

Majuba Power Station

Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
0	General														
0.01	Site establishment for OP		X												
0.02	Site establishment for IN			X											
0.03	Site establishment for IR				X										
0.04	Site establishment for GO					X									
0.05	Site de-establishment for OP		X												
0.06	Site de-establishment for IN			X											
0.07	Site de-establishment for IR				X										
0.08	Site de-establishment for GO					X									
0.09	Open inspection doors		X	X	X	X									
0.10	Close inspection doors		X	X	X	X									
0.11	Wash the complete fan casing, concrete pedestals and fan bearing pedestals.			X	X	X									

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
ID Fans															
1	Fan Inspection OP														
1.01	a) Open/close all access doors b) Visual inspect Inlet box for signs of leakage ingress or wear, shaft guard sealing, measuring point blockage and compensator failure. c) Visual inspect Stall detection device for damage. d) Visual inspect Fan DE/NDE blades for wear, damage, looseness and attachment bolts. e) Visual inspect Fan DE/NDE Casing fixed vanes for wear, weld-cracks and damage. f) Visual inspect Fan casing DE/NDE Rotor track for damage and concentricity, Radial casing seals for damage/leakage, blade removal door leakage/position (where applicable), Bearing room access door fixing (where applicable). g) Visual inspect Fan NDE casing for wear, damage, cracks, measuring point blockage and compensator failure. h) Visual inspect Hydraulic compartment access doors, casing radial sealing, oil leakage, loose bolts and dirt ingress. i) Visual inspect Vent-fan installation, ducts, dampers and suction filter condition. j) Visual inspect lube system and piping to fan/motor for leakage/condition. k) Visual inspect Motor and bearings for leakage and cause, oil level and cleanliness. l) Visual inspect external casing, tapping points, and vibration equipment (where applicable). m) Report all findings		X												

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
ID Fans															
2	Fan Inspection IN														
2.01	a) Open/close all access doors b) Visual inspect Inlet box for signs of leakage ingress or wear, shaft guard sealing, measuring point blockage and compensator failure. c) Visual inspect Stall detection device for damage. d) Visual inspect Fan DE/NDE blades for wear, damage, looseness and attachment bolts. e) Visual inspect Fan DE/NDE Casing fixed vanes for wear, weld-cracks and damage. f) Visual inspect Fan casing DE/NDE Rotor track for damage and concentricity, Radial casing seals for damage/leakage, blade removal door leakage/position (where applicable), Bearing room access door fixing (where applicable). g) Visual inspect Fan NDE casing for wear, damage, cracks, measuring point blockage and compensator failure. h) Visual inspect Hydraulic compartment access doors, casing radial sealing, oil leakage, loose bolts and dirt ingress. i) Visual inspect Vent-fan installation, ducts, dampers and suction filter condition. j) Visual inspect Lube system and piping to fan/motor for leakage/condition. k) Visual inspect Motor and bearings for leakage and cause, oil level and cleanliness. l) Visual inspect external casing, tapping points, and vibration equipment (where applicable). m) Report all findings			X											

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
ID Fans															
3	Fan Inspection IR														
3.01	a) Open all access doors & remove coupling guard b) Visual inspect Inlet box for signs of leakage ingress or wear, shaft guard sealing, measuring point blockage and compensator failure. c) Visual inspect Stall detection device for damage. d) Visual inspect Fan DE/NDE blades for wear, damage, looseness and attachment bolts. e) Visual inspect Fan DE/NDE Casing fixed vanes for wear, weld-cracks and damage. f) Visual inspect Fan casing DE/NDE Rotor track for damage and concentricity, Radial casing seals for damage/leakage, blade removal door leakage/position (where applicable), Bearing room access door fixing (where applicable). g) Visual inspect Fan NDE casing for wear, damage, cracks, measuring point blockage and compensator failure. h) Visual inspect Hydraulic compartment access doors, casing radial sealing, oil leakage, loose bolts and dirt ingress. i) Visual inspect Vent-fan installation, ducts, dampers and suction filter condition. j) Visual inspect Lube system for leakage/condition. k) Visual inspect Coupling and brake assy for damage and condition - report brake pad wear. l) Visual inspect Motor and bearings for leakage and cause, oil level and cleanliness. m) Visual inspect external casing, tapping points, and vibration equipment (where applicable). n) Perform DE/NDE Blade tip clearance monitoring. o) Report all findings			X											

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
ID Fans															
4	Fan Inspection GO														
4.01	a) Open all access doors & remove coupling guard b) Visual inspect Inlet box for signs of leakage ingress or wear, shaft guard sealing, measuring point blockage and compensator failure. c) Visual inspect Stall detection device for damage. d) Visual inspect Fan DE/NDE blades for wear, damage, looseness and attachment bolts. e) Visual inspect Fan DE/NDE Casing fixed vanes for wear, weld-cracks and damage. f) Visual inspect Fan casing DE/NDE Rotor track for damage and concentricity, Radial casing seals for damage/leakage, blade removal door leakage/position (where applicable), Bearing room access door fixing (where applicable). g) Visual inspect Fan NDE casing for wear, damage, cracks, measuring point blockage and compensator failure. h) Visual inspect Hydraulic compartment access doors, casing radial sealing, oil leakage, loose bolts and dirt ingress. i) Visual inspect Vent-fan installation, ducts, dampers and suction filter condition. j) Visual inspect Lube system for leakage/condition. k) Visual inspect Coupling and brake assy for damage and condition - report brake pad wear. l) Visual inspect Motor and bearings for leakage and cause, oil level and cleanliness. m) Visual inspect external casing, tapping points, and vibration equipment (where applicable). n) Perform DE/NDE Blade tip clearance monitoring. o) Report all findings				X										

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
ID Fans															
5	Casing Doors														
5.01	Service, re-seal and close the casing access doors (qty 4 doors)				X	X									
5.02	Service, re-seal and close the blade removal access doors.				X	X									
6	Blade NDT and Condition Monitoring														
6.01	Carry out complete blade set NDT when the blades are removed during a rotor swop.			X	X	X									
6.02	Carry out turning of impeller to carry out Blade crack testing on 8 blades per fan - (in situ - when blades are not removed)			X	X	X									
6.03	Carry out blade crack testing on 8 blades per fan - (in situ - when blades are not removed)			X	X	X									
6.04	Carry out blade thickness monitoring when the blades are removed (Selected 4 first stage and 4 second stage blades).				X	X									
6.05	Carry out blade thickness monitoring when the blades are in-situ (Selected 4 first stage and 4 second stage blades)				X	X									
6.06	Perform DE/NDE blade tip clearance check if any blades were removed without Rotor swop.			X	X	X									
7	Casing NDT and Condition Monitoring														
7.01	Casing fixed vane crack testing - Open Fan, including bearing compartment.				X	X									
7.02	Casing fixed vane crack testing - Closed Fan and no fan swop.				X	X									
7.03	Casing fixed vane crack testing - NDT (Re-test 10% after casing repairs).				X	X									

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
ID Fans															
8	Rotating Assembly Swop (RAS)														
8.01	a) Remove the casing top half, survey flat laydown and clean the split flanges. b) Re- seal and refit the casing top half c) Remove top half rotor track casing compensators. d) Refit top half Rotor track casing compensators. e) Remove inlet cone during rotor swop. f) Refit/seal inlet cone during rotor swop. g) Disconnect and re-fit/torque fan side coupling. h) Remove blades and clean/prepare for NDT. i) Refit blades. j) Service/polish blades to remove mechanical damage and wear. k) Measure, report and then evaluation the casing, bearing labyrinth, cone and hydraulic compartment seal clearances (when casing is being removed). l) Check blade tip clearance to procedure. m) Trim blade tips - based on trimming 23 of blades. n) Remove all Rotor connecting piping & bolts. o) Refit all Rotor connecting piping & bolts. p) Remove Rotating Assy complete. q) Refit Rotating Assy complete. r) Perform Lube system flushing before pipe connection to swopped Rotor bearings. s) Record blade tip and rotor seal clearances. t) Check blade pitch servo motor alignment and report. u) Inspect and verify secureness/health of all compartment seal pressure measuring pipes. v) Adjust/stroke blades hydr and mechanically. w) Assist with C&I blade pitch stroking.			X	X										

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
ID Fans															
9	Repair Tasks - Rotor swop or non-swop														
9.01	Replace steel structure bolts for rigging beam (12 yearly)				X	X									
9.02	Balance rotor before blade fitting				X	X									
9.03	Replace Inlet Cone labyrinth seal (if damaged) (when cone has been removed for swop)				X	X									
9.04	Replace bearing housing casing labyrinth seals (if damaged) - must incorporate adjustment with dummy rotor) (2x)														
9.04	Re-adjust/repair Servo-motor housing labyrinth/radial seal (if required)				X	X									
9.05	Replace Servo-motor housing labyrinth/radial seal (if damaged)				X	X									
9.06	Trimming of Complete set of new blades (additional 23 blades)				X	X									
9.07	Replace complete Rotor track casing compensators complete when casing open/removed (2x)														
9.08	Repair casing fixed vane cracks (16 vanes)				X	X									
9.09	Repair casing fixed vane cracks (32 vanes)				X	X									
9.09	Remove and Replace Inlet duct compensator				X	X									
9.10	Remove and Replace Outlet duct compensator				X	X									
9.11	Replace Casing tapping points - weld attach and connect				X	X									
9.12	Clean and unblock casing drains				X	X									
9.13	Provide and connect a control power supply distribution board to enable lube pump control during rotor swop.				X	X									
9.14	Service/clean all pressure/flow tapping points.		X	X	X	X									
9.15	Repair/replace stall probe (if damaged)														
9.16	Service blade pitch control lay shaft bearings - replace bearings (if required)					X									

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ID Fans															
10	Lubrication System														
10.01	Service lube tank - Drain/replace oil, clean tank, clean/replace level sight glass, filters and door seal if required.			X	X	X									
10.02	Replace lube system PRV (2x)			X	X	X									
	Service lube system PCV - clean spool, replace seals (Majuba only)														
10.03	Replace lube system PCV (1x)														
10.04	Remove and replace hydraulic/lube system pumps with serviced/new/tested units				X	X									
10.05	Replace system cooler with serviced unit					X									
10.06	Service lube/hydraulic return piping sight glasses - clean glass, replace gaskets (qty 5)				X	X									
10.07	Replace hydraulic/lube system flow gauges with serviced/new units (qty 1)				X	X									
10.08	Replace accumulator if required														
11	Bearing Cooling/Sealing Fans														
11.01	Replace fan/motor complete														
11.02	Service/Replace fan coupling on motor shaft					X									
11.03	Preserve (de-rust and paint) fan housing and support					X									
11.04	Visual Inspect fan impeller condition for wear					X									
12	Motor and Bearings														
12.01	Execute complete motor DE bearing service - open, inspect, clean, sight glass, replace sleeve/seals/oil ring if required.					X									
12.02	Execute complete motor NDE bearing service - open, inspect, clean, sight glass, replace sleeve/seals/oil ring if required.					X									
12.03	Lift motor cooler for internal inspection and replace - (includes Cooling Water supply/return pipes remove/replace)				X	X									
12.04	Remove motor, Clean Motor base and Refit Motor														
12.05	Open inlet cone for alignment during motor swop (if not during Fan Rotor swop)														
12.06	Close/seal of inlet cone after alignment during motor swop (if not during Fan Rotor swop)														

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ID Fans															
12.07	Strip, inspect (NDT) motor side coupling lamellas - performed while motor or fan rotor is moved														
12.08	Carry out alignment of motor to fan shaft														
13	Commissioning														
13.01	Perform motor direction test run and confirmation of magnetic centre position.					X									
13.02	Carry out balancing of rotor (qty 4 balance runs)				X	X									
13.03	Check/charge hydraulic/lube system accumulator pressure (where applicable)				X	X									
13.04	Commission and report on Lube/hydr compartment seal air pressure settings during fan operation (Medupi only)				X	X									
13.05	Measure Lube/Hydr compartment seal pressures and report				X	X									
13.06	Commissioning of lube system (Cold and Hot setting & verification)			X	X	X									
13.07	Test Run Fan and report on performance			X	X	X									

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
FD Fans															
1	Fan Inspection OP														
1.01	a) Open/close all access doors b) Visual inspect Inlet box for signs of leakage ingress or wear, shaft guard sealing, measuring point blockage and compensator failure. c) Visual inspect Stall detection device for damage. d) Visual inspect Fan DE/NDE blades for wear, damage, looseness and attachment bolts. e) Visual inspect Fan DE/NDE Casing fixed vanes for wear, weld-cracks and damage. f) Visual inspect Fan casing DE/NDE Rotor track for damage and concentricity, Radial casing seals for damage/leakage, blade removal door leakage/position (where applicable), Bearing room access door fixing (where applicable). g) Visual inspect Fan NDE casing for wear, damage, cracks, measuring point blockage and compensator failure. h) Visual inspect Hydraulic compartment access doors, casing radial sealing, oil leakage, loose bolts and dirt ingress. i) Visual inspect Lube system and piping to fan/motor for leakage. j) Visual inspect fan DE/NDE bearings and labyrinth seals for condition & leakage k) Visual inspect Motor and bearings for leakage and cause, oil level and cleanliness. l) Visual inspect external casing, tapping points, and vibration equipment (where applicable). m) Report all findings.		X												

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
FD Fans															
2	Fan Inspection IN														
2.01	a) Open/close all access doors b) Visual inspect Inlet box for signs of leakage ingress or wear, shaft guard sealing, measuring point blockage and compensator failure. c) Visual inspect Stall detection device for damage. d) Visual inspect Fan DE/NDE blades for wear, damage, looseness and attachment bolts. e) Visual inspect Fan DE/NDE Casing fixed vanes for wear, weld-cracks and damage. f) Visual inspect Fan casing DE/NDE Rotor track for damage and concentricity, Radial casing seals for damage/leakage, blade removal door leakage/position (where applicable), Bearing room access door fixing (where applicable). g) Visual inspect Fan NDE casing for wear, damage, cracks, measuring point blockage and compensator failure. h) Visual inspect Hydraulic compartment access doors, casing radial sealing, oil leakage, loose bolts and dirt ingress. i) Visual inspect Lube system and piping to fan/motor for leakage. j) Visual inspect fan DE/NDE bearings and labyrinth seals for condition & leakage k) Visual inspect Motor and bearings for leakage and cause, oil level and cleanliness. l) Visual inspect external casing, tapping points, and vibration equipment (where applicable). m) Report all findings.			X											

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
FD Fans															
3	Fan Inspection IR														
3.01	a) Open all access doors and remove coupling guard. b) Visual inspect Inlet box for signs of leakage ingress or wear, shaft guard sealing, measuring point blockage and compensator failure. c) Visual inspect Stall detection device for damage. d) Visual inspect Fan DE/NDE blades for wear, damage, looseness and attachment bolts. e) Visual inspect Fan DE/NDE Casing fixed vanes for wear, weld-cracks and damage. f) Visual inspect Fan casing DE/NDE Rotor track for damage and concentricity, Radial casing seals for damage/leakage, blade removal door leakage/position (where applicable), Bearing room access door fixing (where applicable). g) Visual inspect Fan NDE casing for wear, damage, cracks, measuring point blockage and compensator failure. h) Visual inspect Hydraulic compartment access doors, casing radial sealing, oil leakage, loose bolts and dirt ingress. i) Visual inspect Lube system for leakage. j) Visual inspect coupling & brake assy for condition. k) Visual inspect Fan DE/NDE bearings & seals for damage and condition. l) Visual inspect Motor and bearings for leakage and cause, oil level and cleanliness. m) Visual inspect external casing, taping points, and vibration equipment (where applicable). n) Perform DE/NDE Blade tip clearance monitoring. o) Report all findings.			X											

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Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
FD Fans															
4	Fan Inspection GO														
4.01	a) Open all access doors and remove coupling guard. b) Visual inspect Inlet box for signs of leakage ingress or wear, shaft guard sealing, measuring point blockage and compensator failure. c) Visual inspect Stall detection device for damage. d) Visual inspect Fan DE/NDE blades for wear, damage, looseness and attachment bolts. e) Visual inspect Fan DE/NDE Casing fixed vanes for wear, weld-cracks and damage. f) Visual inspect Fan casing DE/NDE Rotor track for damage and concentricity, Radial casing seals for damage/leakage, blade removal door leakage/position (where applicable), Bearing room access door fixing (where applicable). g) Visual inspect Fan NDE casing for wear, damage, cracks, measuring point blockage and compensator failure. h) Visual inspect Hydraulic compartment access doors, casing radial sealing, oil leakage, loose bolts and dirt ingress. i) Visual inspect Lube system for leakage. j) Visual inspect coupling & brake assy for condition. k) Visual inspect Fan DE/NDE bearings & seals for damage and condition. l) Visual inspect Motor and bearings for leakage and cause, oil level and cleanliness. m) Visual inspect external casing, tapping points, and vibration equipment (where applicable). n) Perform DE/NDE Blade tip clearance monitoring. o) Report all findings.				X										

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
FD Fans															
5	Casing Doors														
5.01	Reseal and close all casing access doors				X	X									
5.02	Open, reseal, close the blade removal doors (Casing closed)				X	X									
6	Blade NDT And Condition Monitoring														
6.01	Carry out out turning of impeller to carry out Blade NDT (crack testing) on blades per fan - (in situ - when blades are not removed)			X	X	X									
6.02	Carry out blade NDT on 20 blades per fan - (in situ - when blades are not removed)			X	X	X									
6.03	Carry out complete blade set NDT when the blades are removed during a rotor swop.				X	X									
6.04	Carry out blade thickness monitoring when the blades are removed (Selected 4 blades) and report.				X	X									
6.05	Carry out blade thickness monitoring when the blades are in-situ (Selected 4 blades) and report.		X	X											
6.06	Perform blade tip clearance check if any blades were removed without rotor swop.			X	X	X									
7	Casing NDT And Condition Monitoring														
7.01	Casing fixed vane crack testing - Open Fan				X	X									
7.02	Casing fixed vane crack testing - Closed Fan and no fan swop.				X	X									
7.03	Casing fixed vane crack testing - NDT (Re-test 10% after casing repairs).				X	X									

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
FD Fans															
8	Rotating Assembly Swop (RAS)														
8.01	a) Remove the casing top half, survey flat laydown and clean the split flanges. b) Re- seal and refit the casing top half. c) Remove motor side coupling shaft guard. d) Refit motor side coupling shaft guard. e) Disconnect and re-connect/torque fan/motor side coupling, and inspect/report condition. f) Remove blades, and clean for NDT preparation. g) Refit and re-seal blades. h) Service/polish blades to remove mechanical damage and wear. i) Check blade tip clearance to procedure. j) Trim blades - based on trimming 10 of blades. k) Remove DE/NDE bearing seals, housing tops, and sleeves to facilitate Rotor removal. l) Perform complete DE/NDE bearing inspection and service with remove/replace Rotor - record clearances. m) Remove DE/NDE Rotor/shaft seals, replace & adjust to facilitate Rotor removal. n) Remove all Rotor connecting piping & bolts. o) Refit all Rotor connecting piping & bolts. p) Remove Rotating Assy complete. q) Refit Rotating Assy complete. r) Perform Lube/hydr system flushing before pipe connection to swopped Rotor bearings. s) Record blade tip and rotor seal clearances. t) Adjust and report Rotating union alignment. u) Adjust and stroke blades hydraulically and mechanically. v) Assist with C&I blade pitch stroking.				X	X									

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
FD Fans															
9	Repair Tasks - Rotor swop or non-swop														
9.01	Measure and then evaluation of Casing/bearing labyrinth seal clearances (when casing is being removed) (2x)				X	X									
9.02	Replace complete Fan inlet casing compensators (when required)														
9.03	Replace complete Fan discharge casing compensators (when required)														
9.04	Repair casing fixed vane cracks (5 vanes)				X	X									
9.05	Remove and Replace Inlet duct compensator				X	X									
9.06	Clean and unblock casing drains				X	X									
9.07	Provide and connect a control power supply disutribution board to enable lube pump control during rotor swop.				X	X									
9.08	Repair/replace stall probe if damaged														
9.09	Service blade pitch control lay shaft bearings/seals - replace bearings/seals if requied				X	X									
10	Lubrication System														
10.01	Service lube tank - Drain/replace oil, clean tank, clean/replace level sight glass, filters and door seal if requied.				X	X									
10.02	Replace lube system PRV (1x)														
10.03	Replace lube system PCV (1x)														
10.04	Remove and replace hydr/lube system pumps with serviced/new units				X	X									
10.05	Replace system cooler with serviced/new unit					X									
10.06	Service lube/hydraulic return piping sight glasses - clean glass, replace gaskets (qty 5)					X									
10.07	Replace hydr/lube system flow gauges with serviced/new units					X									
10.08	Replace accumulator if required														

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FD Fans															
11	Fan Bearings														
11.01	Execute complete fan DE bearing service - open, inspect, clean, sight glass, replace sleeve/seals/oil ring if required.					X									
11.02	Execute complete fan NDE bearing service - open, inspect, clean, sight glass, replace sleeve/seals/oil ring if required.					X									
11.03	Service and adjust fan DE/NDE bearing labyrinth seals and report set clearances.				X	X									
12	Motor and Bearings														
12.01	Execute complete motor DE bearing service - open, inspect, clean, sight glass, replace sleeve/seals/oil ring if required.					X									
12.02	Execute complete motor NDE bearing service - open, inspect, clean, sight glass, replace sleeve/seals/oil ring if required.					X									
12.03	Lift motor cooler for internal inspection and replace - (includes Cooling Water supply/return pipes remove/replace)				X	X									
12.04	Remove motor, Clean Motor base and Refit Motor														
12.05	Carry out alignment of motor to fan shaft														
13	Commissioning														
13.01	Perform motor direction testrun and confirmation of magnetic centre position.														
13.02	Carry out balancing of rotor				X	X									
13.03	Check/charge hydr/lube system accumulator pressure (when applicable)				X	X									
13.04	Commissioning of lube system (Cold and Hot setting & verification)			X	X	X									
13.04	Test Run Fan			X	X	X									
13.05	Verify and report and adjust functioning of the fan Stall system.			X	X	X									

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Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
1	Fan Inspection OP														
1.01	a) Visually inspect fan impeller for wear and erosion b) Visually inspect complete casing internally and externally for damage and erosion c) Visually inspect casing flanges for damage and wear d) Visually inspect casing flange bolts for missing and damaged bolts where bolts are visible (no stripping of cladding) e) Visually inspect coupling guard for damage f) Visually inspect shaft seal guards and bolts for damage. g) Visually inspect RVC lay shaft system for damage or broken links h) Visually inspect RVC system for wear, damage and loose links (No opening of annular plates) i) Visually inspect Dorsal Fins for damage and erosion j) Visually inspect bearings for any oil leaks k) Visually inspect lubrication system for oil leaks l) Visually inspect stay rods for damage and wear m) Visually inspect casing holding down bolts for damaged or loose bolts n) Visually inspect the suction cones for damage and erosion o) Visually inspect fan bearing pedestals for damage p) Visually inspect fan bearing holding down bolts for damage q) Visually inspect fan motor bearings for any oil leaks		X												

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Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
2	Fan Inspection IN														
2.01	a) Visually inspect fan impeller for wear and erosion b) Visually inspect complete casing internally and externally for damage and erosion c) Visually inspect casing flanges for damage and wear d) Visually inspect casing flange bolts for missing and damaged bolts where bolts are visible (no stripping of cladding) e) Visually inspect coupling guard for damage f) Visually inspect shaft seal guards and bolts for damage. g) Visually inspect RVC lay shaft system for damage or broken links h) Visually inspect RVC system for wear, damage and loose links i) Visually inspect Dorsal Fins for damage and erosion j) Visually inspect bearings for any oil leaks k) Visually inspect lubrication system for oil leaks l) Visually inspect stay rods for damage and wear m) Visually inspect casing holding down bolts for damaged or loose bolts n) Visually inspect the suction cones for damage and erosion o) Measure suction cone penetration and clearance p) Visually inspect fan bearing pedestals for damage q) Visually inspect fan bearing holding down bolts for damage r) Visually inspect fan motor bearings for any oil leaks			X											

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Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
3	Fan Inspection IR														
3.01	a) Visually inspect fan impeller for wear and erosion b) Visually inspect complete casing internally and externally for damage and erosion c) Visually inspect casing flanges for damage and wear d) Visually inspect casing flange bolts for missing and damaged bolts where bolts are visible (no stripping of cladding) e) Visually inspect coupling guard for damage f) Visually inspect shaft seal guards and bolts for damage. Tighten loose bolts g) Visually inspect RVC lay shaft system for damage or broken links h) Visually inspect RVC system for wear, damage and loose links (No opening of annular plates) i) Visually inspect Dorsal Fins for damage and erosion j) Visually inspect bearings for any oil leaks k) Visually inspect lubrication system for oil leaks l) Visually inspect stay rods for damage and wear m) Visually inspect casing holding down bolts for damaged or loose bolts n) Visually inspect the suction cones for damage and erosion o) Measure suction cone penetration and clearance p) Visually inspect fan bearing pedestals for damage q) Visually inspect fan bearing holding down bolts for damage r) Visually inspect fan motor bearings for any oil leaks			X											

Majuba Power Station

Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
4	Fan Inspection GO														
4.01	a) Visually inspect fan impeller for wear and erosion b) Visually inspect complete casing internally and externally for damage and erosion c) Visually inspect casing flanges for damage and wear d) Visually inspect casing flange bolts for missing and damaged bolts where bolts are visible (no stripping of cladding) e) Visually inspect coupling guard for damage f) Visually inspect shaft seal guards and bolts for damage. g) Visually inspect RVC lay shaft system for damage or broken links h) Visually inspect RVC system for wear, damage and loose links (No opening of annular plates) i) Visually inspect Dorsal Fins for damage and erosion j) Visually inspect bearings for any oil leaks k) Visually inspect lubrication system for oil leaks l) Visually inspect stay rods for damage and wear m) Visually inspect casing holding down bolts for damaged or loose bolts n) Visually inspect the suction cones for damage and erosion o) Measure suction cone penetration and clearance p) Visually inspect fan bearing pedestals for damage q) Visually inspect fan bearing holding down bolts for damage r) Visually inspect fan motor bearings for any oil leaks				X										

Majuba Power Station

Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
5	NDT - Inspection														
5.01	Microblast impeller clean for preparation for NDT				X	X									
5.02	Do complete impeller NDT weld inspection as per 240-89218242 Boiler Centrifugal Fan Inspection Standard				X	X									
5.03	Do complete impeller NDT thickness testing inspection as per 240-89218242 Boiler Centrifugal Fan Inspection Standard														
5.04	NDT testing of all weld repairs after waiting period														
6	Impeller Weld Repairs														
6.01	Inspection of Fan In-situ by Engineer to determine damage and repairs required and submit detailed report			X	X	X									
6.02	Compilation of detailed fan in-situ repair procedure by Engineer														
6.03	Weld repair of impeller in-situ by crew required based on a 12 hour shift.														
6.04	Install correct balance weights after dynamic balancing by approved method			X	X	X									
6.05	NDT the balance weights welding after waiting period to procedure			X	X	X									

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Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
7	Coupling - Spring														
7.01	Remove coupling guards			X	X	X									
7.02	Open and clean coupling, Inspect covers, springs and teeth. Replace springs if required. Re-grease coupling and close up coupling. Submit wear report			X	X	X									
7.03	Remove fan shaft end coupling half and refit fan shaft end coupling half														
7.04	Remove motor shaft end coupling half and refit motor shaft end coupling half.														
7.05	Laser align fan impeller and motor to correct specifications and coupling gap			X	X	X									
7.06	Carry out minor repairs on coupling guard and replace missing bolts.			X	X	X									
7.07	Refit coupling guards			X	X	X									

Majuba Power Station

Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
8	Lubrication System - Two Electrical Pumps														
8.01	Remove and refit pump motor														
8.02	Remove and refit pump														
8.03	Remove and refit pressure regulating valve														
8.04	Remove and refit needle valve														
8.05	Remove and refit filters														
8.06	Remove and refill oil														
8.07	Remove and refit duplex filter unit														
8.08	Remove and refit flexible hoses to bearings				X	X									
8.09	Open, drain, clean and inspect tank for rust and damage. Inspect all oil pipework for leaks and repair where required. Inspect suction strainer/foot valve (Where fitted). Fit new gaskets and close tank. Refill tank via filtration unit.			X	X	X									
8.10	Microblast clean tank inside, clean tank and re-coat inside of tank with special coating														
8.11	Remove lubrication oil filters and clean/replace filters as required. Service filter change over handles and repair oil leaks on piping and filter unit.			X	X	X									
8.12	Inspect lubrication oil pumps for leaks and repair leaks where required.			X	X	X									
8.13	Remove lubrication oil pumps and inspect couplings and bell housing/guards for damage. Repair any damage and replace coupling or bell housing if required. Refit pumps					X									
8.14	Send pumps away for overhaul					X									
8.15	Disconnect and remove oil coolers. Open water boxes and inspect coolers for damage and wear. Replace gaskets/O-rings where required. Clean coolers. Close coolers and refit coolers.			X	X										
8.16	Disconnect and remove oil coolers. Send coolers for inspection and pressure testing off site. Refit coolers.					X									
8.17	Chemically flush lubrication piping to remove any rust and scaling.														
8.18	Flush lubrication system by bypassing bearings and using mobile filtration unit.			X	X	X									

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Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
8.19	Commission lubrication system by setting pressures and/or flow rates			X	X	X									
10	Bearings - White Metal Force Lubricated DE & NDE														
10.01	Clean bearing and working area.			X	X	X									
10.02	Remove lubrication oil piping and blank of oil lines to prevent dirt getting into the lines					X									
10.03	Remove thermocouple					X									
10.04	Open bearing top cap					X									
10.05	Remove bearing sleeve top half					X									
10.06	Jack up shaft and remove bearing bottom half					X									
10.07	Inspect bearing sleeves white metal surfaces for damage and wear.					X									
10.08	Send sleeves away for re-metal					X									
10.09	Remove fan bearing holding down bolts, Inspect bolts and re-fit bolts					X									
10.10	Remove fan bearing housing when bearing has been removed														
10.11	Inspect fan bearing pedestal for flatness and damage when bearing has been removed														
10.12	Refit fan bearing housing														
10.13	Inspect bearing bottom and top saddles for damage and spherical seats for wear and damage.					X									
10.14	Inspect the shaft surface finish and dimensions on the bearing landings, thrust collars and shaft seal landings					X									
10.15	Refit new/refurbished bearing sleeves by fitting the bottom half first. Apply a layer of oil on the lower sleeve.					X									
10.16	Check that the bearing lip clearances are correct and the ears are open on the thrust faces.					X									
10.17	Lower the fan shaft and allow the sleeve to settle in the spherical seat on the bottom.					X									
10.18	Fit the top half of the sleeve					X									
10.19	Fit the bearing top cap, labyrinth seals and take plastiguage readings of the bearing clearances.					X									
10.20	Remove and service labyrinth seals														

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Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
10.21	Refit Labyrinth Seals														
10.22	Check the clearances are correct to specification					X									
10.23	Re-install the thermocouple.					X									
10.24	Flush the lubrication oil piping before re-installing the piping onto the bearing.					X									
11	RVC System - Open Ring														
11.01	Inspect pull rod clevises, operating ring rollers, operating ring, connecting links, operating levers, outer blade pins and bushes for damage and wear.			X	X	X									
11.02	Inspect RVC inner vanes and inner cones for damage and wear			X	X	X									
11.03	Inspect RVC inner pins and bushes for wear			X	X	X									
11.04	Remove all RVC connecting links, operating levers, swivel pins and pin bushes in-situ					X									
11.05	Install all RVC connecting links, operating levers, swivel pins and pin bushes in-situ					X									
11.06	Remove 2 off RVC connecting links, operating levers, swivel pins and pin bushes in-situ			X	X										
11.07	Install 2 off RVC connecting links, operating levers, swivel pins and pin bushes in-situ			X	X										
11.08	Remove operating ring guide rollers														
11.09	Install operating ring guide rollers														
11.10	Remove operating ring and guide rollers					X									
11.11	Install operating ring and guide rollers					X									
11.12	Open lay shaft bearings			X	X	X									
11.13	Inspect lay shaft bearings			X	X	X									
11.14	Clean and re-grease lay shaft bearings			X	X	X									
11.15	Fit new lay shaft bearings														
11.16	Close lay shaft bearings			X	X	X									
11.17	Remove lay shaft pull rods and operating levers														
11.18	Install lay shaft pull rods and operating levers														
11.19	Remove RVC actuator					X									
11.20	Inspect RVC actuator plinth and holding down bolts					X									
11.21	Re-fit RVC actuator					X									
11.22	Adjust and synchronise RVC and lay shaft system			X	X	X									
11.23	Assist with RVC actuator stroking			X	X	X									
12	Shaft Seals														

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Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
12.01	Remove the shaft seal guards			X	X	X									
12.02	Remove the shaft seals			X	X	X									
12.03	Refit the shaft seals			X	X	X									
12.04	Remove shaft seal housing														
12.05	Carry out minor repairs to shaft seal housing and reseal and refit shaft seal housing														
12.06	Refit the shaft seal guards			X	X	X									
14	Motor														
14.01	Remove motor					X									
14.02	Open the Motor DE Bearing. Clean out the bearing housing. Remove and inspect the bearing sleeves. Inspect and measure the oil rings and record the findings. Refit oil rings and bearing sleeves. Measure the bearing clearances and record. Close up the bearing. Fill the bearing to the correct oil level. Ensure that the oil rings turn correctly.			X	X	X									
14.03	Open the Motor NDE Bearing. Clean out the bearing housing. Remove and inspect the bearing sleeves. Inspect and measure the oil rings and record the findings. Refit oil rings and bearing sleeves. Measure the bearing clearances and record. Close up the bearing. Fill the bearing to the correct oil level. Ensure that the oil rings turn correctly.			X	X	X									
14.04	Inspect motor base mounting pads for flatness when motor has been removed					X									
14.05	Clean base and refit motor					X									
14.06	Remove the motor holding down bolts and inspect them. Re-fit the motor holding down bolts and tighten to correct torque			X	X	X									
15	Casing														
15.01	Repair casing with welding team consisting of one welder and one assistant for a 12 hour shift														
15.02	Carry out minor repairs to casing doors and fit new gaskets, Replace bolts and clamps that are damaged where required			X	X	X									
16	General														
16.01	Remove complete impeller when casing is closed														

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Fan Scope Of Work

Unit 1-6

Item No	Description	Spares and Consumables Required	OP	IN	IR	GO	Dur/ Fan (Hrs)	Dur/ Unit (Hrs)	SE	A	W	S/S	L	Price/ Fan	Price/ Unit
PA Fans															
16.02	Re-install complete impeller after removal														
17	Commissioning														
17.01	Test run fan		X	X	X	X									
17.02	Dynamically balance fan		X	X	X	X									