Eskom	Specification	Kusile Power Station

Title: **Kusile Power Station Supply, Installation and Repairs of Cables Scope of Work**

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1. Introduction

Kusile Power Station management has decided to establish a partnership with a suitably qualified, experienced and well established contractor for the supply, installation and repairs of cables associated with Kusile Power Station. This document describes the details of the requirements, standards, scope of work and the terms and conditions of the maintenance partnership.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The purpose of this document is to define the scope of work specified for the supply, installation and repairs of cables activities functions requirements for Kusile Power Station.

The station is expected to perform at 92% UCF, 6% PCLF and 2% UCLF. The specified Cables maintenance must support this requirement.

It is therefore imperative that the successful and suitably qualified partner aligns their organisation fully to these specified scope activities and processes laid down in this document.

2.1.2 Applicability

This document is applicable to Kusile Power Station.

2.1.3 Effective date

This document is effective from the date of authorisation until its succeeding document has been authorised.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] ISO 9001 : Quality Management Systems

[2] ISO 14001: Environmental management System

[3] Act No 73 of 1989: The Environment Conservation Act No 107 of 1998: National

[4] Act No. 107 of 1998: National Environmental Management Act, 1998

[5] Act No 14 of 2009: The National Environmental Act, 1989

[6] Act No 102 of 1980: National Key Points Act, 1980

[7] Act No 36 of 1998: National Water Act, 1998

[8] Act No 85 of 1993: Occupational Health and Safety Act & Regulations, 1993.

2.2.2 Informative

[1] 414 - 32 Rev 0: Kusile Maintenance User Requirement Specification

[2] GGR 0992: Plant Safety Regulations

[3] 32 - 726 Rev 0: Mandatory S.H.E. Requirements for the Eskom Procurement and Supply Chain Management Process.

[4] GGS 0462: Safety and Quality Specifications.

[5] 237 - 0016 Rev 0: Integrated Business Improvement – prevention and improvement standard

[6] GGSS 1181: Specification for chemical product and material used in a power plant

[7] GGS 1426 : Environmental Conditions For Process Control Electronic Equipment Used at Power Stations

[8] GVLIR 0007: Safety, Health and Environment Specifications for Contractors

[9] ESKASAAA3 Eskom approval of personnel performing quality related special processes.

[10] 32-726 Annexure C: S.H.E. Requirements for Tender Enquiries

[11] 32-726 Annexure D: S.H.E. Tender Evaluation and Scoring Card

[12] 32-726 Annexure E: Supplier Suspension

[13] 36 – 942: Arc Flash Protection Specification

[14] GSS 0456 : Specification for LV Switchgear and control gear assemblies and associated equipment for voltages up to and including 1000V and 1500V DC

[15] ESKSCAA04 :Standard for electronic protection and fault monitoring equipment for power systems

[16] GGS 1426 :Environmental Conditions For Process Control Electronic Equipment Used at Power Stations

[17] 240 – 56227443 : Requirements for Control and Power cable for Power Stations Standard

2.3 Definitions

2.3.1 Availability: Period when a system is operating satisfactory when used under specified conditions.

2.3.2 Contractor: Service provider contracted to provide a specific service to Eskom, Kusile Power Station.

2.3.3 Employer: Eskom, or Eskom Kusile Power Station or representative.

2.4 Abbreviations

Abbreviation	Explanation
AP:	Appointed Person
BOM:	Bills of Material
BMS:	Building Management System
BU:	Business Unit
NEC:	New Engineering Contract
OEM:	Original Equipment Manufacturer
OHS Act:	Occupational Health and Safety Act
PCLF:	Planned Capability Loss Factor
PPE:	Personal Protective Equipment
PM:	Plant Maintenance
PSR:	Plant Safety Regulations
PTW:	Permit to Work
QC:	Quality Control
QCP:	Quality Control Plan
QMP:	Quality Management Programme
RP:	Responsible Person
SABS:	South African Bureau of Standards

Abbreviation	Explanation
SANS:	South African National Standards
SAP PM:	SAP Plant Maintenance
SAP:	Systems, Applications, Products (Plant Maintenance, Procurement, Finance and Materials Management) integrated maintenance management system.
SHE:	Safety, Health, Environment
SOW:	Scope of Work
UCF:	Unit Capability Factor
UCLF:	Unplanned Capability Loss Factor
URS:	User Requirement Specification

2.5 Roles and Responsibilities

2.5.1 Contractor

a) All Contractor employees shall comply with Eskom's policies and site regulations, adherence to Eskom's Life Saving Rules, adherence to Generation Occurrence Management Procedure, Smoking Policy, zero tolerance on alcohol usage, etc. These requirements will be detailed during the induction training process. This document will be used in conjunction with the Kusile Maintenance URS.

b) The number of maintenance staff required to execute the works is to be decided by the Contractor after his/her assessment of the scope of work and submitted to the Employer for approval.

c) The successful Contractor shall utilise/provide skilled and suitably qualified staff (in line with Eskom Job specifications) with current experience in the following but not limited disciplines;

i. Competent Maintenance Person according to OHS Act

ii. Occupational Health and Safety Act 85 of 1993

iii. NEC contract management

iv. Quality Management Control and Assurance procedures

v. Plant Safety Regulation authorisation

vi. Spares optimisation

vii. Plant optimisation and commissioning

viii. Procedure writing

ix. BOM compilation

d) Staff must meet minimum requirements of Eskom job descriptions, with additional requirements specified.

e) All staff brought onto site in connection with this SOW should be able to fluently speak, understand and write in English.

f) Proof of qualification is to be supplied on request by the Employer.

g) The Contractor ensures that all staff being brought to Kusile PS site has a valid fitness certificate based on the specified plant man-job specification.

h) The Contractor shall employ in and about the execution of the works only such persons that are careful, competent and efficient in their several trades and callings and the Employer shall be at liberty to object to and require the Contractor to remove from the works forthwith any person employed by the Contractor in or about the execution of the works who, in the opinion of the Employer, misconduct's himself/herself or is incompetent or negligent in the proper performance of his/her duties and such person shall not be again employed for the works without the written permission of the Employer.

i) Provide daily supervision of all related plant through trained and competent personnel to ensure that inspections & work activities are conducted daily.

j) Ensures proper behaviour of personnel under his/her supervision as per the Kusile culture.

k) Ensures training of all personnel under his/her supervision. The training required will include but not limited to Eskom safety training requirements, related plant training and Kusile culture.

l) Ensures high morale of staff and competency.

m) Ensures that throughout the duration of the contract, they conform and adhere to the safety, health and environment regulations as stipulated in the Kusile Maintenance URS.

n) A comprehensive risk assessment shall be done prior to any work being carried out

o) If a Permit to Work is required for working on plant and/or equipment, on completion of the work the relevant piece of plant/equipment shall be properly re-commissioned prior to the clearance of the Permit to Work.

p) The Contractor shall be responsible or held liable for any defects arising from maintenance/operational faults within twenty four hours (24 hrs.) after an intervention, provided that the equipment has been placed into service.

q) The contractor shall be held responsible or held liable for any defects arising from poor workmanship performed by their staff or use of inferior spare parts. The guarantee periods shall be:

i. Poor workmanship within 48 hours period from the time which the equipment is put in to operation

ii. Inferior spares within a period of 6 months from time the equipment is put in service.

2.6 Process for Monitoring

This specification will be reviewed every two years period from date of initial authorisation or when necessary.

2.7 Related/Supporting Documents

Not applicable.

3. Document Content

3.1 Works information

The contractor will be responsible for the supply, installation and repairs of all cables at Kusile Power Station in accordance to **Eskom Cable Standard 240-56227443**. The service provider supplies, installs and repairs of cables as and when required as per the SOW below:

3.2 Supply, installation and repairs of cables

a. The works is the supply; delivery and installation of electrical cables and equipment as listed on an “as and when required” basis at all plants that are related to Kusile Power Station and its boundaries.

b. Repair cable faults by means of cable joints, cable terminations and or cable replacement.

c. Remove the redundant power cabling as per cable schedules or identified and defected on SAP.

d. Supply and install new cable racks as and when required.

e. Note the rates for all galvanized materials use for erecting the required new racking, must include the cost of designing such racking.

f. Supply, deliver & install new cabling, cable joints & termination kits as and when required as per the Cable List on **Appendix A**.

g. Remove all resins, bitumen etc. from cable terminations and replace the same as and when required

h. Install, test, repair, earthing as and when required on all Units and common Plants as and when required: Braided bare stranded copper earth for interconnecting main earthing on racks, etc.

i. Repair install cable conduits as and when required

j. Repair, test, trace and join all 15kV, 6.6 kV, 400V, 220V, 110V & 24V cables as and when required

k. Re-terminate existing cable ends previously disconnected (by others) as & when required.

l. All Cables 15kV, 6.6 kV, 400V, 220V, 110V & 24V installed in Kusile Power Station, repaired and removed MUST be tested first, the test results MUST be within the specification and the employer must accept the result first before any work can continue.

m. All repaired and installed cables must be tested after any intrusive work is carried out.

n. All cables, joints and terminations supplied, must be in accordance with all applicable standard and specification.

o. The Contractor must issue a Certificate of Compliance for the work done where applicable.

p. All terminations and jointing to include ferrules, lugs, tapes and associated consumables

q. The Contractor must also provide knowledge on other plant falling within his field of expertise.

r. Labelling of cables: Cable number tags to identify cable as per requirements and colour coding

s. Excavation in all classes of material not exceeding 2000mm deep for cable trench, sleeve pipe, etc. including risk of collapse, keeping free of water, river sand bed backfilling, compacting and disposal of surplus material, all to the Engineer's specification.

t. Excavation by hand in all classes of material not exceeding 2000mm deep for cable trench, sleeve pipe, etc. including risk of collapse keeping free of water, river sand bed backfilling, compacting and disposal of surplus material, all to the Engineer's specification

u. Re-excavation over existing cables, pipes and sleeves, etc. in soft material not exceeding 2000mm deep for cable trench, sleeve pipe, etc. including risk of collapse, keeping free of water, river sand bed backfilling, compacting and disposal of surplus material, all to the Engineer's specification

v. For every excavation work, removal of concrete, digging of trenches must be replaced

w. Trenches standards will be adhered to by the contractor.

x. All old cables removed belong to Eskom and will not be removed off-site by the contractor.

y. The Employer reserves the right to have any of the Contractors personnel removed off site without any compensation to the Contractor in the event of Contractor's personnel being in contravention with the OHS Act or any of the Employer's rules, regulations and procedures.

z. The Employer reserves the right to request disciplinary/corrective action if, and when required

aa. The contractor will operate under direct instructions of Employer.

bb. The contractor will provide all safety apparel, safety equipment and cleaning materials to comply with construction regulations

cc. Repair work to commence on exact time agreed between contractor and Employer and the contractor on this plan of action.

dd. After hours and during weekends all call-outs instruction to contactor will be made through EOD Control room and Contractor should report to EOD control room personally prior to commencement of work, and a register provided by Eskom will be signed at the beginning of work and signed off on completion of work.

ee. The permit to work system applies at all times before work can commence, LAR will be signed before any activity can commence in the plant.

ff. All HV joints and terminations must be pressure tested after work is completed.

gg. Supply and deliver new copper bus bars as and when required as per specifications on **Appendix B and C.**

hh. Supply and deliver new of copper flexibles as and when required as per specifications on **Appendix D**.

ii. Supply detection services i.e. Cabling and piping as and when required.

3.3 Work preparation and work management

a) Adhere to work management system SAP PM.

b) Adhere to Eskom plant safety regulations (PSR).

c) Risk assessment shall be done and documented/filed for each task.

d) Safe work procedures or temporary work procedures shall be available and used for each job.

e) Job observation shall be done on agreed frequencies.

f) All documentation required to complete work shall be referenced and filed for future reference (Test results, reports, drawings etc.) All documentation to be completed and filed (test sheets, test results, technical reports, drawings etc.)

g) The contractor must ensure that he maintains a 24hours standby roster at all times.

h) Ensure compliance to PSR before any work commence.

i) Perform toolbox talks, discuss and fill risk assessment, ensure you're in possession of the correct drawings, correct check sheet, correct work procedure, correct QCP's and you're at the correct plant.

j) Attend various meetings. (Safety, Production, Maintenance, Commissioning etc.)

k) The contractor must identify all potential hazardous tasks in the Works Information and prepare safe working procedures to issue to his staff before any work will start.

l) The contractor must familiarize himself with the works and must make available his specific "housekeeping" action plans to ensure that the working areas and surroundings are kept safe and tidy during the duration of the works.

m) The contractor must provide all the required PPE to his staff before the work will start.

n) The contractor must ensure that all the necessary induction has been done before any work will start.

o) The contractor must ensure before any work is carried out, the correct equipment and hand tools are available to his staff and that it is in a good and safe working condition and complying with all OHSA requirements.

p) The contractor must provide proof that toolbox talks have been held and a workers register must always be available and kept on date and reported to the Employer on a required basis.

q) The contractor must ensure that on a daily basis the agreed safety and housekeeping are upheld and that it is reported to the Employer on a required basis.

r) The contractor must assist the Security Department by providing a name list and copies of identity documents for all the workers at least one day before site establishment.

3.4 Standby services

a) The Contractor shall ensure that staff with adequate expertise is available to manage plant issues on a 24 hour standby service.

b) The Contractor's response time to a callout shall be one hour from the time the person on standby is officially notified until the time that person arrives on site.

c) The Contractor's 'Technical Support Service' staff shall be available as advisory back-up to assist on instances where the staff on site is struggling to solve any technical problem.

3.5 Conditions

a) Please note that the equipment will only form part of the works once the respective area has been commissioned and handed over to the Eskom Generation.

b) The contractor shall carry out the work in accordance with the works order papers supplied to him and returns all necessary documents duly completed for entry into SAP PM Module for plant history.

c) All stand-alone reports on the work done, tests performed or modifications carried out shall be submitted to the contract supervisor not later than 7 days after completion of the work.

d) The contractor shall be responsible for assisting the employer in the development of the preventative maintenance program. Such assistance will include the development of work instructions, maintenance frequencies and monitoring and inspection requirements.

e) Maintenance procedures must be consistent with best practices and must be available in an accessible format on-site for and stored in SAP PM.

f) The contractor will be responsible for reviewing equipment requirement, leakage and spillage control on all responsible plant areas.

g) The contractor is to complement their services to improve Plant performance by:

i. Project management.

ii. Value engineering.

iii. Procedure and documentation writing.

iv. Design services.

v. Spares Management.

vi. Technical Advice.

vii. Operational and production process review.

h) The contractor will be responsible for cleaning and checking the air-conditioning rooms and cabinets

i) The works may include the use of hazardous substances during normal and routine maintenance activities.

j) The contractor will be responsible for all repairs of refurbishable items connected to this scope utilising the rotable process in SAP.

k) The employer may request the contractor to ensure that an accurate description of spare parts is maintained in the employer's stores and the contractor will inform the Employer of any changes.

l) The contractor may be requested to support the employer's personnel by providing cross sectional drawings and part numbers for stock identification and subject to the employer's access control procedures, assists in checking the stock holding.

m) The contractor in conjunction with the OEM recommends to the employer the optimal spares that should be carried at Kusile Power Station and includes:

i. Spares required for maintenance.

ii. Minimum number of spares kept for emergency.

iii. Serviceability of spares in the stores.

3.6 Continuous Improvement

a) The Contractor shall implement a program of continuous improvement to optimise Plant performance and reduce system and equipment failures.

b) The Contractor shall participate in improvement programs and root cause investigations/analysis as stipulated by the Employer.

c) The Contractor shall participate in improvement programs pertaining to plant equipment.

3.7 Management and Reporting

a) The type of reports, level of detail and frequency of reporting will be mutually agreed by the Employer and the Contractor. These may change from time to time on request by the Employer.

b) The Contractor to be represented at any ad-hoc meetings that may arise in order to address any production or safety related matters.

c) Liaison meetings shall be held between the Employer's representative or his/her delegate and the Contractor's representative or his/her delegate on a monthly basis or when necessary to discuss any technical details, or concerns.

d) The Contractor will be responsible for implementing an employee performance management system that is consistent with the Employer's management requirements

3.8 Quality and Documentation Control

a) The contractor shall submit a QCP which will be overseen by Eskom and will ensure that the relevant documentation is available on site to manage the scope and related programs.

b) The Contractor shall ensure that all measuring and test equipment is calibrated at all times & proof thereof must be readily available.

c) The Contractor shall adhere to all 'Quality References' and 'Standards' applicable to this SOW.

d) The Contractor shall utilise the Employer's quality documentation management system and processes.

3.9 Works Implementation

The Contractor shall supply a work implementation plan including at least the following;

a) Site establishment.

b) Manpower plan.

c) Organogram.

d) Skills required and associated cost per skill (e.g. artisan, site manager, etc.)

3.10 General

a) The contractor shall carry out all plant activities as per the Works Management Process.
b) The contractor shall ensure that the work area is kept clean on completion of any work done.
c) The contractor shall execute the works within the times stipulated on the works order.
d) The employer is to schedule all maintenance tasks.
e) The contractor shall ensure that any witness, hold points are strictly adhered to.
f) Before work starts on site, an inaugural meeting is held with the contractor and the employer, to explain in details all the requirements of the site regulations.

g) The contractor will be issued with a file of current site regulations on arrival. The file remains the property of the employer.

h) The Employer and Contractor in this SOW shall commit towards the following;
i. Retention of critical skills
ii. Continuous cost reduction
iii. Safety ,Health & Environment
iv. Transfer of Operational experience and skills
i) Performance is measured by the Employer against those areas which contribute to the Employer's business.

j) Areas of measurement include the Employer's key business indicators and will be redefined from time to time.

k) The Contractor is to ensure that any service rendered does not interfere with the Employer's scheduled work and should align himself with the Employer's work control process.

l) Should the Employer become aware of any changes to the activity schedule (programme of notifications), the Employer may issue the Contractor with a revised programme.

m) The contract entered into with the Contractor is non-exclusive and work against this contract can only be performed upon receipt of a task order.

n) All works will be subject to anytime inspection from the Employer.
o) Please note that equipment will only form part of the works once the respective area has been commissioned and handed over to Generation.

p) The Contractor maintains all year round an agreed base crew at Kusile Power Station which is supervised by the contractor with any changes to the crew being negotiated and agreed upon with the Employer.

q) Any tests done on the cables as defined by the Employer, the Contractor shall supply the Employer with proof of such tests.

r) The contractor shall ensure the integrity of Plant labelling and that deficiency with regards to plant labelling is reported immediately.

s) All contractors must ensure they have responsible persons (in terms of PSR) for any work performed on the plant. This will require individuals to successfully complete a written and oral examination for the relevant regulation based on the Plant Safety Regulations. All maintenance technically qualified (above semi-skilled) contractors will be trained and authorised (in terms of PSR) within 3 months of contract award date. Training will be supplied by the Employer.

3.11 Communication and Correspondence

a) All correspondence includes:

i. Kusile Power Station

ii. Employer's Contract number

iii. Contract description

iv. Correspondence subject matter

v. Employer's name and contact details

vi. Contractor contact details

vii. Contract Date

b) Where appropriate the correspondence includes the Employer's reference and is delivered as a single package.

c) All communications from the Contractor are numbered sequentially with a prefix as advised by the Employer. The Employer responds in like manner. The prefix and numbering system is decided upon at the Inaugural meeting.

3.12 Contractor's organisation

The Contractor shall submit a Contract's organogram to the employer for acceptance, indicating the contractor's and the sub-contractor's employees

3.13 Tender requirements

a) A proposal is to be submitted by the tenderer for the above-mentioned scope of work.

b) Hereafter a contract shall be negotiated with the successful Contractor.

c) The appointment of a Contractor is at Eskom's (The Employer) sole discretion taking into account the factors which Eskom considers relevant.

d) The Employer shall perform evaluation based on the criteria of commercial, financial and technical evaluation as per specific applicable enquiry document.

e) The tender prices shall be completed as per the pricing structure.

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Bongekile Makini	Electrical Maintenance Manager
Mashudu Monyai	Electrical Engineer
Justice Tshikomba	Maintenance Manager
Bright Nelufhangani	Senior Electrical Advisor

5. Revisions

Date	Rev.	Compiler	Remarks
March 2018	1	D. Mothabela	First issue

6. Development Team

The following people were involved in the development of this document:

7. Acknowledgements

a. Ntombifuthi Ngwenya

Appendix A: Cable List

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
1	Cable	LV Cable	600/1000V	Power	1 x 120mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01QCM
2	Cable	LV Cable	600/1000V	Power	1 x 150mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01RCM
3	Cable	LV Cable	600/1000V	Power	1 x 185mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01SCM
4	Cable	LV Cable	600/1000V	Power	1 x 240mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01TCM
5	Cable	LV Cable	600/1000V	Power	1 x 500mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01WCM
6	Cable	LV Cable	600/1000V	Power	1 x 4mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03ECM
7	Cable	LV Cable	600/1000V	Power	1 x 35mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03LCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
8	Cable	LV Cable	600/1000V	Power	1 x 70mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03NCM
9	Cable	LV Cable	600/1000V	Power	4 x 1.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04CCM
10	Cable	LV Cable	600/1000V	Power	4 x 2.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04DCM
11	Cable	LV Cable	600/1000V	Power	4 x 4mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04ECM
12	Cable	LV Cable	600/1000V	Power	4 x 6mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04FCM
13	Cable	LV Cable	600/1000V	Power	4 x 10mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04GCM
14	Cable	LV Cable	600/1000V	Power	4 x 16mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04HCM
15	Cable	LV Cable	600/1000V	Power	4 x 25mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04KCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
16	Cable	LV Cable	600/1000V	Power	4 x 35mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04LCM
17	Cable	LV Cable	600/1000V	Power	4 x 70mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04NCM
18	Cable	LV Cable	600/1000V	Power	4 x 95mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	4	BVV04PCM
19	Cable	LV Cable	600/1000V	Power, Armoured	3 x 1.5mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03CCM
20	Cable	LV Cable	600/1000V	Power, Armoured	3 x 2.5mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03DCM
21	Cable	LV Cable	600/1000V	Power, Armoured	3 x 4mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03ECM
22	Cable	LV Cable	600/1000V	Power, Armoured	3 x 6mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03FCM
23	Cable	LV Cable	600/1000V	Power, Armoured	3 x 10mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03GCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
24	Cable	LV Cable	600/1000V	Power, Armoured	3 x 16mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03HCM
25	Cable	LV Cable	600/1000V	Power, Armoured	3 x 35mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03LCM
26	Cable	LV Cable	600/1000V	Power ,Armoured	3 x 70mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03NCM
27	Cable	LV Cable	600/1000V	Power, Armoured	3 x 120mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03QCM
28	Cable	LV Cable	600/1000V	Power, Armoured	3 x 185mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03SCM
29	Cable	LV Cable	600/1000V	Power, Armoured	3 x 240mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03TCM
30	Cable	LV Cable	600/1000V	Power, Armoured	3 x 400mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	3	BVX03VCM
31	Cable	LV Cable	600/1000V	Power, Armoured	4 x 16mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	4	BVX04HCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
32	Cable	LV Cable	600/1000V	Power, Armoured	4 x 25mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	4	BVX04KCM
33	Cable	LV Cable	600/1000V	Power, Armoured	4 x 35mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	4	BVX04LCM
34	Cable	LV Cable	600/1000V	Power, Armoured	4 x 70mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	4	BVX04NCM
35	Cable	LV Cable	600/1000V	Earth Grn/Yel	1 x 6mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01FCM
36	Cable	LV Cable	600/1000V	Earth Grn/Yel	1 x 16mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01HCM
37	Cable	LV Cable	600/1000V	Earth Grn/Yel	1 x 25mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01KCM
38	Cable	LV Cable	600/1000V	Earth Grn/Yel	1 x 35mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01LCM
39	Cable	LV Cable	600/1000V	Earth Grn/Yel	1 x 70mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	1	BVV01NCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
41	Cable	LV Cable	600/1000V	Control	3 x 2.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03DCM
42	Cable	LV Cable	600/1000V	Control	7 x 2.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV07DCM
43	Cable	LV Cable	600/1000V	Control	12 x 2.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV12DCM
44	Cable	LV Cable	600/1000V	Control	19 x 2.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV19DCM
45	Cable	LV Cable	600/1000V	Control	37 x 2.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV37DCM
46	Cable	LV Cable	600/1000V	Power	3 x 1.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03CCM
47	Cable	LV Cable	600/1000V	Power	3 x 10mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03GCM
48	Cable	LV Cable	600/1000V	Power	3 x 50mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03MCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
50	Cable	LV Cable	600/1000V	Control	5 x 1.5mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	5	BVV05CCM
51	Cable	LV Cable	600/1000V	Control, Armoured	4 x 4mm²	General PVC, Steel wire armoured, Stranded Copper, halogen free low smoke flame Retardant sheathed	4	BVX04ECJ
52	Cable	LV Cable	600/1000V	Control, Armoured	4 x 6mm²	General PVC, Steel wire armoured, Stranded Copper, halogen free low smoke flame Retardant sheathed	4	BVX04FCJ
53	Cable	LV Cable	600/1000V	Power, Armoured	4 x 6mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	4	BVX04FCM
54	Cable	LV Cable	600/1000V	Power, Armoured	4 x 10mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	4	BVX04GCM
56	Cable	LV Cable	600/1000V	Control, Armoured	7 x 1.5mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	7	BVX07CCM
57	Cable	LV Cable	600/1000V	Control, Armoured	4 x 2.5mm²	General PVC, Steel wire armoured, Stranded Copper, Halogen Free Low Smoke Flame Retardant, Sheathed	4	BVX04DCJ
58	Cable	LV Cable	600/1000V	Control, Armoured	7 x 4mm²	General PVC, Steel wire armoured, Stranded Copper, Low Halogen PVC Sheathed	4	BVX07ECM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
59	Cable	LV Cable	600/1000V	Control	2 x 0.75mm²	Halogen free low smoke material, halogen free low smoke flame Retardant bedding, Stranded Copper, Halogen Free Low Smoke Flame Retardant, Sheathed	2	BJJ02BCJ
60	Cable	LV Cable	600/1000V	Control	6 x 0.75mm²	Halogen free low smoke material, halogen free low smoke flame Retardant bedding, Stranded Copper, Halogen Free Low Smoke Flame Retardant, Sheathed	6	BJJ06BCJ
61	Cable	LV Cable	600/1000V	Power	3 x 4mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03ECM
62	Cable	LV Cable	600/1000V	Power	3 x 6mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03FCM
64	Cable	LV Cable	600/1000V	Power	3 x 25mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV03KCM
70	Cable	LV Cable	600/1000V	Power	4 x 50mm²	General PVC, Covered, Stranded Copper, Low Halogen PVC Sheathed	3	BVV04MCM
74	Cable	MV Cable	3.8/6.6kV	Power	3 x 35mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	3	DXG03LCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
75	Cable	MV Cable	3.8/6.6kV	Power	3 x 70mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	3	DXG03NCM
76	Cable	MV Cable	3.8/6.6kV	Power	3 x 95mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	3	DXG03PCM
77	Cable	MV Cable	3.8/6.6kV	Power, Armoured	3 x 95mm²	Cross Linked Polyethene (Xple),individual copper screen tape plus single steel wire armouring , Stranded Copper, Low Halogen PVC Sheathed	3	DXE03PCM
78	Cable	MV Cable	3.8/6.6kV	Power	1 x 185mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	DXG01SCM
79	Cable	MV Cable	3.8/6.6kV	Power	1 x 300mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	DXG01UCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
80	Cable	MV Cable	12.7/22kV	Power, Armoured	3 x 95mm²	Cross Linked Polyethene (Xple),individual copper screen tape plus single steel wire armouring , Stranded Copper, Low Halogen PVC Sheathed	3	FXE03PCM
81	Cable	MV Cable	12.7/22kV	Power, Armoured	3 x 120mm²	Cross Linked Polyethene (Xple),individual copper screen tape plus single steel wire armouring , Stranded Copper, Low Halogen PVC Sheathed	3	FXE03QCM
82	Cable	MV Cable	12.7/22kV	Power	1 x 70mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	FXG01NCM
83	Cable	MV Cable	12.7/22kV	Power	1 x 95mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	FXG01PCM
84	Cable	MV Cable	12.7/22kV	Power	1 x 150mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	FXG01RCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
85	Cable	MV Cable	12.7/22kV	Power	1 x 240mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	FXG01TCM
86	Cable	MV Cable	12.7/22kV	Power	1 x 300mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	FXG01UCM
87	Cable	MV Cable	12.7/22kV	Power	1 x 400mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	FXG01VCM
88	Cable	MV Cable	12.7/22kV	Power	1 x 500mm²	Cross Linked Polyethene (Xple), Individual brass screen tape, Stranded Copper, Low Halogen PVC Sheathed	1	FXG01WCM
89	Cable	MV Cable	6.6kV	Powermite multicore	Texoprene TRHT 3 x 35 + 1 x 25 + 2 x (4 x 1.5)C + OFE 12G 62.5/125	Neoprene TRHT 3 x 35 + 1 x 25 + 2 x (4 x 1.5)C + OFE 12G 62.5/125	6	
90	Cable	MV Cable	3.6/6.6kV	Powermite multicore	Texoprene TR66ECC 3 x 35SC + 1 x 25ECC + 2 x 10Pmm²	Texoprene TR66ECC 3 x 35SC + 1 x 25ECC + 2 x 10Pmm²	6	

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
79	Cable	LV Cable	450/750 V	Power	4 x 1.5mm²	H07BQ-F (NGMH11Y"O), Green/Yellow wire, LSOH cross link polyolefin insulation, Bare copper conductor, Polyurethane/PUR outer jacket. -40 deg. C to +80 deg. C, Soot blower application	4	N/A
80	Cable	LV Cable	600/1000V	Power	4 x 35mm²	750 V; PVC; CORE QUANTITY: 4; Copper; 25 MM2; TEXOPRENE; TR75-4G/35	4	N/A
81	Cable	LV Cable	600/1000V	Power	4 x 4mm²	750 V;PVC; CORE QUANTITY: 4; Copper; CONDUCTOR SIZE: 4 MM2;TEXOPRENE;TR75-4G/04	4	N/A
82	Cable	LV Cable	600/1000V	Power	3 x 6mm²	750 V; PVC; CORE QUANTITY: 3; Copper; CONDUCTOR SIZE: 6 MM2; ARMOR: TEXOPRENE; TR75-3G/06	3	N/A
83	Cable	LV Cable	6600V		3x50mm²	Cross linked Polyethene XPLE; Steel Wire armoured General PV Sheathed	3	DXX3MCQ
84	Cable	LV Cable	600/1000V		4x95mm²	General PVC Steel Wire Armoured Stranded Copper Low Halogen PVC sheathed	4	BVX4PCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
85	Cable	LV Cable	600/1000V		4x6mm²	General PVC : General PVC covered Stranded Copper Low Halogen PVC sheathed	4	BVV4FCM
86	Cable	LV Cable	600/1000V		4x150mm²	General PVC : General PVC covered Stranded Copper Low Halogen PVC sheathed	4	BVV4RCM
87	Cable	LV Cable	600/1000V		7x2.5mm²	General PVC Steel Wire Armoured Stranded Copper Low Halogen PVC sheathed	7	BVX7DCM
88	Cable	LV Cable	600/1000V		19x1.5mm²	General PVC Steel Wire Armoured Stranded Copper Low Halogen PVC sheathed	19	BVX19CCM
89	Cable	LV Cable	600/1000V		7x1.5mm²	General PVC Steel Wire Armoured Stranded Copper Low Halogen PVC sheathed	7	BVX7CCM
90	Cable	LV Cable	600/1000V		4x150mm²	General PVC Steel Wire Armoured Stranded Copper Low Halogen PVC sheathed	4	BVX4RCM
91	Cable	LV Cable	600/1000V		4x2.5mm²	General PVC Steel Wire Armoured Stranded Copper Low Halogen PVC sheathed	4	BVX4DCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
92	Cable	LV Cable	600/1000V		4x70mm²	General PVC Steel Wire armoured stranded Copper Low Halogen PVC sheathed	4	BVX4NCM
93	Cable	LV Cable	600/1000V		4x4mm²	General PVC Steel Wire Armoured Stranded Copper Low Halogen PVC sheathed	4	BVX4ECM
94	Cable	LV Cable	600/1000V		4x35mm²	General PVC Steel Wire armoured Stranded Copper Low Halogen PVC sheathed	4	BVX4LCM
95	Cable	LV Cable	600/1000V		4x1.5mm²	General PVC Steel Wire armoured Stranded Copper Low Halogen PVC sheathed	4	BVX4CCM
96	Cable	LV Cable	600/1000V		12x1.5mm²	General PVC Steel Wire armoured Stranded Copper Low Halogen PVC sheathed	12	BVX12CCM
97	Cable	LV Cable	600/1000V		3x1.5mm²	General PVC Steel Wire Armoured, Stranded Copper Low Halogen PVC Sheathed	3	BVX03CCM
98	Cable	LV Cable	Special		4x16 mm²	Special Stranded Copper	4	ZZZ04HCZ
99	Cable	LV Cable	REF DWG 0.00/2713		2x0.75 mm²	Ref Dwg 0.00/2713 Cross Linked * Polyethylene (Xlpe) Individual Copper Screen Tape Plus Single Steel Wire Armouring, Stranded Copper, Low Halogen PVC Sheathed	2	VXE02BCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
100	Cable	LV Cable	Special		4x35 mm²	Special Stranded Copper	4	ZZZ04LCZ
101	Cable	LV Cable	Special		4x4mm²	Special Stranded Copper	4	ZZZ04ECZ
102	Cable	LV Cable	Special		6x1.5mm²	Special Individual brass Screen Tape Stranded Copper	6	ZZH06CCZ
103	Cable	LV Cable	REF DWG 0.00/2713		3x0.75 mm²	Ref Dwg 0.00/2713 Cross Linked * Polyethylene (Xlpe) Individual Copper Screen Tape Plus Single Steel Wire Armouring, Stranded Copper, Low Halogen PVC Sheathed	3	VXE03BCM
104	Cable	LV Cable	REF DWG 0.00/2714		4x0.75 mm²	Ref Dwg 0.00/2713 Cross Linked * Polyethylene (Xlpe) Individual Copper Screen Tape Plus Single Steel Wire Armouring, Stranded Copper, Low Halogen PVC Sheathed	4	VXE04BCM
105	Cable	LV Cable	REF DWG 0.00/2715		7x0.75mm²	Ref Dwg 0.00/2713 Cross Linked * Polyethylene (Xlpe) Individual Copper Screen Tape Plus Single Steel Wire Armouring, Stranded Copper, Low Halogen PVC Sheathed	7	VXE07BCM

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
106	Cable	LV Cable	REF DWG 0.00/2716		12x0.75mm²	Ref Dwg 0.00/2713 Cross Linked * Polyethylene (Xlpe) Individual Copper Screen Tape Plus Single Steel Wire Armouring, Stranded Copper, Low Halogen PVC Sheathed	12	VXE12BCM
107	Cable	LV Cable	REF DWG 0.00/2717		19x0.75mm²	Ref Dwg 0.00/2713 Cross Linked * Polyethylene (Xlpe) Individual Copper Screen Tape Plus Single Steel Wire Armouring, Stranded Copper, Low Halogen PVC Sheathed	19	VXE19BCM
108	Cable	LV Cable	REF DWG 0.00/2718		37x0.75mm²	Ref Dwg 0.00/2713 Cross Linked * Polyethylene (Xlpe) Individual Copper Screen Tape Plus Single Steel Wire Armouring, Stranded Copper Low Halogen PVC Sheathed	37	VXE37BCM
109	Cable	LV Cable	Special		12x35 mm²	Special Low Halogen PVC Sheathed	12	ZOZ12LLM
110	Cable	LV Cable	600/1000 V		3x2.5 mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	3	BVX03DCF

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
111	Cable	LV Cable	600/1000 V		4x2.5mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04DCF
112	Cable	LV Cable	600/1000 V		4x4mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04ECF
113	Cable	LV Cable	600/1000 V		4x6mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04FCF
114	Cable	LV Cable	600/1000 V		4x10mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04GCF
115	Cable	LV Cable	600/1000 V		4x16mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04HCF
116	Cable	LV Cable	600/1000 V		4x25mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04KCF
117	Cable	LV Cable	600/1000 V		4x35mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04LCF

No.	Spare Part		Cable Voltage	Type	CND Size	Detailed Design Characteristics	CND	Eskom No.
118	Cable	LV Cable	600/1000 V		4x50mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04MCF
119	Cable	LV Cable	600/1000 V		4x70mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04NCF
120	Cable	LV Cable	600/1000 V		4x120mm²	General PVC, 'Steel Wire Armoured, Stranded Copper, Flame Retardant PVC Sheath	4	BVX04QCF

Appendix B: Busbar List (Switchgears)

	Busbar	Riser Busbar	Dropper Busbar (L-Shaped)	Neutral Bar (Horizontal)	Earth Bar (Horizontal)
3200A	2x(120x12)	3x(100x10)	1x50x50x10	2x(40x12)	2x(40x12)
2500A	2x(100x12)	2x(100x10)			
2000A	2x(80x12)	2x(80x10)			
1600A	2x(60x12)	2x(60x10)			
1250A	2x(40x12)	2x(50x10)			
800A	2x(40x12)	2x(50x10)			
630A	2x(40x12)	2x(40x10)			
DC BDs	2x(20x12)	1x(30x10)			2x(20x12)

Appendix C: Busbar List (Transformers)

Voltage (kV)	Rating (kVA)	Drawing No. (LHS Entry)	Drawing No. (RHS Entry)
0.69/0.42	500	0.90/40416 (Sheet 7)	0.90/40417 (Sheet 7)
6.6/0.42	315	0.90/40404 (Sheet 7)	0.90/40405 (Sheet 7)
6.6/0.42	500	0.90/40418 (Sheet 7)	0.90/40419 (Sheet 7)
6.6/0.42	800	0.90/40420 (Sheet 7)	0.90/40421 (Sheet 7)
6.6/0.42	1000	0.90/40422 (Sheet 7)	0.90/40423 (Sheet 7)
6.6/0.42	2000	0.90/40426 (Sheet 7)	0.90/40427 (Sheet 7)
15/0.42	800	0.90/40402 (Sheet 7)	0.90/40403 (Sheet 7)
15/0.42	1000	0.90/40410 (Sheet 7)	0.90/40411 (Sheet 7)
15/0.42	1600	0.90/40412 (Sheet 7)	0.90/40413 (Sheet 7)
15/0.42	2000	0.90/40406 (Sheet7)	0.90/40406 (Sheet7)
15/0.42	3150	0.90/40408 (Sheet 7)	
15/0.72	2500	0.90/40414 (Sheet 7)	0.90/40415 (Sheet 7)
15/0.72	3150	0.90/40428 (Sheet 7)	0.90/40429 (Sheet 7)

Appendix D: Copper flexibles

Voltage	Type of Flexible and Dimensions	Part Numbers
22kV	Conductor Sleeve 400*720*20	0138G050
22kV	Enclosure Sleeve L500- 500*6 LD1423	0143G114
22kV	Enclosure Sleeve L625- 625*8*LD 2683	0143G193
22kV	Conductor Sleeve D 200 TH 10 (D178*16) Length 600	0147G019
22kV	CU Round Braid 120MM2-400*12.5	0103G008 PSM28A4-0103 - J
22kV	CU Flat Braid 50MM2 TYPE 200*25	0104G008 PSM28A4-0104 - C