A	1914 A
	No load current	I_0	400 A	430 A
	Reactive power consumption at rated power (tolerance. acc to IEC 60034-1)	Q_N	731 kvar	740 kvar
	Reactive power consumption at no load (tolerance. acc to IEC 60034-1)	Q_0	478 kvar	447 kvar
	Number of poles	P	6	6
	Synchronous rotation speed	n_0	1000 rpm	1200 rpm
	Rotation speed at rated power	n_N	1012 rpm	1214 rpm
	Slip at rated power	s_N	1.20 %	1.17 %
	Voltage	U_N	3 x 690 V	3 x 600 V
	Frequency	F	50 Hz	60 Hz
	Coupling		Δ	Δ
	Enclosure		IP54	IP54
	Insulation class/ Temperature increase		F/B	F/B

22	Yaw System – Ball Bearing Slewing Ring		
		50 Hz	**60 Hz**
	Type description	Ball bearing, internal gearing	Ball bearing, internal gearing

23	Yaw System – Yaw Gear and Motors		
		50 Hz	**60 Hz**
	Type description	Planetary gear motor	Planetary gear motor
	Gear ratio of yaw gear unit	app. 1:1687	app. 1:1687
	Voltage	3 x 690 V	3 x 480 V
	Rotational speed at full load	920 rpm	1140 rpm
	Number of yaw gears	6 pieces	6 pieces

24	Yaw System – Yaw Brake		
		50 Hz	**60 Hz**
	Type Description	Hydraulic disc brake	Hydraulic disc brake
	Number of Yaw Friction Units	6 pieces	6 pieces

25	Hydraulic Power Unit for Yaw Brake		
		50 Hz	**60 Hz**
	Voltage	3 x 400/ 3x 690 V	3 x 480 V
	Working pressure range	140-150 bar	140-150 bar
	Oil capacity	App. 10 l.	App. 10 l.

26	Tower		
		50 Hz	**60 Hz**
	Type Description	Conical, tubular	Conical, tubular
	Material	Welded steel plate	Welded steel plate
	Corrosion class, outside	Acc. to DS EN ISO 12944: C5 I	Acc. to DS EN ISO 12944: C5 I
	Colour	RAL 7035	RAL 7035
	Access conditions	Internal, safety harness, ladder cage	Internal, safety harness, ladder cage

27	Wind Turbine Main Panel/ Control panel/ phase comp. panel		
		50 Hz	**60 Hz**
	Voltage	3 x 690 V	3 x 600 V
	Frequency	50 Hz	60 Hz
	Cut-in system	Soft with thyristors	Soft with thyristors
	Design Standard	IEC	UL

28	Electrical Grid Requirements		
		50 Hz	**60Hz**
	Max. voltage	+10 % (60 sec.)	+10 % (60 sec.)
	Min. voltage	-10 % (60 sec.)	-10 % (60 sec.)
	Max. voltage	+12.5 % (0.1 sec.)	+12.5 % (0.1 sec.)
	Min. voltage	-15 % (0.1 sec.)	-15 % (0.1 sec.)
	High frequency	+1 Hz (0.2 sec.)	+1 Hz (0.2 sec.)
	Low frequency	- 2 Hz (0.2 sec.)	- 2 Hz (0.2 sec.)
	Maximum asymmetri current	15 % (60 sec.) – phase to ground	15 % (60 sec.) – phase to ground
	Maximum asymmetri voltage	2 % (60 sec.) – phase to ground	2 % (60 sec.) – phase to ground
	Maximum short circuit current	25 kA at 690V	30 kA at 600V
	Single harmonic	Max 1% of any single harmonic	Max 1% of any single harmonic
	Total harmonic distortion	Max 3% total harmonic distortion	Max 3% total harmonic distortion
	Connection	Solidly grounded wye at secondary (690 V) side of transformer	Solidly grounded wye at secondary (600 V) side of transformer

29	Integrated Grid Connection System, IGC System, Transformer in tower - Optional (IGC is not delivered in the US)		
	Power Transformer incl. Metal Enclosure		
		50 Hz	**60 Hz**
	Type description	Cast Resin (dry type)	Cast Resin (dry type)
	Apparent power	1800 kVA	1800 kVA
	Primary voltage	10 – 24 kV+/- 2 x 2.5 %	10 – 24 kV+/- 2 x 2.5 %
	Secondary voltage	0.690 kV	0.600 kV
	Frequency	50 Hz	60 Hz
	Coupling group	Dyn, Solidly grounded wye at 690 V	Dyn, Solidly grounded wye at 600 V
	Switch gear		
	Type description	Gas insulated SF6 ring main unit	Gas insulated SF6 ring main unit
	Nominal voltage	24 kV	24 kV
	Frequency	50 Hz	60 Hz

30a	Power Factor – No Load Compensation - Standard											
	Preconditions											
	Rated power	P_N	1650 kW					1650 kW				
	Rated voltage	U_N	3 x 690V					3 x 600V				
	Frequency	f	50 Hz					60 Hz				
	Reactive power consumption. At rated power (tolerance. Acc to IEC 60034-1)	Q_N	731 kvar					740 kvar				
	Reactive power consumption at no load (tolerance. Acc to IEC 60034-1)	Q_O	478 kvar					447 kvar				
	Capacitor banks:											
	Capacitors		550 kvar, split into steps					499.4 kvar, split into steps				
	Capacitor banks resolution		2 x 25 kvar					2 x 22.7 kvar				
	Min. regulation time (operation)		120 sec.					120 sec.				
	Generator G, 6 poles, 1650 kW:											
	Generator load	%	25	50	75	100	110	25	50	75	100	110
	Power factor without phase compensation (tolerances acc to IEC 60034-1)	cos φ	0.71	0.86	0.91	0.91	0.91	0.69	0.85	0.90	0.91	0.91
	Power factor with phase compensation (tolerances acc to IEC 60034-1)	cos φ	0.99	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98

30b	Power Factor – Full Load Compensation – Optional											
	Preconditions											
	Rated power	P_N	1650 kW					1650 kW				
	Rated voltage	U_N	3 x 690V					3 x 600V				
	Frequency	f	50 Hz					60 Hz				
	Reactive power consumption. At rated power (tolerance. Acc to IEC 60034-1)	Q_N	731 kvar					740 kvar				
	Reactive power consumption at no load (tolerance. Acc to IEC 60034-1)	Q_O	478 kvar					447 kvar				
	Capacitor banks:											
	Capacitors		850 kvar, split into steps					817 kvar, split into steps				
	Capacitor banks resolution		2 x 25 kvar					2 x 22.7 kvar				
	Min. regulation time (operation)		120 sec.					120 sec.				
	Generator G, 6 poles, 1650 kW:											
	Generator load	%	25	50	75	100	110	25	50	75	100	110
	Power factor without phase compensation (tolerances acc to IEC 60034-1)	cos φ	0.71	0.86	0.91	0.91	0.91	0.69	0.85	0.90	0.91	0.91
	Power factor with phase compensation (tolerances acc to IEC 60034-1)	cos φ	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00