

	Scope of Work	Camden Power Station
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SERVICES TO BE EXECUTED IN THIS CONTRACT ARE:

1 HV MOTOR, 6.6KV, AC, 3 PHASE, see appendix: SECTION A.

2 LV MOTORS, 380V AC, 3 PHASE. see appendix.

3 LV MOTORS, 220V DC, See appendix.

This is a rate-based contract, unit is each and the quantity is 1 for all the lines in the pricelist attached (see appendix).

4 MANPOWER PRICE LIST, see appendix: SECTION B

MANPOWER ON STANDBY

- 1st call-out made/emergency call out, four hours will be a time to be booked even if the work done during call-out is less than four hours. Second, third call, actual hours shall be booked as they are.
- If the work exceeded four hours of the first call, the actual hours worked will be booked.
- Hours worked under emergency will be paid only if there is emergency call out form, signed by EOD.
- Time sheet will be used to monitor the time worked and it's the supervisor responsibility to ensure that they are submitted to the contract Manager/supervisor every week for approval. It will be used for monthly assessment.
- Transport rate will be based on maximum of 44 km return trip (Ermelo to Camden Power Station).

5 DESCRIPTION OF THE SERVICE

5.1 Executive overview

The *Works* covers Maintenance, transportation to and from Camden Power station, stripping, assessment, refurbishment, testing, supply of test certificates and other related Documents for refurbished HV and LV Stock and Non-stock Motors.

The *works* shall be accomplished with minimum sub-contracting of main scope to reduce make-up pricing and extended warranty delays. Camden P/S will shut

down as instructed by the Executive because of lifetime, it shall be communicated in advanced and this agreement/ partnership will then stop.

5.2 Employer's requirements for the *service*

The *Works* covers Maintenance, transportation to and from Camden Power station, stripping, assessment, refurbishment, testing, supply of test certificates and other related Documents for refurbished HV and LV Stock and Non-stock Motors.

The *Employer* has limited design information on the old type motors. The *Contractor* shall obtain all the design and manufacturing details required for the *Works* during stripping and then reverse engineer to original design. Drawings generated shall be shared to Eskom on request. On completion of the *Works*, motors shall be delivered to and off-loaded at Camden Power Station Main stores (or venue preferred by the *employer*).

The preliminary scope of work covered by this contract is as follows:

- Transportation of motors from Camden Power station to the contractor's workshop and back to site at Camden Power Station after completion of works. The *Supplier* accepts full responsibility and accountability for the motor/s when the motor/s is handed over to the *Supplier* on site to be transported from Camden site for refurbishment. Any additional damage during transport or during the stripping, testing, assessment, refurbishment and re-assemble will be for the *Supplier's* account and could include the cost for a new motor in case of a worst-case scenario.
- Strip the motor and mark all parts with unique relevant job number.
- Do a full assessment of the motor condition, and complete the assessment sheet, ensuring that any evidence of failure or deterioration is kept for review by the employer, if not present during assessment.
- The complete Assessment report will determine the detailed scope of work for refurbishment; refer to HV Motor Assessment Form.
- Execute the scope of work on each individual motor as approved by the *Employer*, including the relevant Engineering work as defined in paragraph 1.6.

- Ensure that quality management is incorporated in refurbishment process as defined in approved Process Quality Plans (PQP's) between the Contractor and Eskom.
- Should the motor be found to be beyond repair, and the employer concurs with the finding, the contractor will be informed to re-assemble the motor and return the motor to Camden Power station accompanied by a full breakdown report on the findings and motivation to be beyond repairs status.
- Where additional tests or work not covered by the contract is required from the motor assessment, a quotation must be submitted to Camden Power station before any commencement of such tests or activities for approval.
- The employer reserves the right to do price matching of any additional work specified in the assessment report, with the intent to ensure that the pricing is market related.

The motors covered by this contract are as indicated but not limited if the motor is for Camden Power Station, *Motor price lists attached*.

The *works* are to be carried out at the contractor's workshop and on-site by maintenance team at Camden on all HV Motors and LV Motors, stock and Non-stock, see Motor price list given for the purpose of quoting if price list is not sufficient the repairer must highlight and notify the employer in advanced for scope re-evaluation before contract is concluded.

5.3 Contract requirements & specification

- **Dismantling**
Dismantling of the motor should not commence until required Mechanical checks and Electrical test have been physically carried out by the repairer and accepted by the Eskom representative as per assessment form.
- **Testing and Tools**
All tests, inspections, repairs and measurements must be done by qualified, competent persons and must have sound years of experience.

All testing equipment, tools and other respective accessories must be calibrated according to SANS, SANS, IEC and ISO standards and have valid calibration certificates.

The Contractor responsible and accountable for Camden motors will be informed by the Contract Manager on an “as and when” required basis to release back-up team to assist site team with Motor investigations on site.

- Invoicing

Quotation with full SOW must be accepted and signed by the employer before commencing with the repairs.

Failure report Data pack must be submitted to the employer upon delivery of the motors. Invoices to be paid on the month must be submitted to Contract Manager before the 20th of each month.

A WARRANTY will be repaired at NO cost to Camden Power Station.

A GUARANTEE will be repaired at NO cost to Camden Power Station.

5.3.1 Tests to be performed at the repair workshop before disassembly and after assembly

The high voltage tests will only be performed after the stator has passed the polarization index test. (High voltage tests are subjected to employer’s request or approval as indicated on Motor price list “as and when required tests”).

Tests to be performed after repairs

❖ STATOR TESTS

- Stator winding insulation resistance
- Stator winding polarization index
- EI-Cid
- Tan delta
- PT100 insulation resistance
- Space heater insulation resistance

❖ ROTOR TEST

- Bar to bar continuity test
- El-Cid test

❖ HEAT RUN TEST AND MEASUREMENTS

- Bearing insulation test
- Bearing heat run test
- No load test run
- Current balance between phases
- Power at no load
- Bearing vibration tests and vibration acceptance testing.
- Bearing temperatures
- Power factor at no load (duty point)
- Start up and run-down time (Motor uncoupled)

5.3.2 Vibration testing and analysis scope of work:

The following services and specifications must be adhered to and be provided by the motor repairer/ motor supplier:

ACCEPTANCE TESTING PROCEDURE AND REQUIREMENTS:

- With every vibration test, a test certificate and a report containing complete analysis and recommendations must be completed, signed by repairer's QC before handing to the employer. The motor must be tested at a correct rotational direction and speed.
- All tests and measurements must be done by a qualified, competent person and must have sound years of experience.
- Vibration phase analysis (Phase relationship testing) must be conducted during acceptance testing. The result must also reflect on the test report and certificate.
- Overall magnitude of vibrations generated (all directions i.e. vertical, horizontal and axial movement) within the motor when running on their own shall not exceed the values specified below:
 - 8 pole – 1 mm/sec
 - 6 pole – 1 mm/sec
 - 4 pole – 1.5 mm/sec
 - 2 pole – 2 mm/sec

- With every vibration test certificate, a schematic or sketch of the machine or equipment must be supplied. The following will be indicated:
 - Measurement locations
 - The measurement locations shall be numbered
- With every vibration test certificate, a machinery data sheet must be completed, signed and supplied.

The data sheet must have the following parameters:

- RPM minimum.
- RPM maximum.
- Manufacturer.
- Serial number.
- Frame size.
- AC or DC.
- Voltage.
- Phase.
- Amperage
- Kilowatt or Horsepower.
- Number of rotor bars.
- Number of motor fan blades.
- Number of drive end bearings.
- Drive end bearing model. (If it is a sleeve bearing indicate by writing "Sleeve")
- Drive end bearing manufacturer.
- Number of non - drive end bearings.
- Non drive end bearing model. (If it is a sleeve bearing indicate by writing "Sleeve")
- Non drive end bearing manufacturer.
- Type mounts the unit are on.
- Obtain or calculate the major component forcing frequencies i.e. bearing defect frequencies, blade/vane pass frequencies, pole passing frequencies and rotor bar frequencies.
- Prior the final acceptance testing is performed, the following must be done:

- Use the correct instrumentation, vibration transducer, mounting method and cabling.
- List the machine details, measurement point information, location and orientation on the vibration test report.
- The vibration analyser and data collector should analyse data and recommendation thereof for correction if required.
- While vibration testing is being conducted and on the test reports and certificates must be accompanied by the spectrum and analysis.
- Refer to the specifications and recommendations of the vibration transducer OEM for the correct frequency response range.
- Cables and their individual connectors must be in a good condition.
- Cables and their respective connectors must not introduce distortion on the pick-up signal.
- Make sure that the transducer is securely mounted.
- The contact surfaces of both the motor and the vibration transducer must be free of foreign materials.
- The vibration analyser's sampling time setting for the time waveforms must be 10 revolutions of the shaft of the specific motor.
- Vibration data for machine certification and acceptance in the following measurement units as shown in Frequency (Hz), Rotational speed (RPM), Velocity (RMS) mm/sec.
- The motor to be tested for vibration must be mounted on a T-slotted steel block. The T-slotted steel block must be isolated from the floor and other nearby equipment that is operating must be switched off during testing to avoid interference. Other equipment's vibration must not interfere with the machine being tested.
- The motor must run until it attains its stabilised speed and operating temperature.
- Load test the motors as per Contract Manager Instructions. AC induction motors must be loaded 70% of full load or higher, except if it is stated otherwise by the Contract Manager.
- The following specific frequencies' vibration results must be supplied via spectrums and values (mm/sec) and recommendations thereafter.

i) **AC Motors:**

- For AC induction motors under a minimum of 70% of full load, the Pole Pass Frequency Sidebands.
- Two times line frequency.
- Rotor bar passing frequency.

ii) **DC Motors:**

- SCR firing frequency.
- Line frequency harmonics.
- The contractor must analyse vibration test results and give simplified recommendation.

5.3.3 Bearing temperature acceptance criteria

The acceptance criteria for **bearing temperature rise** when thermal equilibrium has been reached are;

- **Ball and Roller Bearings;**
 - 35°C on motors with 4 or more poles.
- **Sleeve and Tilting Pad/ white metal Bearings;**
 - 35°C for vertical motors when measured on thrust pads,
 - 30°C for motors with shaft diameter less than 70 mm,
 - 40°C for 2 and 4-pole motors with shaft diameter between 70 and 100 mm,
 - 30°C for 6-pole and 8-pole motors with shaft diameter between 70 and 100 mm,
 - 45°C for 2 and 4-pole motors with shaft diameter between above 100 mm,
 - 35°C for 6-pole and 8-pole motors with shaft diameter above 100 mm,
- Magnetic centre of the sleeve bearing type must be clearly marked and have a solid pointer. Magnetic centre mark shall be at the centre of both DE and NDE thrust marked on the shaft (50%-50% / 60%-40%).
- During solo run the bearing temperature differences between De and NDE shall be less than 10°C at the end of 1.5hr run and the motor must be settled.

5.3.4 Engineering Services as Required by Eskom Generation Standard

The contractor is responsible for engineering services, material and labour as follows:

- Verify the performance matching requirements of the power supply and driven machine.
- Inspection and testing of the motor prior to and after repairs, recording, reporting and making recommendations and providing the necessary information where applicable.
- The contractor is required to provide detailed breakdown report for each motor stating clearly the contributory and root causes of motor failure.
- Evaluate all parts for possible re-use.
- Select, design and procurement of new components, ensuring that replacement insulation system and other material are compatible with the existing materials. If the replacements parts are not exactly as the originals, the contractor demonstrate that the replacement meets or exceeds the capability of the original in all essential requirements.
- The contractor must ensure that the employer and others required are present during dismantling, testing and assessment to inspect any evidence of failure or aspects of defective design or workmanship uncovered. Ensure that correct photographic records and history of each Motor as per Serial No's are made and be available when requested by the employer.
- Establish the suitability of the motor for rewinding to achieve the life extension required by the Employer. Perform all tests, investigation and calculation required for this purpose.
- Shall eliminate weaknesses. Submitting a written report recording the defects, and detailing the extent of repair and work required to achieve the life extension specified by the Employer. Obtaining the Employer's prior agreement in writing for the extent of repair and work to be done.
- Design replacement stator windings when necessary or specified, with the required wedging and coil end-winding support systems, including means of tightening if looseness develops. The means of tightening is agreed with the Employer.
- The test facility shall comply for stator temperature monitoring, on-line partial discharge monitoring,
- Where changes to the design or rating are necessary, carrying out design review and validation of the rating and suitability of the motor for the applicable environment and cooling arrangements.

- Where changes are introduced, carrying out design calculations of motor capability and appropriate settings for over current protection, repeated start protection, stall protection, voltage unbalance protection, and other protection applied or required.
- Submission of design results and proposed protection settings to the Employer for agreement.
- Where changes to the design are made, producing details of the design, working drawings, repair and rewinding instructions and procedures, as well as all necessary amendments to operating and maintenance manuals; producing agreed procedures for works inspection and tests, and site commissioning and testing, all with details of acceptance criteria to be attained.
- Producing reports or test certificates detailing actual results attained. Producing quality plans for the activities concerned before commencing work. Producing progress reports on a Micro-soft project as required periodically by the Employer.
- Submit details of the redesign and all drawings and documentation in quadruplicate to the Employer for agreement.
- Produce a consolidated report on all aspects of the work, incorporating all reports, data, acceptance criteria, and quality assurance records.
- White Metal bearing Manufacturing Company used must be competent, registered and have a good track record. A bearing test Certificate to be provided for every manufactured white metal bearing.
- Provide complete vibration analysis for factory acceptance testing.
- The repairer must keep record of each motor Serial No repaired and shall be requested by the Employer at any time.

5.4 Site Maintenance Services

5.4.1 Purpose/Activities

- Inspection, all maintenance activities and repair of all motors.

5.4.2 PSR Authorization

- The contractor must be authorized within three months of the contract in terms of PSR (LV) to be able to perform the following activities covered in a scope of work. If all employees of the contractor are not authorized in terms of

PSR a deduction of 10% from the monthly maintenance invoice shall apply thereafter.

5.4.3 Daily Inspection and Maintenance

- Inspect and repair bearings, breathers for oil leaks – record current readings
- Take Temperatures and keep records. Record and/or report excessive noise.
- Keep correct oil levels, repair oil leaks and fill up where necessary, The Daily inspection sheet must be completed, analysed by the Supervisor and filed for record purposes.
- Record winding temperatures (RTD's).
- Attend day to day notification created against, close and give them to relevant planner for processing.
- Do daily plant walk before knock-off time and load defects where necessary.
- Attend all daily meeting necessary.
- Adhere and attend all standby duties, callouts during and after hours.
- Assist in collection and repair LV and HV motors under emergency / normal conditions.
- Take LV motor to and from the base plate. Clean dust from all motors to enhance air circulation.
- Maintain and repair LV and HV motors bearing when required.
- Compile a comprehensive scope and program for work to be done by the contractor on site and be accompanied with an approved QCP.

5.4.4 Weekly maintenance

- Record all defects and compile SOW for weekend outage and other opportunities to be corrected.
- Monitor bearing temperature trend and correct the problem, keep records of what was done.
- Monitor winding temperature trend, vacuum stator and check air suction.
- Adhere to weekly maintenance program, PM's, plan for Lockdown and close lockdown work and defects on time.

5.4.5 Monthly maintenance

- Ensure that all bolts are tightened i.e. Motor hold down, bearing housing where possible.

- Adhere to Monthly maintenance program for all motors in storage and in the plant.
- Dust proofing of motors.
- Visual inspection and recording of any defects on LV and MV motors.
- Record casing and bearing temperatures by the use of Laser thermometers if possible/ needed by the employer.
- Check that covers are intact and suction air is free from obstruction.
- Check that the earths are intact and repair if necessary.
- Attend all monthly PM's, close and give them to relevant planner.
- Attend the monthly greasing program & shaft rotation program.
- Check and plan in the meeting for the Unit that needs to be flushed in that month.
- Clean LV and HV motors.

5.4.6 Pre-planned maintenance (Pre-outage Inspection for SOW)

- Inspected and record outage related defects and must form part of an outage scope of work.
- Plan for the resources needed for outage prior to outage.
- Compile breakdown scope, planned scope and outage scope, and execute as planned.

5.4.7 Planned maintenance (Outage scope)

- Do repairs on all the defective motors.
- Correct all problems identified before and during the outage for the unit to return and synchronize on time.
- Open all white metal bearings and clean them, repair bearings when needed
- Inspect bearing clearances, journals for any damages and for any changes in sizes.
- Drain, clean and refill bearing with new oil
- Do Bearing resistance tests and record when possible.
- Clean heat exchanger pipe work and dust out of the motor stator
- Tighten fixing bolts, coupling guards, cooling water pipe on the motor.
- Assist in mounting and dismounting terminal boxes, re-install porcelain glasses.
- Inspect motors for corrosion.
- Check resistors for burning on DC Motors and repair where it is due.

- Check and replace the brushes on DC motors where necessary.
- Clean carbon dust on DC motors with compressed air.

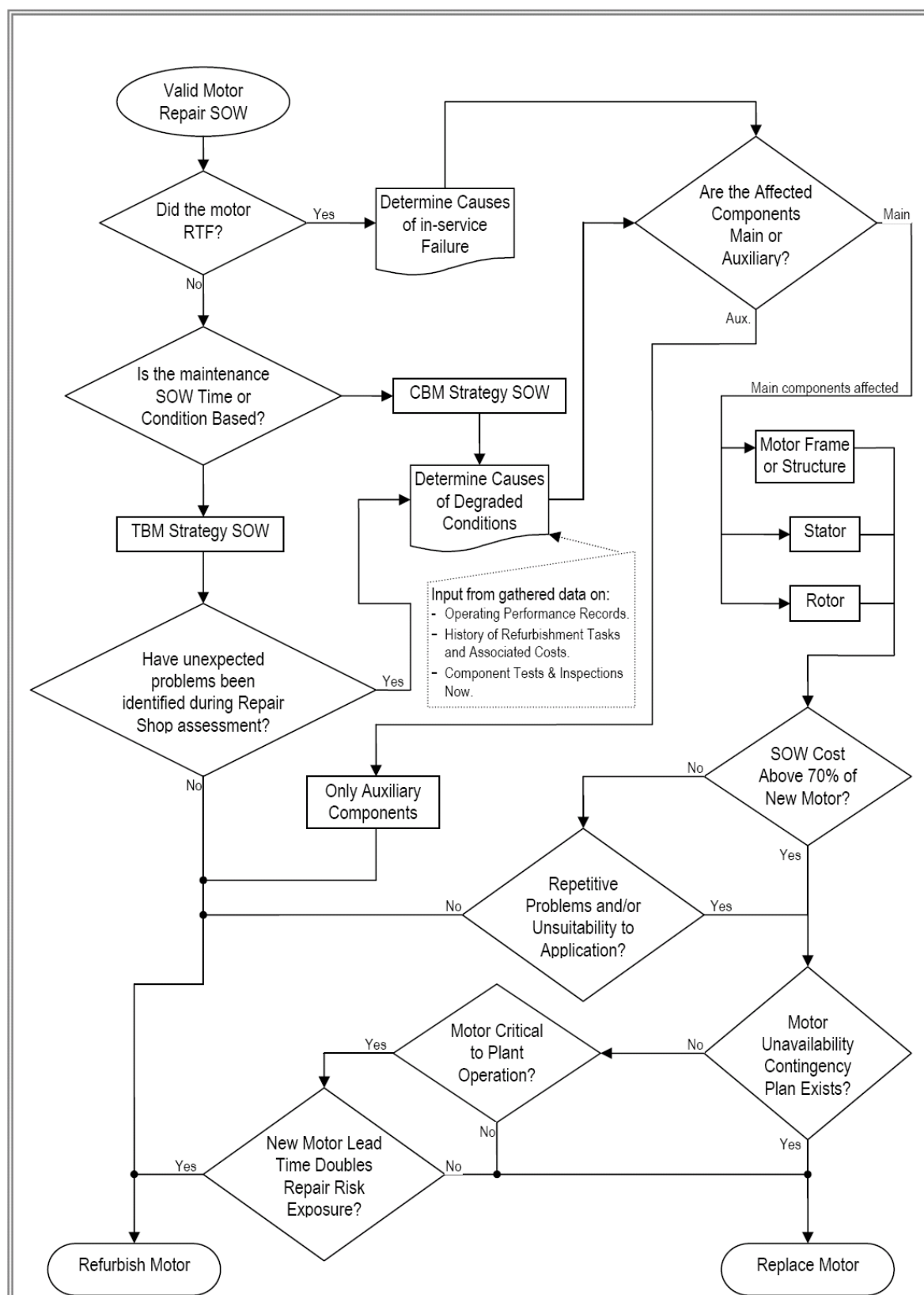
5.4.8 Post-planned outage

- Compile a report for all the activities done in an outage and keep record (filed). ITP must be available and approved first for all critical jobs to be done.
- Keep test Certificates available on request.

5.4.9 LV Motor and HV Motor repair delivery duration

- I. The LV Motor sent under emergency repairs must be delivered back within 48 Hrs the latest to clear the load loss earlier.
- II. The LV motor sent under normal repairs should be delivered back within 7 working days.
- III. If the Motor is unrepairable, the Eskom motor replacement flowchart must be followed and a full assessment must be done, agreed and signed. The unrepairable Motor should be delivered back to Camden together with the replacement Motor. See below flowchart.

ESKOM MOTOR REPAIR VS REPLACEMENT FLOWCHART



NOTE: IF THE ESKOM MOTOR REPAIR VS REPLACEMENT FLOWCHART WAS USED TO ESTABLISH WHETHER A MOTOR MUST BE REPLACED OR NOT, AND IT IS ESTABLISHED THAT THE MOTOR MUST BE REPLACED, THE DECISION TO SOURCE OR NOT TO SOURCE A MOTOR FROM THIS CONTRACT WILL REST WITH THE CONTRACT MANAGER. I.E. TO BE REPLACED FROM THE CONTRACT OR FROM A SEPARATE ORDER NUMBER.

- 5.4.9.2 i. The HV motor should be stripped immediately when reaching the contractors site (Camden Motors shall take precedence from other repairs).
- ii. Delivery of an HV motor should be within 7 weeks after instruction to commence *major repair* work (Rotor Re-bar, Stator Rewind) from Employer (Order Number given – *Normal Repair Request*).
- iii. Delivery of an HV motor should be within 6 weeks after instruction to commence *major repair* work (Rotor Re-bar, Stator Rewind) from Employer (Order Number given – *Emergency Repair Request*).
- iv. Delivery of an HV motor should be within 3 week after instruction to commence *minor repair* work (Low PI, bearings, ash removal from windings) from Employer (Order Number given – Normal Repair Request).
- v. Delivery of an HV motor should be within 4 days after instruction to commence *minor repair* work (Low PI, bearings, ash removal from windings) from Employer (Order Number given – *Emergency Repair Request*).

- **For every emergency repair quote, it will be accepted conditionally in writing and be finally accepted on the delivery day.**

For early delivery of emergency repair, +20% extra on total cost will be compensated for 24hrs, two shift service.

For late delivery of emergency repair, -20% of total cost will be deducted for delay and exposing the employer into disrepute.

5.5 Test certificate

- Complete motor tests and Certificates (data pack) must be submitted with the LV motor upon delivery.
- Complete motor tests and Certificates (data pack) must be submitted with the HV motor upon delivery.

- Delivery Note and QC form must be signed by the relevant Eskom personnel at Stores receiving.

5.6 House keeping

- All workplaces must be kept clean at all times and must not Interface with other contractors scope of work.

5.7 Training

- All relevant courses to execute this scope must be attended as required on contractor's account.
- The Employer shall only be responsible for FFFR and PSR Regulation on site.

5.8 Safety Risk management

- Risk assessment must be done prior to performing any task, barricading and demarcation must be maintained when safety related work is to be performed.

5.9 Completion communication

- Completed task must be communicated to Contract Manager and to Operating when needed.

5.10 Meetings

- All relevant meetings must be attended by contract Manager and minutes compiled and adopted by Eskom contract Manager.

5.11 Tools

- Contractor must provide sound original tools to the Maintenance team to do proper maintenance and monitoring.
- All tools that need certificates must have valid certificate all the time to comply with safety.

5.12 Program

A detailed program should be provided preferably in the form of Micro-soft project with bar-chart or any software that will specify the plan and progress of motor repairs. A program detailing up to the delivery date must be drafted after an Assessment has been done and agreed upon with the Client.

5.12.1 Contractors and Workshop Capacity

5.12.1.1 Workshop

- Housekeeping and Demarcation
- Strip and assess area to accommodate GO repairs
- Overhead crane capacity (above 25 tons)
- Winding section capacity
- Workshop space capacity to accommodate GO repairs
- Dismantle and assembling procedure.
- VPI tank capacity
- Oven capacity
- Balancing machinery for MV
- Shaft NDT machine
- Test bay structure capacity
- Test bay voltage capacity (should accommodate up to 6.6kv)
- Calibration certificates on test equipment
- Load tests certificates for lifting equipment

5.12.1.2 HV Motors

- Turnaround time (emergency rewind, to be confirmed in writing)
- Turnaround time (normal rewind, to be confirmed in writing)
- Turnaround time (emergency white metal bearings replacement, to be confirmed in writing)
- Turnaround time (normal white metal bearings replacement, to be confirmed in writing)
- Turnaround time (emergency dry-out, to be confirmed in writing)
- References for winding repairs (a minimum of three orders and data packs, for Eskom and for other companies)

5.12.1.3 LV Motors

- Turnaround time (emergency repairs, to be confirmed in writing).
- Turnaround time (normal repairs, to be confirmed in writing).

5.12.2 Manpower

5.12.2.1 Qualifications (on site)

- Supervisor (a minimum of N5 plus trade test or equivalent, and of 5 years' experience working with white metal bearings and HV motors).
- Fitters (a minimum of N3 plus trade test or equivalent, and of 3 years' experience working with white metal bearings and HV motors).

5.12.2.2 Qualifications (workshop)

- Supervisor (a minimum of N5 plus trade test or equivalent, and of 5 years' experience working with white metal bearings and HV motors)
- Fitters (a minimum of N3 plus trade test or equivalent, and of 3 years' experience working with white metal bearings and HV motors)
- Contract Manager must have a Diploma in Business Management/ Project Management as a minimum, with any other NEC course will be advantageous.
- Rewinder (with N3/ equivalent and above, and armature rewind certificate and years of experience rewinding motors)

6 MANAGEMENT STRATEGY AND START UP

6.1 The Contractor's plan for the service

THE CONTRACTOR SHALL BE AUTHORIZED WITHIN **THREE** MONTHS IN TERMS OF PSR TO WORK INDEPENDENTLY OTHERWISE **10%** WILL BE DEDUCTED FROM MONTHLY GROSS MAINTENANCE INVOICE.

6.2 Management meetings

- Monthly meetings shall be attended monthly as per NEC where contract related issues shall be discussed in details with due dates agreed. This meeting shall take place before the 25th of each month, and where assessment should also be signed.
- Minutes of the meeting shall be compiled by the contractor and submitted to the Contract Manager within five days of the meeting for verification and adoption and actions shall be adhere to as per due dates specified.
- All meetings shall be recorded and minutes circulated, such minutes shall not be used for issuing of instructions under the contract.

6.3 Contractor's supervision and key people

- All tests, inspections, repairs and measurements must be done by qualified, competent persons and must have sound years of experience or at least more than three years doing that work physically.
- Supervisor and Fitters for site maintenance as a minimum must have a Trade test with experience of more than two years working with white metal bearing motors as a requirement.
- Technical Competence Certificate will be required and verified by the employer for any skill provided to execute the given scope of work and this includes proof of courses attended.
- The employer may verify qualification and experience when feels needed. Semi-skills must have two years and above working with both LV and HV motors.
- All relevant courses must be attended as required and special PPE shall be provided by the contractor to ensure safety of employees when executing this scope.
- The Employer shall only be responsible for FFFR and PSR Regulation on site.

6.4 Provision of bonds and guarantees.

- Where Guarantees and Warranties are applicable, it must be stipulated clearly in writing under terms and condition and both parties shall abide by it.

6.5 Documentation control

- All documents linked to a failure shall reflect a Document unique number and an order No in each page where there is a change, a revision number shall also be reflected. A contractor shall keep both hard copy and an electronic copy and be available on request. All critical communication shall be made formally.
- The following minimum documents must be supplied to the Employer for each motor that is sent for repairs:
 - Electrical and mechanical assessment performed before repairs.
 - Detailed failure report for each motor failure with pictures to support.
 - Certificates and tests results
 - Signed Quality Control Plan/ ITP's etc
- Also, the Employer may wish to exercise control or include witness and hold points during manufacture, repair, assembly, test, test run until to the delivery of such Equipment.

- Eskom representative shall be informed in advanced for hold and witness points OR authorised in writing before the contractor can continue to the next step.

6.6 Invoicing and payment

- Once the item is delivered after the repairs the Contractor shall provide the Employer with a tax invoice showing the amount due for payment equal to that stated in the Contract Manager's assessment/ accepted quotation for payment certificate.

6.7 Contract change management

N/A

6.8 Records of Defined Cost to be kept by the *Contractor*

- All financial records must be kept for audit backup purposes.

6.9 Insurance provided by the *Employer*

N/A

6.10 Training workshops and technology transfer

- The contractor will train student as requested by the employer.

6.11 Design and supply of Equipment

- All reverse engineered components copy drawing shall be shared to the employer for record purposes.

6.12 Items provided at the end of the *service period* for the *Employer's* use

6.12.1 Equipment

- All equipment unrepairable, reverse engineered drawings, drawings made and equipment repaired are part of Eskom's asset shall be return to Eskom before the end of the contract.

6.12.2 Information and other things

- Failure data base or Failure history should be provided as and when required and at the end of the service period. The contractor shall keep history of each serial No failure to scrap the item when OEM recommended rewinds are reached.

6.13 Management of work done by Task Order

- Maintenance Task Order Number shall be provided by the Employer in the beginning of each the month and it shall be closed with an assessment which will be signed by both parties before the end of the month.
- Any stock item motor failed will be collected when an Order No is issued by the Employer/ Stores, the order will only be closed when the item is delivered back to Camden and Quality checked.

7 HEALTH AND SAFETY, THE ENVIRONMENT AND QUALITY ASSURANCE

7.1 Health and safety risk management

- Risk assessment must be done prior to performing any task
- Baseline risk assessment to be submitted as part of SHE profile for evaluation

7.2 Environmental constraints and management

The contractor to comply with the following requirements and legislation:

- Occupational Health and Safety Act 85 of 1993 as amended and its regulations
- Compensation for Occupational Injuries and Diseases Act 130 of 1993 as amended
- National Environmental Management Act 107 of 1998 as amended
- National Environmental Waste Act 59 of 2008 as amended
- National Water Act 36 of 1998 as amended
- Eskom procedures and safety requirements set out in safety, health and environmental specifications 004 4830
- Eskom procedure 32-95 in regards with the management of safety, health and environmental incidents
- Any other act or procedure deemed necessary or applicable

7.3 Quality assurance requirements

- The Contractor shall implement and maintain a Quality Management System that, as a minimum meets the requirements of ISO 9001 series and the Business Excellence Quality Management Standard for

Refurbishment, Engineering, Manufacturing & Maintenance Works for Camden Power Station (Doc No: 004/5602).

7.3.1. Contractor's Quality Assurance and Quality Control

- The Contractor compiles, in conjunction with the Employer and the Supervisor, a product verification plan. This document shows at which stages during the contract involvement is required, and what types of inspection, testing, hold, witnessing etc. are carried out to ensure that the requirements of the specifications are met.

7.3.2. Quality Control Plan

- The Quality Control Plan, which should be based on an agreed Quality Control Plan between Eskom and the Contractor.
- The Quality Control Plan consists of the following as a minimum and is accepted by the Supervisor and the Contractor prior to commencement of the work.
- A covering page which includes and makes provision for the following:
 - Document unique number.
 - Revision number.
 - Page number
 - Provision to incorporate all inspection report numbers.
 - System worked on
 - High level description of work execution
 - Provision for review and approval signatures by the *Contractor*, the *Employer Representative* and *Relevant Engineers*.
 - Provision for final releases signatures by the *Contractor*, *Employer Representative* and the *Relevant Engineers*.
- A page which includes a logical sequence of work execution but not detailed.
 - Abbreviations.
 - Record numbers.
 - Procedure numbers.
 - Reference document numbers.
 - Certificate numbers and references.
- The work execution logic and sequence for the fabrication and erection addition to this hold, witness points etc. are also detailed.

- A material summary list which includes:
 - Material quantities and specifications.
 - Material certificate numbers.

7.3.3 Test reports

- Where tests were performed, they are recorded and the positions of measurements are traceable to the specific area of testing against the records. Factory Acceptance Testing certificates to be submitted upon delivery of motor to site.

8 SITE SECURITY REQUIREMENT

8.1 People

8.1.1 Minimum requirements of people employed.

- The Contractor applies for access permits (Contractor's permit) at the Security gate on the start date of the contract. The Contractor personnel shall be required to be in possession of an access permit at all times.
- In order to assist Protection Services with the issuing of permits and the identification of personnel on site the successful contractor is to supply a list of all personnel that intends using on site, at least 72 hours prior to entry of the Security Area. This list must be delivered to Protection Services. The list, identified with the Contractor's name, is to contain the following minimum information:
 - Employee name
 - Employee ID Number
 - The Employer's Safety Coordinator's signature
 - Electrical Maintenance Manager signature
- Copy of the ID book for every employee of the Contractor.
- Access permits must be returned to protection services when the worker/s leave the site, either after completion of the services, or upon earlier termination of service of a worker during the contract period.
- To speed up the process of gaining access to the site, the Contractor must compile detailed lists of all tools and equipment (including serial numbers where applicable) to be taken on site before arriving at the Power Station Security gate. An authorised copy of this list must be retained by the

contractor - to be used again when the tools and equipment are removed from site after the completion of the services.

- Any additional tools or equipment brought to site, or any tools or equipment removed during the contract period must be reported to protection services and all lists amended likewise. Gate release permits will not be issued for the removal of any tools or equipment not specified on the tool list.
- The Contractor's visitors and all personnel shall conform at all times to the security arrangements in force at the site. Application forms for visitors must be filled in by the Contractor's Site Manager and approved by the Service Manager, one day before the visit and submitted to the Employer's Protection Services office. Visitors will not be allowed on site if the necessary forms are not in the possession of the security staff.
- The Chief of Protection Services may, with valid cause, remove any, of the Contractor's personnel from the site, either temporarily, or permanently. He may deny access to the site to any person whom, in the opinion of the said Chief of Protection Services, constitutes a security risk.
- No unauthorised vehicles will be allowed on site. Only Contractor's Vehicles with displayed Contract Vehicle Permits disks will be allowed on site. Contract Vehicle Applications should be directed to the Service Manager.
- The Contractor will be restricted to the working areas associated with his place of work. The Contractor is forbidden to enter any other areas, and must ensure that his employees abide by these regulations.

8.2 Plant and Materials

8.2.1 Specifications

- Contractor must provide tools and PPE to the Maintenance team. All tools that need certificates must have valid certificate to comply with safety.

NORMATIVE REFERENCES, STANDARDS, PROCEDURES, SPECIFICATIONS TO BE USED.

- The following technical specifications, standards and procedures and their normative references are applicable to this contract. The following specifications, standards and procedures and their normative references are part of this Contract Works Information and are to be read in

conjunction with this document. Only the latest revisions of the specifications, standards and procedures and their normative references to be used.

- The Contract Works Information is not limited by the following specifications, standards and procedures and their normative references. New or additional specifications, standards and procedures and their normative references may be added to the following list at any given time by the Contract Manager.
- Eskom related specifications, standards and procedures and their normative references are available on request from Eskom. All other technical specifications, standards and procedures are available from the original compiler i.e. IEC, IEEE, SANS etc. The cost of obtaining these specifications, standards and procedures and their normative references, except Eskom technical specifications, standards and procedures, are on the Contractor's account.
- The requirements of the Eskom technical specifications, standards and procedures take precedence over the requirements of normative references and other specifications mentioned in this document.
- Note that where a conflict arises between any of the specifications, standards and procedures and their normative references, mentioned in this document, the IEC documentation has precedence, except over Eskom technical specifications, standards and procedures.

TITLE	DOCUMENT NUMBER
Eskom Camden Motor Installation, Alignment and Magnetic Centre Determination Rev 0	229 -12158
Eskom Camden LV Motor Overhaul Rev 0	229 - 11683
Eskom Camden Maintenance of LV DC Motors Rev 0	229 - 11708
Eskom Storage and Preservation of Power Station Electric Motors Standard	240-56360387
Refurbishment and Repair of Power Station Electrical Motors Work Instruction	240-89217674
New Low Voltage Motors Procurement Standard	240-57617975
Eskom Transport of Power Station Electric Motors Standard	240-56361435

TITLE	DOCUMENT NUMBER
New MV Motor Procurement Standard	240-50237155
Requirements for Transportation and Movement of Large Electrical Equipment Standard	240-56178825
MV Motor Online Condition Monitoring Standard	240-130913933
Rotating electrical machines Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IEC 60034-4:2008) – Classification-IEC	IEC 60034-4:2008 IDT, Ed. 3
Eskom Re-Metalling White Metal Bearings	GGSS0526
White metal designated WM 90	SANS124
Guide for diagnostic field testing of electric Power apparatus- Electrical apparatus	IEEE STD 62.2
Rotating electrical machines. part 1, rotating and performance	IEC 60034-1
IEEE Recommended Practice for Testing Insulation Resistance of Rotating Machinery	IEEE STD 43-2000
Generation Standard on Control of Clean Condition when Working on Generators and Large Motors	240-47859177

8.2.2 Correction of latent defects

- At least a twelve (12) month guarantee must be offered on workmanship when item is in service and (18) months when stored properly. Guarantee, warrantee terms and delivery period as per the contract must be stated clearly in the quotation provided.
- The contractor's guarantee and warrantee start the day when the item is delivered.
- The contractor must state any guaranteed limitations or other requirements from Camden P/S's side that may influence the guarantees given.
- A WARRANTY will be repaired at NO cost to Camden Power Station. A GUARANTEE will be repaired at NO cost to Camden Power Station.

8.3 Contractor's procurement of Plant and Materials

8.3.1 Warranties and Guaranties

Where a contractor buys an item from another supplier there should be a warranty/ guaranty that will be transferred to the employer.

8.3.2 Tests and inspections after stripping and before delivery

The repairer invites Camden personnel to inspect the motor and agree with the assessment report and scope to re-engineer the item, the following should be ready.

- All motor components kept on one unique area at the repairer's workshop.
- Any communication and arrangement for inspections at the Contractor's premises to be arranged through the Employers Representative or be copied on the e-mail.
- The motor should be fully assessed by the repairer before Camden personnel (Electrical Engineering, Electrical Maintenance and Mechanical Engineer) are called out.
- Invite / notify Camden personnel at least 5 days before inspection.
- Pictures of all defective components and tests to be taken and handed over to Camden on request.
- The proposed repair scope of work should be ready and shall be finalized with Camden personnel on the same day of assessment / inspection.
- The preliminary quotation to be ready on the day of inspection and should reflect the item numbers and price as agreed on the contract (Camden personnel might/ might not agree with the quote).
- All additional items that are not included on the contract (The contractor should advice to close gaps on the contract prices before it is signed) prices should be included on the price column of the quotation as non-contractual and must be accompanied by original quotes or subjected to market verification by Contract Manager.
- No quotations that shall be blank.
- All quotation must be signed/ approved in writing before continuing with work.
- All quotations shall be verified by Electrical Engineering, Electrical Maintenance/ Mechanical Engineer or anyone in a good position to do so.
- No work shall commence before approval or a go ahead from the Employer's Representative or the personnel acting on his behalf (Contract Manager).
- In an event of a WARRANTY the contractor shall carry all costs of repairs, tests, transportation etc.

8.3.3 Plant & Materials provided by the *Employer*

- Consumables which are stock items shall be provided by the Employer and those non-stock the contractor will provide.

9 WORKING ON THE AFFECTED PROPERTY

- PSR regulation shall apply always when work is to be done in the plant.

9.1 Employer's site entry and security control, permits, and site regulations

- The Contractor applies for access permits (Contractor's permit) at the Security gate on the start date of the contract. The Contractor personnel shall be required to be in possession of access permit at all times.
- In order to assist Protection Services with the issuing of permits and the identification of personnel on site the successful contractor is to supply a list of all personnel that he intends using on site, at least 72 hours prior to entry of the Security Area. This list must be delivered to Protection Services. The list, identified with the Contractor's name, is to contain the following information:
 - Employee name
 - Employee ID Number
 - The Employer's Safety Coordinator's signature
 - Electrical Maintenance Manager signature
 - Copy of the ID book for every employee of the Contractor
- Access permits must be returned to protection services when the worker/s leave the site, either after completion of the services, or upon earlier termination of service of a worker during the contract period.
- To speed up the process of gaining access to the site, the Contractor must compile detailed lists of all tools and equipment (including serial numbers where applicable) to be taken on site before arriving at the Power Station Security gate. An authorised copy of this list must be retained by the contractor - to be used again when the tools and equipment are removed from site after the completion of the services.
- Any additional tools or equipment brought to site, or any tools or equipment removed during the contract period must be reported to protection services and all lists amended likewise. Gate release permits will not be issued for the removal of any tools or equipment not specified on the tool list.
- The Contractor's visitors and all personnel shall conform at all times to the security arrangements in force at the site. Application forms for visitors must be filled in by the Contractor's Site Manager and approved by the Contract Manager, one day before the visit and submitted to the Employer's Protection

Services office. Visitors will not be allowed on site if the necessary forms are not in the possession of the security staff.

- The Chief of Protection Services may, with valid cause, remove any, of the Contractor's personnel from the site, either temporarily, or permanently. He may deny access to the site to any person whom, in the opinion of the said Chief of Protection Services, constitutes a security risk.
- No unauthorised vehicles will be allowed on site. Only Contractor's Vehicles with displayed Contract Vehicle Permits disks will be allowed on site. Contract Vehicle Applications should be directed to the Service Manager.
- The Contractor will be restricted to the working areas associated with his place of work. The Contractor is forbidden to enter any other areas, and must ensure that his employees abide by these regulations.

9.2 People restrictions, hours of work, conduct and records

- Lunch time is between 12:00 until 12:45, the Contractor's personnel working on site are expected to be on site office at 07h15, 12:00 then break for Lunch and back at 12:45 from lunch. Knock off time is 16:30 from Monday to Thursday and 12:15 on Friday.
- The contractor should keep daily attendance register for each employee. This is a service contract which means all employees onsite rendering the service will be compensated accordingly.

9.3 Health and safety facilities on the Affected Property

- The Contractor provides a First Aid service to his employees and subcontractor. In the case where these prove to be inadequate, as in the event of a serious injury, the Employer's Medical Centre and facilities will be used.
- Outside the Employer's office hours, the Employer's First Aid Services will only be available for serious injuries and life-threatening situations.

9.3.1 Barricading

- The Contractor will ensure that equipment and persons are not exposed to danger or to prevent access to dangerous areas.

NB: All welding, flame cutting and grinding work shall be properly screened to protect persons from any injury. A PTW must be applied and issued before working.

- All gratings shall be covered with adequate protective screening when welding or flame cutting in the vicinity.

9.3.2 Speed limit

- All vehicles must be driven with due consideration for personnel and property. A maximum speed limit of 40 km/h will be adhered to on the premises and 20 km/h in the plant at all times.

9.3.3 Health and safety arrangements

- The Contractor must ensure that all his personnel attend a Health and Safety Induction Course prior to starting with their work. The Induction Course can, on request, be provided by the Employer and will be valid for the duration of the services.
- Safety Risk Management has the right and authority to visit and inspect the Contractor's workplace or site establishment to ensure that tools, machinery and equipment comply with the minimum safety requirements.
- The Contract Manager shall be entitled to instruct the Contractor to stop work, where the Contractor's personnel fail to conform to safety standards or contravene health and safety regulations. The contract Manager is entitled to call the Contractor to discipline his employees and to submit disciplinary action, and submit a report to the Contract Manager. The Contractor shall implement additional health and safety precautions where necessary.
- The Contractor will provide all his personnel with the required personal protective equipment and tools. Employer shall only be responsible for PSR regulation on site.
- Risk Assessments, PTW, Pre-Job Briefs, Post – Job Briefs & Job Observations will be conducted for all jobs.
- All Construction Regulation - safety requirements should also be adhered to.
 - Safety Plan
 - Fall Protection Plan
 - 161 and 162 appointments

9.4 Environmental controls, fauna & flora

The contractor to comply with the following requirements and legislation:

- Occupational Health and Safety Act 85 of 1993 as amended and its regulations.
- Compensation for Occupational Injuries and Diseases Act 130 of 1993 as amended.
- National Environmental Management Act 107 of 1998 as amended.
- National Environmental Waste Act 59 of 2008 as amended.
- National Water Act 36 of 1998 as amended.
- Eskom procedures and safety requirements set out in safety, health and environmental specifications 004 – 4830.
- Eskom procedure 32-95 in regards with the management of safety, health and environmental incident.
- Any other act or procedure deemed necessary or applicable.

If the work includes some toxic and hazardous substances during normal and routine maintenance activities. In this case the *Contractor* uses such hazardous substances in accordance with the applicable regulations and procedures are disposed off by the contractor in accordance with the applicable law.

9.5 Cooperating with and obtaining acceptance of others

- 1) The *Contractor* may be required to share the Affected Plant equipment and/or space with *Others*.
- 2) Cooperating with statutory authorities or inspection agencies.

9.6 Records of *Contractor's* Equipment

Maintenance team must have rigging skills and rigging equipment to rig motors when motors are out of plant sectional boundaries.

9.7 Equipment provided by the *Employer*

Proper communication must be made then a crane shall be made available when needed. The contractor may provide a truck with a crane when informed by a contract manager from time to time when too many motors are to be loaded and offloaded.

The Contractor will use this Camden pre-assessment form if does not have their own approved form.

APPENDIX 1: PRE-ASSESSMENT REPORT FORM

CAMDEN POWER STATION HV MOTOR PRE -ASSESSMENT FORM

MOTOR DETAIL

CONTRACTOR'S ASSESSOR _____ ESKOM ASSESSOR _____

LAST JOB NO. AND NAME OF CONTRACTOR WHO HAS DONE REPAIRS BEFORE:
 JOB No.: _____ NAME OF Co: _____

NEW JOB No: _____

ORDER No.: _____

QCP REF. NUMBER: _____

FAULT FOUND: _____

MACHINE NAME PLATE DETAILS			
MAKE		SERIAL NO.	
STATOR VOLTS		kW/HP	
STATOR AMPS		FRAME SIZE	
SPEED			
	MOTOR DISCRIPTION		

PRE-CLEANING ASSESMENT			
ITEM DESCRIPTION	ACCEPTABLE		REMARKS AND MEASUREMENTS
	YES	NO	
STATOR			
STATOR CORONA DISCHARGE / PARTIAL DISCHARGE			
CLEANLINESS OF WINDING.(OIL, DUST MOISTURE)			
SIGNS OF OVERHEATING			
LOOK FOR FOREIGN OBJECTS IN HOUSING			

VENT DUCTS BLOCKED			
--------------------	--	--	--

ROTOR			
SIGNS OF OVERHEATING			
VENT DUCTS BLOCKED			

BEARINGS			
MISALIGNMENT			
LAY			

EXTERNAL FANS			
FAN LOOSE			
FAN CRACK			

TERMINAL CONNECTION BOX			
TERMINALS CONDITION			
TERMINAL-BOX - CONDITION			
TERMINAL BOX CONNECTION AND INSULATORS			
TERMINAL BOX CONDITION	^^		
INSULATION RESISTANCE AND PI			
ITEM DESCRIPTION	ACCEPTABLE		REMARKS AND MEASUREMENTS
	YES	NO	
STAR POINT BOX & AUX BOX:			
STAR POINT BOX- CONDITION			
STAR POINT AND NUTS - CONDITION			
TERMINAL BOX RTD'S CONDITION			
TERMINAL BOX HEATERS- CONDITION			
CONDITION OF DESICCATORS AND INSULATORS			

ASSESSMENT AFTER CLEANING ALL COMPONENTS			
ITEM DESCRIPTION	ACCEPTABLE		REMARKS AND MEASUREMENTS
	YES	NO	
STATOR			
HEAT EXCHANGER/ COOLER			

HEAT EXCHANGER PHYSICAL APPEARANCE			
COOLING TUBES/ COOLER BLOCKAGE			
CASING CRACK/ RUST			

STATOR HOUSING			
FOOT MOUNTING - CONDITION			
END SHIELD MOUNTING SPIGOTS DE - ID MEASUREMENTS			A)
			B)
			C)
END SHIELD MOUNTING SPIGOTS NDE - ID MEASUREMENTS			A)
			B)
			C)
WINDING ANTI-CONDENSATION HEATERS - RATING			
CHECK CONCENTRICITY			
HOUSING OVERALL CONDITION			

CORE AND WINDINGS			
CORE - CONDITION			
CORE - FLUX TEST RESULT (COMPULSORY) HOT SPOT AND WATTS LOSS, EL CID (CONSULT REPRESENTATIVE)			
WINDING - CONDITION			
CONDITION OF WEDGES			
RTD'S RESISTANCE			1 2
			3 4
			5 6
WINDING - INSULATION RESISTANCE TEST			
INSULATION RESISTANCE TEST	BETWEEN PHASES		
INSULATION RESISTANCE TEST	PHASE TO EARTH		
POLARISATION INDEX TEST			
TAN DELTA TEST (CONSULT ESKOM REPRESENTATIVE)			
WITHSTAND VOLTAGE TEST (CONSULT ESKOM REPRESENTATIVE)			
LAMINATION OUTER DIAMETER			

CORE AND WINDINGS - SQUIRREL CAGE ROTOR				
VISUAL INSPECTION - CONDITION (CRACKING)				
CORE TEST (ELCID CONSULT ESKOM REPRESENTATIVE)				
BAR TO BAR TEST (ELCID CONSULT ESKOM REPRESENTATIVE)				
CRACKS / WELDING				
IF DEFECTIVE, RECORD DATA BELOW				
ROTOR CORE - DIAMETER				
ROTOR CORE - LENGTH				
ROTOR WINDINGS - SINGLE OR DOUBLE CAGE				
ROTOR SLOTS - NUMBER OF				
ROTOR BARS - NUMBER OF				
ROTOR BARS - MATERIAL				
ROTOR BARS - SECTIONAL DIMENSIONS (DRAWING)				
ROTOR BARS - LENGTH				
SHORT CIRCUIT RINGS - MATERIAL				
SHORT CIRCUIT RINGS - NUMBER OF				
SHORT CIRCUIT RINGS - OUTSIDE DIAMETER				
SHORT CIRCUIT RINGS - INSIDE DIAMETER				
SHORT CIRCUIT RINGS -WIDTH				

AIR GAP						
ROTOR OD (TAKE 3 OD MEASUREMENTS ON 3 PLACES MINIMUM, DEPENDING ON LENGTH OF CORE)			A1)	A2)	A3)	A4)
			B1)	B2)	B3)	B4)
			C1)	C2)	C3)	C4)
STATOR ID (TAKE 3 ID MEASUREMENTS ON 3 PLACES MINIMUM, DEPENDING ON LENGTH OF CORE)			A1)	A2)	A3)	A4)
			B1)	B2)	B3)	B4)
			C1)	C2)	C3)	C4)
AIR GAP (CALCULATED FROM ABOVE MEASUREMENTS)						
ROTOR OVAL / DEFORMED / MISALIGNMENT						

STATOR			
IF WINDING IS DEFECTIVE, RECORD WINDING DATA BELOW			
STATOR CORE - DIAMETER			

STATOR CORE - LENGTH			
WINDING - TYPE			
WINDING - CONNECTION			
STATOR SLOT - NUMBER OF			
STATOR COIL - NUMBER OF			
STATOR COIL - PITCH			
STATOR COIL - MEAN TURN LENGTH			
STATOR COIL - TURNS			
CONDUCTOR - BARE DIMENSION			
CONDUCTOR - HOW MANY IN PARALLEL			
STATOR SLOT - WIDTH			
STATOR SLOT - DEPTH BELOW WEDGE			
STATOR SLOT - DEPTH ABOVE WEDGE			
WINDING PROJECTION - CONNECTION SIDE			
WINDING PROJECTION - PLAIN SIDE			

ITEM DESCRIPTION	ACCEPTABLE		REMARKS AND MEASUREMENTS
	YES	NO	
ROTOR			
SHAFT			
NDT TEST (CONSULT ESKOM REPRESENTATIVE – MPI (MAGNETIC PARTICLE INSPECTION TEST)			
MEASURED GAUSS LEVEL IN BEARING AREA (AS A GUIDELINE IT MUST BE LESS THAN 2G)			
MEASURED GAUSS LEVEL IN SHAFT AREA (AS A GUIDELINE IT MUST BE LESS THAN 8G)			
SHAFT EXTENSION - DIMENSION FAN SIDE			A)
			B)
			C)
SHAFT EXTENSION - DIMENSION NON FAN SIDE			A)
			B)
			C)
SHAFT EXTENSION - ACTUAL LENGTH NON FAN SIDE			
SHAFT RUN OUT FAN SIDE			

SHAFT RUN OUT NON FAN SIDE			
ROTOR CORE RUN OUT			
COMPLETE ROTOR RUN OUT (6 MEASUREMENTS)			A) B) C)
			D) E) F)
D/E BEARING JOURNAL - CONDITION			
D/E BEARING JOURNAL -SPECIFIED DIMENSIONS			MIN.) MAX.)
D/E BEARING JOURNAL - ACTUAL DIMENSIONS			A)
			B)
			C)
D/E BEARING JOURNAL - ACTUAL LENGTH			
D/E SEAL LANDINGS - CONDITION			
D/E SEAL LANDINGS - ACTUAL DIMENSIONS			A)
			B)
			C)
D/E SEAL LANDINGS - ACTUAL LENGTH			
ND/E BEARING JOURNAL - CONDITION			
ND/E BEARING JOURNAL -SPECIFIED DIMENSIONS			MIN.) MAX.)
ND/E BEARING JOURNAL - ACTUAL DIMENSIONS			A)
			B)
			C)
ND/E BEARING JOURNAL - ACTUAL LENGTH			
ND/E SEAL LANDINGS - CONDITION			
ND/E SEAL LANDINGS - ACTUAL DIMENSIONS			A)
			B)
			C)
ND/E SEAL LANDINGS - ACTUAL LENGTH			
D/E COOLING FAN INTERNAL - CONDITION (NDT TO BE DONE)(CONSULT REPRESENTATIVE)			
ND/E COOLING FAN INTERNAL - CONDITION (NDT TO BE DONE)(CONSULT REPRESENTATIVE)			
EXTERNAL COOLING FAN - CONDITION (NDT TO BE DONE)(CONSULT REPRESENTATIVE)			
FAN COWL			

DRIVE END - END SHIELD AND BEARING HOUSING

DRIVE END - END SHIELD			
SPIGOT - OD MEASUREMENTS			A)
			B)
			C)
BEARINGS HOUSING SEAT - INSIDE DIAMETER			A)
			B)
			C)
BEARING CAP - INNER			
BEARING CAP - OUTER			
CHECK CONCENTRICITY			
DRIVE END END SHIELD FIXING BOLTS - CONDITION			
DRIVE END END SHIELD FIXING BOLTS - NUMBER OF			
DRIVE END BEARING HOUSING			
WHITE METAL - SIDE GLASS & PORTS			
WHITE METAL BEARING HOUSING CHECK PORTS AND ADDITION ITEMS E.G. OIL PUMP			
BEARING HOUSING - CONDITION			
BEARING HOUSING FRONT // REAR COVER - CONDITION			
			A)
BEARING HOUSING SEAT - OUTSIDE DIAMETER			B)
BEARING HOUSING SEAT - OUTSIDE DIAMETER			C)
BEARING - CONDITION			
BEARING - TYPE AND MAKE			
BEARING - SIZE			
BEARING HOUSING BORE -SPECIFIED DIMENSIONS			MIN.) MAX.)
BEARING HOUSING BORE - ACTUAL DIMENSIONS			A)
			B)
			C)
BEARING IR MEASUREMENTS			
SLEEVE BEARING BORE -SPECIFIED DIMENSIONS			MIN.) MAX.)
			A)
SLEEVE BEARING BORE - ACTUAL DIMENSIONS			B)
			C)

SLEEVE BEARING OIL RING - CONDITION			
SLEEVE BEARING OIL RING - NUMBER OF			
SLEEVE BEARING OIL WIPER			
BEARING OIL SCOOP CONDITION			
BEARING GREASE SLINGER - CONDITION			
BEARING - INSULATED			
BEARING INSULATION - CONDITION			
BEARING HOUSING FIXING BOLTS - CONDITION			
BEARING HOUSING FIXING BOLTS - NUMBER OF			
SEALS			
TEMPERATURE DETECTOR CONDITION			
OIL LEVEL INDICATOR PIPING CONDITION			
ITEM DESCRIPTION	ACCEPTABLE		REMARKS AND MEASUREMENTS
	YES	NO	
NON-DRIVE END - END SHIELD AND BEARING HOUSING			
NON-DRIVE END - END SHIELD			
SPIGOT -OD MEASUREMENTS			A)
			B)
			C)
BEARINGS HOUSING SEAT - INSIDE DIAMETER			A)
			B)
			C)
BEARING CAP - INNER			
BEARING CAP - OUTER			
CHECK CONCENTRICITY			
NON DRIVE END END SHIELD FIXING BOLTS - CONDITION			
NON DRIVE END END SHIELD FIXING BOLTS - NUMBER OF			
NON-DRIVE END BEARING HOUSING			
WHITE METAL - SIDE GLASS & PORTS			
WHITE METAL BEARING HOUSING CHECK PORTS AND ADDITION ITEMS E.G. OIL PUMP			
BEARING HOUSING - CONDITION			
BEARING HOUSING FRONT // REAR COVER - CONDITION			
BEARING HOUSING SEAT - OUTSIDE DIAMETER			A)

			B)
			C)
BEARING - CONDITION			
BEARING - TYPE AND MAKE			
BEARING - SIZE			
BEARING HOUSING BORE - SPECIFIED DIMENSIONS			MIN.) MAX.)
			A)
BEARING HOUSING BORE - ACTUAL DIMENSIONS			B)
			C)
BEARING IR MEASUREMENTS			
SLEEVE BEARING BORE - SPECIFIED DIMENSIONS			MIN.) MAX.)
SLEEVE BEARING BORE - ACTUAL DIMENSIONS			A)
			B)
			C)
SLEEVE BEARING OIL RING - CONDITION			
SLEEVE BEARING OIL RING - NUMBER OF			
SLEEVE BEARING OIL WIPER			
BEARING OIL SCOOP CONDITION			
BEARING GREASE SLINGER - CONDITION			
BEARING - INSULATED			
BEARING INSULATION - CONDITION			
BEARING HOUSING FIXING BOLTS - CONDITION			
BEARING HOUSING FIXING BOLTS - NUMBER OF			
SEALS			
TEMPERATURE DETECTOR CONDITION			
OIL LEVEL INDICATOR PIPING CONDITION			

SITE FACILITIES AND SERVICES

9.7.1 Employer site information

9.7.1.1 Fire Precautions

Any tampering with the *Employer's* fire equipment is strictly forbidden. All exit doors, fire escape routes, walkways, stairways, stair landings and access to electrical distribution boards must be kept free of obstruction, and not be used for work or storage at any time. Fire fighting equipment must remain accessible at all times. In case of a fire, report the location and extent of the fire to the Electrical Operating Desk at extension 3471.

Take the necessary action to safeguard the area to prevent injury and spreading of the fire.

9.7.1.2 Reporting of accidents

The *Employer* follows an accident prevention policy that includes the investigation of all accidents involving personnel and property. This is done with the intention of introducing control measures to prevent a RE-OCCURRENCE of the same incidents. The *Contractor* is expected to fully co-operate to achieve this objective. The *Contract Manager* must be informed immediately of any incidents and any damage to property or equipment must be reported within 12 hours.

NOTE! This report does not relieve the *Contractor* of his legal obligation to report certain incidents to the Department of Labour, or to keep records in terms of the Occupational Health and Safety Act, and Compensation for Occupational Injuries and Diseases Act.

9.7.1.3 Refuse Disposal

The *Employer* will provide and empty special colour coded bins for refuse disposal.

The *Contractor* will be responsible for cleaning their site office space and yard, and their own refuse bins to be kept clean.

The *Contractor* ensures that all workers under his control strictly adhere to the correct use of refuse bins:

For the full duration of the *services*, the *Contractor* is responsible to keep the work area clean of any rubble, and to place all refuse into the bins provided.

9.7.1.4 Portable Water

The contractor may utilize water points on Site. Where no supply is available the contractor makes his own arrangements.

9.7.1.5 Electrical Power

Existing 3 Phase 380V and single phase 220V power on site may be utilised by the contractor. Where no supplies are available the contractor supplies his own source. The employer does not guarantee uninterrupted power supply.

9.7.1.6 Sanitary Facilities

Permanent facilities to serve the Power Station terrace are provided randomly by the employer.

9.7.1.7 Waste Removal

Household waste removal to the bins, as provided on the Site by the employer, is the responsibility of the Contractor. The contractor complies with Employer's policy for waste management on Site, policy. 004/4100.

9.7.1.8 Telecommunication

Connections are available. The contractor applies via the Project Manager for a connection. Connection fees and calls are for the Contractor's account.

9.7.2 Office and Toilet Facilities

The *Employer* will provide the *Contractor* access to office and toilet facilities if available.

9.7.3 Accommodation and catering

The *Contractor* will be responsibility for the provision of accommodation to his personnel – the *Employer* does not provide accommodation.

The *Contractor* or any of his employees or subcontractors will be allowed to use the *Employer's* dining facilities.

The *Contractor* or any of his employees or subcontractors may also buy take away meals from the fast foods outlet on Site. Lunch time is from 12:00 to 12:45. Work starts at 07h15 until 16h30 from Monday to Thursday and Friday we knock off at 12h15 midday.

9.7.4 Provided by the Contractor

The contractor shall provide accommodation, vehicles, office equipment, PPE, special PPE etc to execute the given SOW. The contractor shall only collect what belongs to the contractor upon completion of the contract.

9.8 Control of noise, dust, water and waste

Full PPE shall be worn at all times when entering the plant.

9.9 Hook ups to existing works

Eskom Cardinal Rules shall apply and be complied to, contractor shall provide safety harnesses to hook up at height.

9.10 Tests and inspections

9.10.1 Description of tests and inspections

Safety equipment's shall be tested/calibrated and inspected before use by the Contractor, a record/ certificates shall be kept by the contractor and available upon request.

9.10.2 Materials facilities and samples for tests and inspections

N/A

10 LIST OF DRAWINGS

10.1 Drawings issued by the *Employer*

This is the list of drawings issued by the *Employer* at or before the Contract Date and which apply to this contract.

Drawing number	Revision	Title
N/A	N/A	N/A