



Scope of works

Request for a Service provider to perform service on Electrical Switchgear of 11kV, 400V, Power Transformers and Mini Substations,

OEM shall always be respected

All work shall be guaranteed for 6 (six) months

Justification process for a suitable vendor will initial the following:

Ensure that all activities (installation + equipment & spares) is completed according to the applicable **legislation** and **standards** and acceptable quality of the Airports Company SA – which is detailed, but not limited to, the list below: • Occupational Health & Safety (OHS) Act (act 85 of 1993)

- Applicable SANS standards

All work (supplied equipment) must be signed off by way of completing the attached Service & Repairs Report Sheet – which needs to be completed in full prior to the processing of payments.

Note that the maximum allowances to be made provision for, is indicated in the fields below. However, only actual quantities will be invoiced for. Should you feel based on expertise and experience that the listed allowance is not adequate – please indicate so on the quotation. This implies that all prices must be indicated per applicable unit, i.e.

- Labor = Each (per activity completed in full according applicable published standards)
- Material / Spares = per standard length; or per meter; or per square meter

The item list (scope) below was formulated to provide a complete solution to the needs analysis at hand. Should the bidder feel that the scope is not adequate or an alternative method (different scope) may be applied – then they should provide an additional quotation (2nd version) which detail the variance in scope. The bidder must still provide a **cost breakdown** on quotation for the scope detailed below – as it will be utilized to determine the winning bid.

Equipment Inventory

Description	OEM (Manufacturer)	Rating	Location
Main Transformer 1	ACTOM	1 MVA /11KV-400V	Main Substation
Main Transformer 2	ACTOM	1 MVA /11KV-400V	Main Substation
Transformer C	GEC	250KVA /11KV-400V	Substation C
Transformer B	CHEMROTECH POWER	150 kVA /11KV-400V	Open Sub (Transformer B) GA Area
Transformer 2	GEC	100KVA /400V-3300V	Main Substation
Transformer 1	GEC	100KVA /3300V-400V	Substation B (Tibbie Visser Ave)
Transformer 2	GEC	100KVA /3300V-400V	Substation B (Tibbie Visser Ave)
Switchgears	SIEMENS MARQOTT	11KV	Main Substation
Switchgear	ALSTOM	11KV	Transformer B (GA Area)
Switchgear	ALSTOM	11KV	Substation C
Circuit Breaker	ABB – SACE PR122/P-LI	400V	Main Substation
Circuit Breaker	ABB – SACE PR122/P-LI	400V	Main Substation
Circuit Breaker	ABB – SACE PR122/P-LI	400V	Main Substation

Mini Substation A	GEC – T3-OF	315KVA	Car Rental Depot
Mini Substation B	ALSTOM – K3-AF	315KVA	Hotel
Mini Substation No. 1	ABB – FBX-C	500KVA	Boulevard
Mini Substation No. 2	ABB – FBX-C	500KVA	Boulevard
Mini Substation - Hospital	ABB – FBX-C	500KVA	Boulevard
Mini Substation Solar Plant	ALSTOM – SF6	800KVA	Solar Plant

Power Factor No. 1	ST50100	400V	Substation A
Power Factor No. 2	ST50100	400V	Substation A

Yearly Maintenance - MV Switchgear	
Item	Description
1	<p>MV Board Housing Panel:</p> <ul style="list-style-type: none"> • Check integrity of panel structure • Clean the casing with a vacuum cleaner and a dry cloth. • Check and record the phase to phase and phase to casing insulation resistance <p>Cleaning products with solvents are strictly prohibited.</p>
2	<p>Cabling and Termination Accessories:</p> <ul style="list-style-type: none"> • Visual inspection. Check for signs of burn marks
3	<p>Circuit Breakers (Oil and Air)</p>
	<ul style="list-style-type: none"> • Continuity Test • Contact Resistance Test • Circuit Breaker Speed Test • Functional Testing (Oil) • Inspect condition of arc chutes / extinguishers. Ensure there is no significant damage to the chutes. • Inspect the air filters on the air breaker arc chutes. • Vacuum clean the arc chute • Inspect contact wear levels on the main breaker
4	<p>Current and Voltage Transformers:</p> <ul style="list-style-type: none"> • Visual inspection • Check alignment (VT's) • Check VT fuses • Test CT knee point voltage • Test for the CT saturation curve

5	Protection Equipment: (Relays, Transducers, Communication Devices etc.) <ul style="list-style-type: none"> • Calibration and Testing • Ensure that the protection settings are according to design • Check the response time of the breaker
6	Indication Lighting: <ul style="list-style-type: none"> • Visual inspect • Test for functionality
7	Battery Tripping Unit: <ul style="list-style-type: none"> • Clean tripping batteries and terminals • Top up cells with distilled water • Check battery charger for loose connections and tighten if required • Ensure TRICKLE charge operational • Measure and record battery voltage • Check Amp/Volt meters for proper operation
8	Operating Mechanisms <ul style="list-style-type: none"> • Open and close the mechanism to verify its integrity • Vacuum clean the compartment • Ensure all moving parts are adequately lubricated. • Check the operation and charging time of the gear motor • For breakers that are linked to the generator, simulate a changeover to ensure breaker operates
9	Circuit Breakers (Air): <ul style="list-style-type: none"> • Check for alignment, regressed • Check for tolerances and vibration
10	Perform thermographic scans on bus connections and breakers contacts. (A thorough risk assessment is required)

Maintenance Schedule for LV Switchboards

Yearly Inspection and Maintenance – 400V Switchboard	
Item	Description
1	Visual Inspection: <ul style="list-style-type: none"> • Inspect panel for missing labels • Inspect panel meters for correct operation • Inspect protection relays for fault flags • Inspect earth wire for corrosion • Verify all labels for correct identification
	<ul style="list-style-type: none"> • Inspect panel for signs of rust or damage • Inspect labels for looseness
2	<ul style="list-style-type: none"> • Clean bus bars • Conduct thermographic inspection of busbar • Test operation of protection circuits • Ensure that the protection circuit trip settings are correct • Inspect (visually) breaker frame • Inspect fixed contacts • Visually inspect arc – chutes • Visually inspect escutcheon • Visually inspect moving contacts

	<ul style="list-style-type: none"> • Inspect front cover • Interphase barriers • Inspect visually Insulation blocks • Interphase barriers • Inspect visually Insulation blocks • Visually Inspect Escutcheon

Maintenance on Electrical – Power Transformers

Yearly Inspection and Maintenance – Power Transformers	
Item	Description
1	<p>Oil Transformer – Major Maintenance:</p> <ul style="list-style-type: none"> • Over-all visual inspection • Inspection for oil leaks, active silica gel colour and any flags on the protection devices • Inspection of excessive heat generation • Inspection of tap changer locked (If unlocked do not move the tap changer dial but arrange for a shutdown and ensure the tap is in the right position and lock it) • Check temperature gauge and record the temperature
2	<ul style="list-style-type: none"> • Check oil levels according to the SANS 555 • Functionality test of protection warning and/or trip signal, • Inspection of high voltage cable insulation, • Inspection of earthing and its resistance • Inspection for rust, corrosion or defective coating; cleaned and painted, • Ensure that warning signs and safety devices are present and in correct positions • Scan the transformer with an infra-red tester to check for abnormal “Hot Spots” and repair as required. • Functionality test of protection warning and/or trip signal, • Inspection of high voltage cable insulation, • Inspection of earthing and its resistance • Inspection for rust, corrosion or defective coating; cleaned and painted, • Ensure that warning signs and safety devices are present and in correct positions • Scan the transformer with an infra-red tester to check for abnormal “Hot Spots”
	<ul style="list-style-type: none"> • Scan the transformer with an infra-red tester to check for abnormal “Hot Spots”
3	<p>Oil Analysis</p> <ul style="list-style-type: none"> • Transformer oil tests and analysis; (If PCB’s are present remove and replace the oil immediately); and the PCB contaminated oil must be safely disposed of: SANS 290 provides guidelines for the management of PCB in mineral insulating oils. • When determined in accordance with either IEC 61619, the PCB content of unused mineral insulating oils shall be undetectable – SANS 555. • When tested in accordance with either IEC 61619, the PCB content of reclaimed mineral insulating oils shall not be more than 20 mg/kg – SANS 555 • Replace the existing insulating oil in the oil filled circuit breaker with new or reconditioned insulating oil (as required)

	Battery Tripping Unit
4	<p>Battery Tripping Unit:</p> <ul style="list-style-type: none"> • Clean tripping batteries and terminals • Top up cells with distilled water • Check battery charger for loose connections and tighten if required • Ensure TRICKLE charge operational • Measure and record battery voltage • Check Amp/Volt meters for proper operation
5	<p>Replacement of 10x Substation Auxiliary Supply batteries Spec: VALVE REGULATED LEAD-ACID BATTERY6-GFM-26 12V26Ah(C10) 250C Floating Voltage: 13.38v Charge Current: 5.2A</p> 
	Power Factor correction Equipment
6	<ul style="list-style-type: none"> • Clean the dust filters and clean dust off the equipment in the unit • Test and compare the PFC Unit for any “drift” and calibrate as required • Test and compare the KVar Output to designed specification KVar Output • Check Amp / Volt meters for proper operation • Verify all labels for correct identification • Inspect panel for signs of rust or damage • Inspect labels for looseness • Clean bus bars • Conduct thermographic inspection of bus bar • Test operation of protection circuits • Ensure that the protection circuit trip settings are correct

Yearly Inspection on Mini-Substation	
Item	Description
1	<ul style="list-style-type: none"> • Check if General Signage is still attached to LV Door • Check mini substation labelling, if the name stenciled on the outside of the mini sub, as well as the inner side of the LV door, is done according to the labelling standard • Check the incoming MV labelling if it is according to labelling standard • Check the outgoing MV labelling if it is according to labelling standard • Check LV cable labelling • Are Warning notices on MV side visible and acceptable • Are Warning notices on LV side visible and acceptable • Check that colour coding was attached to left hand side of inner cubicle in MV side

2	<p>Labelling:</p> <ul style="list-style-type: none"> • Check if General Signage is still attached to LV Door • Check mini substation labelling, if the name stencilled on the outside of the mini sub, as well as the inner side of the LV door, is done according to the labelling standard • Check the incoming MV labelling if it is according to labelling standard • Check the outgoing MV labelling if it is according to labelling standard • Check LV cable labelling • Are Warning notices on MV side visible and acceptable • Are Warning notices on LV side visible and acceptable • Check that colour coding was attached to left hand side of inner cubicle in MV side
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3	<p>Mechanical (Mini sub)</p> <ul style="list-style-type: none"> • Check the condition of MV compartment doors • Check the condition of LV doors • Check if locks are available on the MV door side • Check if locks are available on the LV door side • Are all locking devices still in good condition? • Are safety devices fitted to MV & LV doors? • Check the condition of the cooling fins • Check for grass and vermin proofing still in good condition • Check for any visible holes that can lead to unauthorised access and blanked off with a plain rivet or device suitable to overcome the problem. • Check if roof bolts are still intact and no open gaps visible. • Check for operating handles available on site
4	<p>Oil/Gas (Mini sub)</p> <ul style="list-style-type: none"> • Check oil leaks on the MV bushings • Check oil leaks on the LV bushings • Check oil leaks on the Switchgear • Check oil level on the transformer • Check the condition of oil level on the Switchgear
5	<p>Breakers / Fuses (Mini-Sub)</p> <ul style="list-style-type: none"> • Check if all safety barriers are still in position and no live connections exposed. • Check for hot connections with infra-red scanning • Check (Visual Inspection) for loose connections on the LV breakers • Check MV safety barrier fitted • Check (Visual Inspection) the neutral for any loose connections • Check if phase barrier boards are fitted between phase • Check if safety sign is installed on safety barrier • Check and/or Test for fuses if in good condition • Check overall condition of mini sub inside and outside • Check if tap-changer is locked • Check for grass and weeds on outer side of Mini substation that needs to be removed. • Check for back-filling if it needs attention. • Check for interface seal if intact

6	<p>Maintenance:</p> <ul style="list-style-type: none"> • Check for corona discharge • Operation of tap changers • Painting of corroded Mini Substation boxes • Repairing of oil leaks • Correct operation of circuit breakers • Replacement of fuses where applicable • Repairing of corroded or broken mini substation enclosures • Fitting and cleaning of Perspex covers, covering live busbars • Check for hot connection on LV side • Check LV breakers if mounted properly • Check/test for loose connections on the LV breakers • Check the neutral for any loose connections • Check or test fuses if they are in a good condition • Check transformer earthing to be intact • Check earthing on MV cables • Check earthing on all LV cables • Check earthing on the mini substation housing to be intact • Check status and condition of earth fault indicator (where applicable)
	<ul style="list-style-type: none"> • Test the neutral for any loose connections • Test for Oil condition
7	<p>Circuit Breakers (Minimum):</p> <ul style="list-style-type: none"> • Test the functional performance of the oil/air/gas circuit breaker • Clean the switch of the oil/air/gas/vacuum circuit breaker • Lightly lubricate the operating mechanism of the oil/air/gas/vacuum circuit breaker • Test the functional performance of the oil filled circuit breaker and/or Isolator (Not Applicable for Sealed Type enclosures) • Clean the internal mechanism, contacts and the oil tank of the oil filled circuit breaker • Dress, refurbish or replace contacts of the oil filled circuit breaker as appropriate • Replace oil filled circuit breaker seals and gaskets • Adjust mechanisms of the oil filled circuit breaker • Test electrical protection of the oil filled circuit breaker