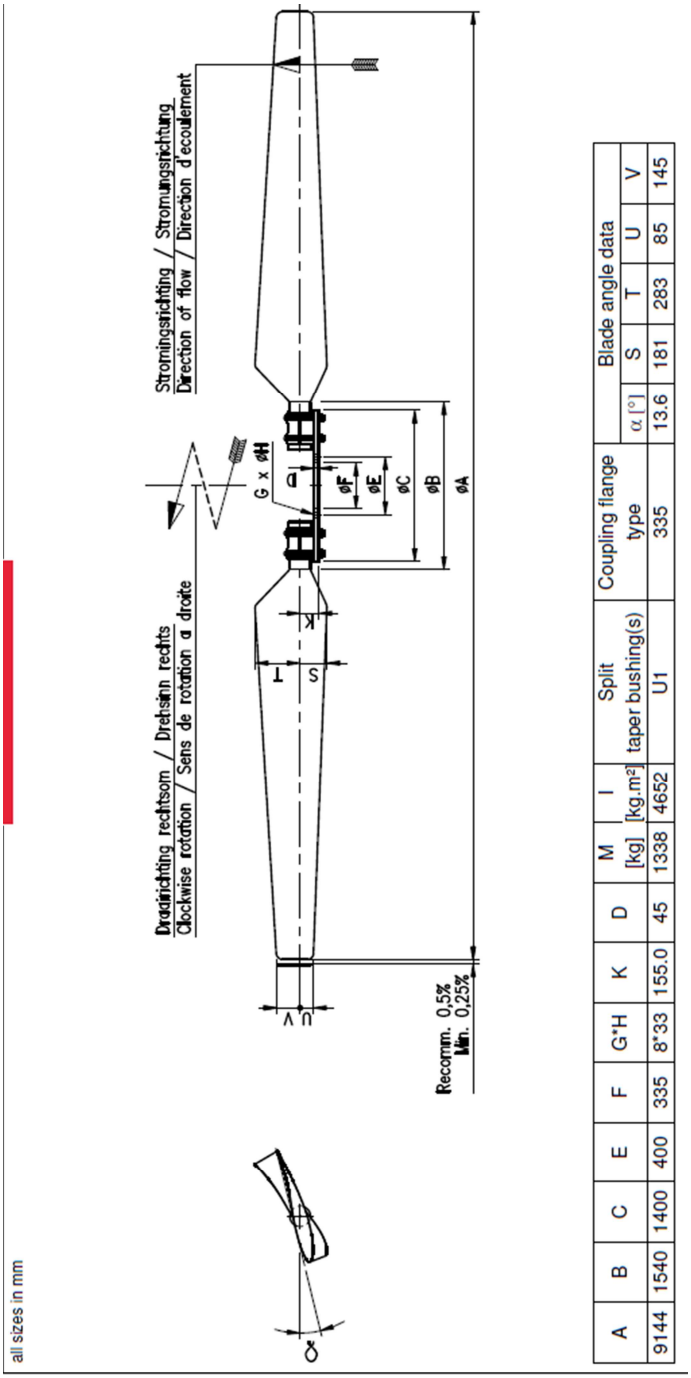
Additional information for tender LPMAT0017GX

Motor and fan specification



A	B	C	E	F	G*H	K	D	M [kg]	I [kg.m²]	Split taper bushing(s)	Coupling flange type	Blade angle data α [°]	S	T	U	V
9144	1540	1400	400	335	8*33	155.0	45	1338	4652	U1	335	13.6	181	283	85	145

Air flow	: 620.0	[m^3/s]	Application	: Air cooled condensor	
Static pressure	: 205.0	[Pa]	Installation type	: Forced Draught	
Inlet temperature	: 23.7	[°C]	Mounting orientation	: vertical shaft; hub at inlet	
Air density	: 1.071	[kg/m^3]	Fan inlet shape	: Bell, L/D = 0.15	
			Forced draught installation; no diffuser present		
Fan diameter	: 30 [ft]				
Fan blade type	: ENF		No obstacles present		
Blade number	: 8				
Fan speed	: 125	[R/min]			
			Fan clearance	: 0.01	(2S/FanDia)
			Crosswind	: 0.0	[m/s]

Blade tip speed		: 59.8		[m/s]
Fan speed		: 125.0		[R/min]
Blade tip angle		: 13.6		[°]
Static efficiency		: 65.0		[%]
Total efficiency		: 79.5		[%]
Fan shaft power		: 195.6		[kW]
Pressure margin	[%]	: 19.4[1]	/	13.5[2]
Air flow margin	[%]	: 9.3[1]	/	-27.0[2]

[1] according to API

[2] at selected blade angle

Impeller Sound Power Level	: 108.2	[dB(A)]
SPL 1m beside fan (A)	: 78.3	[dB(A)]
SPL at 45° 1m below fan (B)	: 80.8	[dB(A)]
SPL 1m below fan (C)	: 86.4	[dB(A)]

Reflections not considered!

Sound power spectrum

Octave [Hz]	PWL [dB]	PWL(A) [dB(A)]	Tolerance [dB]
63	113.3	87.1	5
125	113.3	97.2	3
250	109.3	100.7	2
500	106.3	103.1	2
1000	103.3	103.3	2
2000	95.3	96.5	2
4000	91.3	92.3	2
8000	87.3	86.2	2

Tolerance on sound level values ± 2 [dB(A)]

Dynamical pressure	: 45.9	[Pa]
Corrected Fan Static Pressure	: 205.0	[Pa]
Axial thrust	: 16356	[N]
Sound due to blade angle	: 1.7	[dB(A)]
Sound due to inlet shape	: 0.0	[dB(A)]
Sound due to inlet obstacles	: 0.0	[dB(A)]
Sound due to outlet obstacles	: 0.0	[dB(A)]
Total Sound Power Level	: 108.2	[dB(A)]

Max. allowed tip speed	: 69.6	[m/s]
Max. allowed blade angle	: 30.0	[°]
Max. allowed blade temp.	: 65.0	[°C]
Impeller mass	: 1338	[kg]
Impeller moment of inertia	: 4652	[kg.m^2]
Force due to loss of 1 blade(s)	: 31738	[N]
Residual imbalance force (G6.3)	: 110	[N]
Blade natural frequency	: 4.9	[Hz]
Blade operating natural frequency	: 5.5	[Hz]
Operating frequency	: 2.1	[Hz]
Blade passing frequency	: 16.7	[Hz]
Dimensionless flow Cf	: 0.158	
Dimensionless pressure Cp	: 0.107	

Takenote that the followong is for a 270kW motor on the ACC. All motors wil be repalced with a 280kW motor.

Annex D: Technical schedule B
Guarantees and technical particulars of equipment offered

Eskom

DESIGN DETAILS OF

Project Name:

Project No:

PLANT DESCRIPTION		
DRIVEN MACHINE		
APPLICATION		
ID	Motor Details	Schedule A
1	Motor reference code: Eskom Supplier	
2	Motor manufacturer	CMG 12-PPA
3	Type of motor design	
4	Number installed	288
5	Motor Full Load Rating	
	i) International Efficiency class code (IE Code)	IE2

ii) Frame size	D355 LD
iii) Pole	Four (4)
iv) Phases	Three (3)
v) Supply voltage - V AC	525 V
vi) Rated current - A	341 A
vii) Frequency - Hz	50 Hz
viii) Power factor	0,84
ix) Efficiency - %	96.1%
x) Speed or Speed range - RPM	1480 - 1500
xi) Duty-class - IEC 60034-1	S1
xii) Utilization factor	Continuous
xiii) Altitude (Above sea level)	788
xiv) Enclosure - Degree of protection IP Code	IP66
xv) Cooling Method	Fan Cooled

6.1 Guarantees	3 JRS
i) Rated power - kW	370 kW
ii) Locked rotor torque - Nm	2872
iii) Pull-up torque - Nm	2333
iv) Breakdown torque - Nm	4128
v) Duty point efficiency = %	100%
vi) Duty point power factor	100%
vii) Starting current ratio at 100% Voltage	4.9
6.2 Maximum permissible stall time (s)	
i) hot	
ii) cold	10 sec
iii) Run-up time at minimum (%) voltage = s	45 sec
6.3 Maximum temperatures (see 4.1.8 of GGS 0802)	
i) stator	B rise (80K)
ii) rotor	

Stator core dimensions	
i) Inside diameter	423
ii) Outside diameter	535
iii) Active length	400
Motor insulation class and type of insulating system	
i) Stator winding	H
ii) Stator winding insulation sized for VSD application	N/A
iii) Rotor bars	Copper or Aluminium
Motor mass - Kg	2080 kg
Noise level	IEC 60034-9
Ambient temperature (Minimum and Maximum) - °C	0 - 40 (50 exceptional)
Moment of inertia - kgm^2	4662kg.m^2
Base plate required with motor	No
i) Bearing type	Roller / BALL
ii) Lubrication type and method	Grease, Manual
iii) Lubrication interval	≥4000 Hrs

iii) Lubrication interval	≥4800 Hrs
iv) Bearing life	100 000 Hrs
Rotation (viewed on motor drive shaft)	Clockwise
Motor mounting (Horizontal / Vertical) (foot/flange)	Vertical Flange
Method of impregnation	VPI
Number of starts from Hot, within an hour	Two (2)
Number of starts from cold, within an hour	Three (3)
Motor life expectancy	30 years
Torque-speed curves plotted over the driven machine torque-speed curve	
Thermal limit curves	
Temperature Measuring Devices	
At least one thermistor per phase is provided on all crane motors, actuator motors and other short-time rated motors.	PTC 100/1 per PHASE
Space Heaters	

The following is for a 280kW motor

Three phase cage induction motor		
Type : [redacted]	Prod.Code: [redacted]	
280 kW	1489 r/m	Amb: 40°C
Duty: S1	cos fi: 0.84	50 Hz
525 V	Conn: Delta	381.1 A
IP: 66	Ins.Cl: H	Eff.[%] 96.1
Brg.DE: NU324	Brg.NDE: 6324	2080 kg

Compliance to Standard

Motor performance in accordance with AS1359.101
Efficiency as per AS1359 Part 102.1

FP Nel
2022/08/03

Performance Data

	Voltage [V]	Current [A]	Input Power [Watts]	Frequency [Hz]	Speed [r/m]	Torque [Nm]	Output Power [Watts]	Power Factor	Effic. [%]
No Load	525	105.9	5281	50	1500	0.0	0	0.05	0.0
25% F.L.	525	138.3	75650	50	1497	444.6	69698	0.60	92.1
50% F.L.	525	210.6	140000	50	1495	849.2	132935	0.73	95.0
75% F.L.	525	293.9	210000	50	1492	1287.5	201139	0.79	95.8
100% F.L.	**525**	**381.1**	**291180**	**50**	**1489**	**1794.5**	**279788**	**0.84**	**96.1**
125% F.L.	525	470.0	364500	50	1486	2249.6	350049	0.85	96.0
Locked Rt.T.	525	1799.9	517600	50	0	2807.0	-	0.32	-
Break D.T.	525	-	-	50	1453	4154	-	-	-

Legend: F.L. = Full Load; Locked Rt.T. = Locked Rotor Torque; Break D.T. = Break Down Torque

Resistance between terminals [Ohms]	U1 - V1	0.00991
	U1 - W1	0.00991
	V1 - W1	0.00991
	Conn.	Delta
	@Temp[°C]	20.0
Insulation resistance to frame	Instrument	Megger
	voltage	1000
	megohms	500
	@Temp[°C]	20.0
H.V. test winding to frame	Voltage	2050
	Minutes	1min.
	Result	Passed

Heat Run Performance
After continuous run at:
525 V
365.3 A
1489 r/m

Part of motor	Temperature rise in [K] at amb. temp. 12 [°C] by: thermometer	resistance	temp.detector
Winding	-	67.8	-
Frame	22.7	-	-

Over rate performance

	Value	%incr.	Duration
Excess Torque [Nm]	2872	160	15sec.
Excess Current [A]	573.3	150	2min.
Overspeed [r/m]	1800	120	2min.