

	Specification	Kusile Power Station
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Title: **Kusile Power Station Generator
Protection Spares Scope of Work**

Document Identifier: **240-167204902**

Alternative Reference
Number:

Area of Applicability: **Kusile Power Station**

Functional Area: **PSCM**

Revision: **2**

Total Pages: **21**

Next Review Date: **N/A**

Disclosure
Classification: **Controlled Disclosure**

Compiled by

Supported by

**Functional
Responsibility**

Authorized by

File name: [240-167204902 - Kusile Power Station Generator Protection Spares Scope of Work Rev 2](#)

Template ID: 32-4 (Rev 11) Document template (for procedures, manuals, standards, instructions, etc.

Formatted by: [KusileDC_Nonhlanhla_23.06.2022](#)

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1. Introduction

Kusile Power Station requires maintenance spares for the Generator Protection System. These maintenance spares are required in Kusile stores in case of a breakdown. The Generator Protection System is a level 1 plant and is responsible for safeguarding some of the highest value assets at Kusile Power Station.

To reduce the mean time to repair should a failure occur on the Generator Protection panels, sufficient stock holding of the identified spares should be kept at Kusile stores at all times.

2. Supporting Clauses

2.1 Scope

The scope of work document specifies the required spares, quantities of spares to be supplied by the Supplier/OEM and conditions for acceptance. The scope included here does not substitute procurement procedures that will be followed during the procurement process.

2.1.1 Purpose

The purpose of this document is to provide technical details to allow Kusile Power Station to purchase the required maintenance spares for the Generator Protection System. The KKS of the Kusile Power Station Generator Protection Panels include:

60-* 0BAY01

60-* 0BAY02

60-* 0BAY03

60-* 0BAY04

60-* 0BAW10 GH001

Where * represents an integer value from 1-6 representing a Kusile Power Station Unit.

2.1.2 Applicability

This document applies to Kusile Power Station.

2.1.3 Effective date

This document will be effective from the date of its authorisation.

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] KUS/16/E/CHA -----P13/WD/001 – Kusile Units 1-6 Generator Protection Drawings

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- [2] KUS/16/E/CHA -----P13/WD/050 – Kusile Generator 100% Stator EF NER Cubicle Drawing & Wiring Diagram

2.2.2 Informative

- [3] 240-107979860 - Kusile Power Station Export System Maintenance Spares Strategy

2.3 Definitions

Definition	Description
Supplier	Supplier of goods and/or services contracted to provide specific spares & documentation to Kusile Power Station.
Employer	Eskom Kusile Power Station

2.4 Abbreviations

Abbreviation	Explanation
FAT	Factory Acceptance Test
IED	Intelligent Electronic Device
OEM	Original Equipment Manufacturer
QC	Quality Check
SOW	Scope of Work
UCLF	Unplanned Capability Loss Factor

2.5 Roles and Responsibilities

2.5.1 Supplier

- Supply items listed in Appendix A and deliver to Kusile Power Station stores.
- All IEDs and fault recorders, to be supplied, must be configured and have the correct firmware such that the Kusile generator protection projects can be uploaded and the IED will function as required.
- All programmable relays, transducers or modules must be setup by the supplier for plug and play use in Kusile generator protection panels. Site personnel should not be required to program any relays, transducers, or modules prior to installation and functioning of the device.

Other than the IEDs and fault recorders which will require Kusile generator protection projects to be uploaded.

- Items listed in Appendix A should be packaged in such a way that ensures long term shelf storage does not compromise the equipment in any way.
- Submit all documentation & certificates requested by the Employer.
- Provide a quotation for each listed item in Appendix A as part of tender deliverable

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- g. Supply procured spares as requested by the Employer
- h. Provide after sales technical support services as requested by the Employer
- i. Confirm correctness of the supplied spares information
- j. Provide spares technical information in accordance with this SOW
- k. Timeously inform the Employer of any delays or when outstanding or additional information from the Employer is required
- l. Responsible to ensure that quality product are delivered
- m. Responsible to ensure that the correct spare is supplied
- n. Responsible to ensure that every effort is made to keep to the agreed programs and plans
- o. Provide all required technical datasheets and/or product brochures
- p. Provide Materials Management with populated DCFs for cataloguing of spares and record keeping
- q. Supply all the necessary test sheets/results, where applicable
- r. Invite the Employer or representative thereof three (3) working days in advance for witness/hold points, if applicable, as agreed
- s. All Supplier employees entering site 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.
- t. Ensure that all staff brought onto site in connection with this SOW should be able to fluently speak, understand and write in English language.
- u. The Supplier ensures that all staff brought to Kusile PS site have a valid fitness certificate based on the specified plant man-job specification.

2.5.2 Employer

- a. Ensure SOW & all deliverables are clear.
- b. Ensure an Eskom representative is present for any FAT related activities.
- c. QC all items, once delivered at Kusile stores.
- d. Catalogue the spares on SAP system after completion of DCFs (new spares)

2.5.3 Management and Reporting

- a. The Supplier to be represented at any ad-hoc meetings that may arise to address any scope and safety related matters
- b. Liaison meetings shall be held with the Employer's Representative or his/her delegate on as and when required basis to discuss any technical details, or concerns

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2.5.4 Communication and Correspondence

- a. All correspondence includes but not limited to:
 - i. Kusile Power Station
 - ii. Employer's contract number
 - iii. Contract description
 - iv. Correspondence subject matter
 - v. Employer's name and contact details
 - vi. Supplier contact details
 - vii. Date
- b. Where appropriate the correspondence includes the Employer's reference and is delivered as a single package or as per the agreed contract terms.
- c. All communications from the Supplier 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.

2.5.5 Quality and Documentation Control

- a. During the tender process a quality criterion will be defined that the Supplier must comply to.
- b. The Supplier shall ensure that any witness, hold, and inspection points are strictly adhered to.
- c. All quality references and standards as stipulated in this document will be adhered to.
- d. The Supplier to comply with the Employer's quality documentation management system and processes

2.6 Process for Monitoring

This scope of works will not be further revised.

2.7 Related/Supporting Documents

240-107979860 - Kusile Power Station Export System Maintenance Spares Strategy

3. Generator Protection Spares Scope of Supply

3.1 Plant Description

The generator protection panels installed at Kusile Power Station were manufactured, installed, and commissioned by Actom through Alstom/GE. The generator protection panels are considered level 1 plant and are vital in protecting some of the highest value assets installed at Kusile Power Station. Items such as the generator, generator transformer and unit transformers are all protected using the generator protection panels. The generator protection panels consist of various components that function together in order to try and safeguard these high value assets.

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The KKS of the generator protection panels are as follows:

60-* 0BAY01

60-* 0BAY02

60-* 0BAY03

60-* 0BAY04

60-* 0BAW10 GH001

Where * represents an integer value from 1-6 representing a Kusile Power Station Unit.

The spares indicated below, in section 3.2 Scope of Work, must be applicable to all of the above mentioned generator protection panels listed above.

3.2 Description of the works

Kusile Power station requires the supply of spares as indicated in the Appendix A.

The following are the *Supplier's* requirements:

- a. The *Supplier* will ensure that the correct spare is supplied and will replace or be liable for damage at his/her cost if the incorrect or defective spare/s is supplied. The costs may include, but not limited to, repairs and/or replacement of a defective or incorrect spare.
- b. The *Employer's* (i.e., Eskom Holdings SOC) acceptance of delivered spare/s does not absolve the *Supplier* of the liability to supply the correct and/or defect free spare.
- c. The *Supplier* may, at the *Employer's* discretion, be given access to the plant to verify the information of the installed spare.
- d. The spare must be the same (e.g., same Part Number) as specified on this works information and the part number will also be used to perform quality control checks.
- e. If *Supplier* is not the OEM, the *Supplier* must be certified by OEM to supply spares to ESKOM.
- f. The *Employer* may at his/her discretion make the *Employer's* Engineer or employees or *others* made available to the *Supplier* for the purpose of soliciting additional information or verifying information as the need arises.
- g. The *Supplier* will supply any additional information such as brochure, general arrangement drawing, test certificates, detailed specification, etc.
- h. The *Supplier* shall supply preservation and storage procedure(s) as part of the tender deliverables.
- i. "Estimated Spare Quantities to be Procured over Five Year Period", indicated by the *Employer* in the Appendix A as one of the table subheadings, is the estimated number the *Employer* may require the *Supplier* to supply over the contract period. The *Supplier* may only supply the quantity as specified by the *Employer* in the specific order instruction.
- j. If deemed necessary, the *Employer* may subject the *Supplier* to a quality assurance assessment at the *Supplier's* or *sub-Supplier's* premises as part of the technical evaluation or before the contract placement or at any time during the contract period.
- k. Complete price breakdown must be supplied with the quotation and must include the cost of transport to Kusile Power Station. The quotation will be based on items listed in Appendix A and there should be a similar one compiled for populating the items' individual DCF's.

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Methodology use to quote for transportation of procured items should be defined and quantified.

- l.* Spares will be opened for inspection, counting and quality control check at the *Employer's* stores.
- m.* The *Employer* has provided the Bill of Material table and copies of individual spares DCF's to assist the *Supplier* to meet the requirements of the Work to be performed by the *Supplier*.
- n.* Where the DCF has already been fully or partially populated by the *Employer*, the *Supplier* shall verify the correctness of the information and complete partially populated DCF's.
- o.* The *Employer* may make clarification sessions available to either prospective *Supplier(s)* to further assist the prospective *Supplier/s* to meet the requirements of the Work to be performed by the *Supplier*.

Where the *Employer* has entered into a National Framework agreement for the supply of any listed items in Appendix A before this contract is in place, those items shall not form part of the contract. The following items will be required as tender deliverables and the *Supplier* shall be evaluated on them:

- a.* Use Appendix A to compile a quotation for the tendered items/components. A similar table shall be developed by the *Supplier* to supply quotation for populating individual DCF's. The quotation should include transportation costs as stipulated above.
- b.* Confirmation that the *Supplier* is the original manufacturer or approved distributor of the items tendered for. Confirmation should be provided in written correspondence or certification of approval as a distributor.
- c.* Confirmation that the items to be supplied will be the same as the items listed in Appendix A. Items different from the required spares will only be accepted where the item is approved similar. The *Supplier* must inform the *Employer* in writing as part of the tender deliverables to indicate proposed alternative spares. The *Employer* to be provided with all technical information on the proposed alternative spare to approve the alternative spare as acceptable. Similar spares to be interchangeable with original spares and any modifications required when installing the alternative spare to be indicated to the *Employer*.
- d.* Confirmation that the *Supplier* will populate all DCF's for the tendered items. In instances where not all fields of the DCF can be populated, the *Supplier* shall request the *Employer* for approval to submit an incomplete DCF. The *Employer* reserves the right to reject any populated DCF if the information is not deemed sufficient. More details required with the DCF's are outlined in section 4.2 below.
- e.* The *Supplier* shall supply the preservation procedures for all the items tendered for. These shall include handling, storage, and transportation procedures. Group preservation of similar items is acceptable. The procedures may be supplied after order placement. However, confirmation must be provided as a tender deliverable.
- f.* The *Supplier's* proven track record in supplying listed items or similar items shall be sourced to ensure that the *Supplier* can supply the items. It is also required that there be technical expertise on the said components to ensure proper diagnosis of any faults that may be experienced on the tendered components.
- g.* *Supplier* to notify the *Employer* about the warranty periods for all tendered components/items and the time it will take to deliver the items from the date of order placement.
- h.* *Supplier* to provide data sheets for all tendered spares as part of the tender documentation. The data sheets to be comprehensive enough to give all relevant information that describe a product.

The *Supplier* shall provide shelf-life duration for all tendered items

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3.3 Documentation

- a. All relevant drawings and documentation, including calibration certificates or verification checks to accompany the items listed in Appendix A.
- b. The Supplier will supply any additional information such as brochure, general arrangement drawing, certificates, detailed specification, data sheet, Settings Document for programmable electronic cards etc.
- c. The Supplier provides the Employer with additional spares information and verifies information required in the attached data capturing forms (DCF).
- d. The Supplier shall supply preservation and storage procedure/s, where applicable.
- e. The Employer may make clarification sessions available to either prospective Supplier/s to further assist the prospective Supplier's to meet the requirements of the supply scope delivered by the Supplier.

3.4 Acceptance of Spares

3.4.1 Spares Identification

Appendix A herein and attached to this document is a list of all the spares to be procured under this SOW. This list corresponds to the provided electronic copy of the DCF's or SAP Specification Printout that contain more information about the required spares.

Each spare is identifiable by means of an Eskom SAP Material number (as is used in the Power Station), part description, OEM and/or OEM part number.

3.4.2 Obsolescence

- a. The Supplier shall inform the Employer immediately where spares are found to be obsolete before the alternative spares is supplied,
- b. The Supplier shall indicate this to the Employer and indicate viable alternatives thereof.
- c. The Employer will review the alternatives and advice on the acceptance/rejection of the alternative thereof prior to the spares being delivered onsite.

3.4.3 Spares Quantities

- a. The estimated spares quantities to be provided as stipulated in APPENDIX A: Generator Protection Spares List.

3.4.4 Design, Manufacturing and Testing

Unless an alternative spare is proposed the required spares shall be the same, in all respects, as the original components. The spares shall also conform to the same specifications as the original components. This includes all aspects such as design, materials and material specifications, manufacturing and manufacturing processes, testing, and operating and storage specifications.

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3.4.5 Replacement Parts Upgraded/modified

Where equipment or spares, including the whole assembly, have been upgraded/ modified the *Supplier* shall indicate this to the *Employer* as part of the tender. The *Employer* shall be made aware immediately where the upgrade/modification to the component is only identified after the tender being issued. The detailed compatibility to the existing component shall be indicated including changes required to fit the upgraded/modified spare. This includes hardware, firmware, and software upgrade/modification. Approved alternative components shall be accepted provided they comply to all technical & commercial requirements.

If the components to be supplied will be obsolete, or envisaged to be obsolete, in the 3 years after tender being issued, the *Supplier* shall indicate this to the *Employer* and indicate viable alternatives thereof

3.4.6 Packaging

- i. All supplied spares shall be packaged in such a manner that they will be transported and stored without damage. This includes preventing damage due to moisture ingress, dust, and foreign objects.
- ii. Different spare types shall be packaged separately such that each spare type can be stored separately. Packaging shall be such that the spare can be identified without opening the packaging. Packaging shall be of material that will not be damaged, to an extent possible, by harsh weather conditions during transportation. If that is not possible, then the packaging shall be protected against such conditions.
- iii. Where possible, packaging to be such that procured spares can be positively identified through the packaging. Where this is not possible, the packaging to be such that it allows opening and closing of packaging and still maintain the packaging integrity thereafter.
- iv. Delivery packaging shall include as a minimum the following details:
 - a) Purchase order number
 - b) Part description
 - c) Part number
 - d) Eskom SAP material number
 - e) Drawing number, where applicable
 - f) Physical address of Kusile Power Station and the *Supplier*
 - g) Contact details of the *Supplier*
 - h) Delivery note number

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3.4.7 Transportation

- a) Transportation of all spares shall be conducted with due regard of the sensitivity of the units and in such a manner that spares are suitably protected. All possible care must be taken to ensure that the components are not subjected to undue rough handling, vibration, humidity, excessive temperatures, or abuse. When courier service is used for transportation, the courier services service provider shall be alerted to the nature of the content of the packages and instructed to handle with care. Labels shall be used to indicate the fragile nature of the items.

3.4.8 Quality Control of Spares

- a) No incorrect, damaged, or faulty spares will be accepted.
- b) All the spares will be inspected before payment can be processed.
- c) Eskom template data capturing forms information must be supplied and must meet an acceptable level. (all mandatory fields must be completed in full)
- d) Where applicable; test certificates, material certificate, manuals, data sheet, electronic cards programmed certificates and signature shall be provided.

3.4.9 Information to be provided to the Supplier

The *Supplier* may be provided with either complete, partially complete, or uncompleted electronic Data Capture Form (DCF) for each spare required. The *Supplier* is required to ensure that the correct information is captured on the DCF's by either reviewing the information, completing the missing information, and completing a new DCF depending on action required. The DCF's are required by the Purchaser's Material Management System to be able to book the item in the store. the information should also be sufficient to procure the correct spares in future. Most of the DCF's have been populated by the *Purchaser* where information was available. This information may not be correct and needs to be reviewed and verified/corrected as part of the *Services*.

The DCF's may be provided in Microsoft Word format. The *Supplier* needs to ensure the 'Track Changes' function is selected 'on' so that any changes to the existing information as well as inserted information can easily be identified and tracked. The following information needs to be to be provided as detailed as possible on the DCF's.

- a) Verify the existing information that is already populated on the DCF's and make changes where required. Ensure the 'track changes' function is on.
- b) Populate/verify all mandatory fields on the DCF's.
- c) Supply additional information in the field "Free Format Text" or "Purchase order text" on the DCF's. This includes:
 - The standards or specification that the product must conform to.
 - Add any spares information which has been omitted, which is deemed relevant for spares identification, packaging and protection requirements during transportation and storage.
 - The Quality Control requirements for manufacturing and testing of the product to ensure that the spares conform to the correct specifications or standards, including certificates and test results, that is required with delivery of the goods.
- d) Supply any other additional information that has not been specified on the DCF's but necessary for storage, preservation, installation, and utilisation of spares where applicable.

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Such information includes brochures, technical data, etc. These DCF's with the added information needs to be made available electronically to the employer.

- e) Supply any other additional information that has not been specified on the DCF's but necessary for storage, preservation, installation, and utilisation of spares where applicable. Such information includes brochures, technical data, etc.

3.4.10 Guarantee of delivered spares

All delivered spares shall come with an at least 12-months guarantee period starting from the *delivery date*.

3.4.11 Insurance of the Goods

Insurance to be the responsibility of the *Supplier* until *delivery*.

4. Acceptance

This document has been seen and accepted by:

5. Revisions

6. Development Team

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

7. Acknowledgements

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Appendix A – Generator Protection Spares List

Item No.	Spare Description	Detailed Spare Description & Specification	OEM	Applicable KKS Number/s	OEM Part No.	Eskom SAP Material No.
1	Relay	Generator Rotor Earth Fault Relay MICOM P391 60-250VDC or 100-300VAC	Schneider Electric	60-* 0BAY01	P391 91RAAB	0580194
2	Repeater, Light Signal	PRetrans 5104 Rotor Earth Fault Repeater	PR Electronics	60-* 0BAY01	PR 5104A	0608668
3	Resistor	Resistor for 100% Stator Earth Fault Power Supply 40hm, 10W, KNP type (wire wound), 5% tolerance, 7J	No OEM	60-* 0BAY01	10W4R7J	0679060
4	Relay	Generator Transformer Directional Reactive Power Interlock + HV Back-up Earth Fault (Residual) Protection Relay	Schneider Electric	60-* 0BAY01 60-* 0BAY02	P132 5B940F0HN0BE00	0580195
5	Relay	Generator Reverse Power & Low Forward Protection + Generator Transformer HV Back-up Earth Fault (Neutral) Protection Relay	Schneider Electric	60-* 0BAY01 60-* 0BAY02	P127 BA2W412GB0	0502186
6	Relay	Generator Multiple Protection Function Relay	Schneider Electric	60-* 0BAY01 60-* 0BAY02	P345 31SC6M0B58M	0502183

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7	Relay	Generator Transformer Multiple Protection Function Relay	Schneider Electric	60-* 0BAY01 60-* 0BAY02	P634 8B911H4HF02R00	0636072
8	Relay	Unit Transformer Multiple Protection Function Relay	Schneider Electric	60-* 0BAY01 60-* 0BAY02	P633 8B912F0HM02R00	0636057
9	Relay	Unit Transformer Directional Earth Fault Protection Relay	Schneider Electric	60-* 0BAY01 60-* 0BAY02	P127 BB0W112GB0	0502172
10	Relay	Unit Transformer Overcurrent & Earth Fault Protection Relay	Schneider Electric	60-* 0BAY01 60-* 0BAY02	P122 B00Z112EC0	0609278
11	Module	Contact Protection Module Snubber circuit	Telbit	60-* 0BAY01 60-* 0BAY02	Made on demand. No OEM part number.	0679062
12	Thermistor	PTC Thermistor	TDK	60-* 0BAY01 60-* 0BAY02	EPCOS C885	0608671
13	Light, Indicating	Indication LED 220VDC, Red	Carlo Gavazzi	60-* 0BAY03 60-* 0BAY04	PL 22C HL R 220D	0655084
14	Light, Indicating	Indication LED 220VDC, White	Carlo Gavazzi	60-* 0BAY03 60-* 0BAY04	PL 22C HL W 220D	0655085
15	Light, Indicating	Indication LED 220VDC, Yellow	Carlo Gavazzi	60-* 0BAY03 60-* 0BAY04	PL 22C HL Y 220D	0655081

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16	Unit, Control	Touch Screen Built in PC: 19" SXGA Panel PC with POS-G41, Celeron Dual Core E1500 2.2GHz CPU, 1GB DDR3 RAM, silver colour, PSU ACE-4520C, touch screen, w/o riser card	IEI	60-* 0BAY03	PPC-5190A-G41-E15/R/1G-R10	0236811
17	Controller	Bay Controller 1 & Tap Changer Relay	Schneider Electric	60-* 0BAY03	C264 M01M6910013406000001110D00	0502176
18	Controller	Bay Controller 2 (Extension Module)	Schneider Electric	60-* 0BAY03	C264 C01M6910003004000001110N00	0677977
19	Relay	Synchronising Relay	Siemens	60-* 0BAY03	7VE6320-6EB99-0CA0-L0D-M2K	0502173
20	Relay	DC Chop Over Relay	GE	60-* 0BAY03	MVAA 11T1NA1151A	0226177
21	Relay	Synchronising VT Selection Relay	GE	60-* 0BAY03	MVAJ 205TB1010A	0502174
22	Switch	DC Isolating Switch: DCI	Stratford	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	SRP168TB A010602445	0648309
23	Switch	Lamp Check Switch: LCD	Stratford	60-* 0BAY03	SRP112B/TX/45 A010108545	0717660

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24	Switch	Supervisory Isolating Switch: SIS	Stratford	60-* 0BAY03	SRP169ATB A0106044	0648311
25	Switch	Synchroniser Selector Switch: SYNC-S	Stratford	60-* 0BAY03	SRP146B/AT A010408545R2	0648312
26	Switch	Tap Change Isolating Switch: TIS	Stratford	60-* 0BAY03	SRP145/TB A0104026	0717656
27	Switch	Local OR Remote Selector Switch: LoR	Stratford	60-* 0BAY03	SRP145ATB/45 A010404445	0648314
28	Switch	Manual / Auto Selector Switch: MAS	Stratford	60-* 0BAY03	SRP112B/45/TA A010108545R2	0717659
29	Switch	Raise / Lower Selector Switch: RLS	Stratford	60-* 0BAY03	SRP112B/45/TA A0101085454R2	0717657
30	Switch	AC Isolating Switch: ACI	Stratford	*0BAY04	SRP168TB A010602445	0717658
31	Relay	11 pin relay, 3CO contacts, 24VDC coil voltage	Schrack	60-* 0BAY03	MT321024	0239948
32	Transducer	400kV Busbar 1 & 2 VT Transducer: 230VAC supply voltage Input = 0-132VAC Output = 4-20mA	Pyramid	60-* 0BAY03	MI416	0637083
33	Transducer	Modbus Transducer Input = 4-20mA	Advantech	60-* 0BAY03	ADAM 4017	0608669

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
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34	Controller	Communications Controller RS232 / RS485	Advantech	60-* 0BAY03	ADAM 4520	0608674
35	Module, Power Supply	Power Supply Module: 220/24VDC	Phoenix Contact	60-* 0BAY03	QUINT-PS-1AC/24DC/10 2866763	0252374
36	Terminal	Type KCH Diode Terminal: 8 terminals, Diode included, Termitronix	Elmex	60-* 0BAY03		0581483
37	Recorder	Fault Recorder (400kV Bay; Unit Trfr 1 & 2 Bays)	GE / Bitronics	*0BAY04	M871 2Y91515C	0630889
38	Recorder	Fault Recorder (Generator Bay)	GE / Bitronics	*0BAY04	M871 20V1515C	0580199
39	Recorder	Fault Recorder (Unit Trfr 1 & 2 Bays)	GE / Bitronics	*0BAY04	M872 3Y9000151Y2X	0630949
40	Push Button	Push Button: 22mm, red, non-latch, 1NO aux contact	Siemens	*0BAY04	3SU1100-0AB20-1FA0	0631040
41	Push Button	Push Button: 22mm, green, non-latch, 1NO aux contact	Siemens	*0BAY04	3SB3201-0AA41 (old)	0631039
42	Network Hub	Ethernet Communication Switch Rack mount, 24 LAN port connections, LED indication	Moxa	*0BAY04	PT-7728	0608672
43	Uninterruptable Power Supply	UPS (Rack Mount) 850VA/600W, 230VAC input & output, pure sine wave,	Eaton	*0BAY04	5P850iR	0677979
44	Convertor	IRIG-B Signal Convertor: 18-72VDC input voltage, RS422 output, Ethernet	Hopf	*0BAY04	4830xC-81 / BB	0648399

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		port, fibre optical ST connection (x2)				
45	Relay	DC Fail Relay - MVAX12	GE	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03	MVAX12 R1DA1002A	0126342 0502189
46	Filter, Electronic	DC Line Filter 110/250VAC, 50-60Hz, 10A	Schaffner	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03	FN 670-10/06	0608673
47	Relay	11 pin relay. 3CO contacts, 220VDC coil voltage	Schrack	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	MT321220	0609277
48	Push Button	Protection Reset & Lamp Test Push Button: 22mm, black, non-latch, 1NO auxiliary contacts	Siemens	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	3SU1100-0AB10-1BA0	0635297
49	Terminal	Electrostatic Discharge Terminal Synchronising Test Points Protection Test Points	Inyanga Electrical	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	GPE 100	0638383
50	Block, Terminal	Current & Voltage Test Blocks	Schneider Electric	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	P991	0580196
51	Plug, Test	Current & Voltage Test Plugs	Schneider Electric	N/A	P992C	0677976

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52	Holder, Fuse	Fuse Holder: Front connected terminals, Up to 63A, 660VAC, A2 (bolted connection) fuses	Eaton Bussmann	60-* 0BAY04 -F01/1 to 4	RS63HWH	0608676
53	Holder, Fuse	Fuse Holder: Front connected terminals, Up to 20A, 660VAC, F1 (offset blade tag) fuses	Bussmann	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	32NNSF	0583362
54	Fuse, Cartridge	Fuse 2A, 550VAC, 80kA, F1 (offset blade tag), BS88, Gg class	Bussmann	60-* 0BAY01 -F01/7, 9 & 10 60-* 0BAY02 -F01/7, 9 & 10 60-* 0BAY03 -F01/5 to 8	NSD2	0625894
55	Fuse, Cartridge	Fuse 6A, 550VAC, 80kA, F1 (offset blade tag), BS88, Gg class	Bussmann	60-* 0BAY03 -F01/11 & 12 60-* 0BAY04 -F01/3 & 5	NSD6	0583375
56	Fuse, Cartridge	Fuse 10A, 550VAC, 80kA, F1 (offset blade tag), BS88, Gg class	Bussmann	60-* 0BAY01 -F01/5 & 6 60-* 0BAY02 -F01/5 & 6	NSD10	0583376

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57	Fuse, Cartridge	Fuse 16A, 550VAC, 80kA, F1 (offset blade tag), BS88, Gg class	Bussmann	60-* 0BAY01 -F01/1 to 4 60-* 0BAY02 -F01/1 to 4 60-* 0BAY03 -F01/9, 10, 13, 14 60-* 0BAY04 -F01/1 & 2	NSD16	0583377
58	Fuse, Cartridge	Fuse 20A, 660VAC, 80kA, A2 (bolted connection), BS88, Gg class	Bussmann	60-* 0BAY03 -F01/1 to 4	TIA20	0117227
59	Switch, Limit	Panel Limit Switch (Front & Back): 10A, 1NO & 1NC contact, Long pulley type extension, 187 terminals,	CNTD	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	CMV103D	0677978
60	Terminal	Power Terminals Exposed Terminals; 10 - 70mm	Elmex	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	DPBB 70	0581479
61	Terminal	10mm Spring Loaded Terminal 1.5mm - 10mm (stranded)	Elmex	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	KULT 1	0575220
62	Terminal	6mm Sping Loaded Terminal 0.5 - 6mm (stranded)	Elmex	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	KULT 6	0581480

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63	Terminal	4mm Sping Loaded Terminal 0.5 - 4mm (stranded)	Elmex	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	KULT 4	0575159
64	Terminal	4mm Sping Loaded Terminal 1M Ohm Resistor 0.5 - 4mm (stranded)	Elmex	60-* 0BAY01 60-* 0BAY02 60-* 0BAY03 60-* 0BAY04	KUDF 4	0581482
65	Transformer, Voltage	Voltage Transformer: 660/550V, 3000VA,	Trans Electron	60-* 0BAW10 GH001	J67663/5	0684928
66	Device	20Hz Generator: 3 x 100-125VAC Current output 3.25A Frequency 20Hz Output voltage 26V	Siemens	60-* 0BAW10 GH001	7XT3300-0CA00/DE	0241447
67	Relay, Control	20Hz Band Pass Filter: Frequency 20Hz Smax 80VA	Siemens	60-* 0BAW10 GH001	7XT3400-0CA00/BB	0239781

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