CENTLEC

Reg No 2003/011612/30

RE-ADVERT

CD49/2023

THE MANUFACTURE, SUPPLY, DELIVERY OF NEW 12 kV and 22kV INDOOR METAL CLAD SWITCHGEAR, 12kV/ 22kV FIXED PATTERN NON-EXTENDABLE (RMU) SWITCHGEAR AND ASSOCIATED EQUIP-MENT. THE REPAIR OF EXISTING SWITCHGEAR AND THE RETROFIT OF THE EXISTING SWITCHGEAR.

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1. STATEMENT OF INVITATION

CENTLEC (SOC) Ltd (Here after referred to as CENTLEC) a Municipal Entity distributing electricity in Mangaung and other Municipalities invites suitable bidders to bid for the manufacture, supply, delivery of new 12kV and 22 kV indoor metal clad switchgear, 12kV/22kV fixed pattern non-extendable (RMU) switchgear and associated equipment. The repair of existing switchgear and the retrofit of existing switchgear as per specifications detailed below for a period of thirty-six (36) months.

2. MINIMUM REQUIREMENTS

2.1. Supply unique security personal identification number (PIN) from SARS for TAX compliant status.

2.2. Supply municipal services (water, sanitation, rates and electricity) clearance certificate or Lease Agreement with a current Bill and rates clearances, or Current Bill of Account not owing more than 90 days. In a case where the services are paid by the Landlord, the signed lease agreement and statement of account must be submitted by the bidder.

2.1.1 In an event, that the Bidder utilizes prepaid services (e.g. Water or electricity) a valid municipal clearance certificate(s) must still be provided.

2.2 CIDB grading – Level 6 EP and above.

2.3 The service provider must supply a valid letter of good standing with the Compensation Commissioner.

2.4 The bidder must be registered with National Treasury Data Base of suppliers and proof thereof must be submitted.

2.5 Proof of ISO 9001 quality accreditation from the manufacturer of the goods (a certified copy of the accreditation will suffice).

2.6 Please note that the Special Conditions table as per point 3 below, needs to be met. All supporting documents need to be submitted where applicable.

3. SPECIAL CONDITIONS

Take Note that it is compulsory for Bidders to complete the table in full. Any omission or "no" will be an automatic disqualification.

Item no.	Description	Yes	No	Submit documentation
3.1	The successful bidder will be expected to enter into a Service Level Agreement with CENTLEC			**Upon appointment**
3.2	Please note that CENTLEC reserves the right to appoint more than one bidder.			N/A
3.3	Any work outside of the current scope of work, identified by CENTLEC duly authorized persons can be quoted on by the approved bidder.			N/A

3.4	The quotation can be considered by CENTLEC, and a work instruction generated for the quoted Adhoc work.			N/A
3.5	Factory Acceptance Test for four CENTLEC persons must include transport (flight arrangements), accommodation and transport. The cost will be for the successful bidder account.			N/A
3.6	All the equipment delivered must be accompanied with protection wiring diagrams, panel layout drawings, factory test results, special keys, 200ml touch up paint, and maintenance manuals.			N/A
3.7	All the current transformer information will be indicated in the panel kiosk.			N/A
3.8	All the panels must be labeled according to the specification, A1 to A10, in the middle and on top of the panel kiosk.			N/A
3.9	The services provider will train CENTLEC personnel on all relays, circuit breaker and panel operations for the duration of this contract.			N/A
3.10	The service provider will submit, with his tender a fully breakdown like the spares list, a list of spares that will be applicable to the switchgears tendered for.			Spares list
3.11	The service provider must ensure that all circuit breakers are functional in all panels so that it can be utilized in any panel. CB wiring and panel wiring must be standard.			Submit letter of conformation.
3.12	All relays must carry a minimum of Ten Year (10) warranty, for repair(s) or replacement(s).			Submit warranty and guarantee certificates

Table 1. Special Conditions

4. DEFINITIONS AND ABBREVIATIONS

4.1 A - Ampere
4.2 V - Voltage
4.3 kVA - Kilo Volt Ampere
4.4 LV - Low Voltage
4.5 Hz - Hertz
4.6 ISO - International Organization for Standardization

4.7 IEC - International Electro Technical Commission Standards
4.8 SANS - South Africa Nasional Standard
4.9 Ue – Operational voltage
4.10 Ui - Isolation voltage
4.11 VA - Volt Ampere
4.12 kA - Kilo Ampere
4.13 Ct - Current transformer
4.14 Pt - Potential transformer
4.15 NER - Neutral Earth Resistor
4.16 NERCT – Neutral Earth Compensator Resistor

5. SCOPE OF WORK

5.1 The bidder will be required to manufacture, supply and deliver the following:

5.1.1 Part A: 12 kV and 22kV vacuum indoor metal clad switchgear.
5.1.2 Part B: 12 kV and 22kV fixed pattern metal clad ring main unit and associated accessories according to the applicable standards.
5.1.3 Part C: Vacuum circuit breakers to replace AG16 oil type circuit breakers and the repairs of 12kV switchgear on Adhoc quotation basis. Retrofit existing circuit breakers (Reyrolle).

5.2 The bidder will be required to repair on existing 11kV switchgear:
5.2.1 Repair existing 11kV circuit breakers and related equipment in CENTLEC's network.
5.2.2 Strip and quote quotations on repairs of existing 11kV switchgear, related equipment and the transporting from Bloemfontein to their premises and back to CENTLEC.

5.3 To supply the related Protective Relays and other listed items in the Pricing Schedule.

6. TECHNICAL SPECIFICATION

6.1 METEOROLOGICAL CONDITIONS AT CENTLEC SUPPLY AREA

1. Outdoor temperatures in degrees Celsius	Annual mean – 24.4; Maximum = 40; Minimum = -10
2. Average relative humidity	At 8h00 = 76%; at 14h00 = 33%; at 20h00 = 48% Minimum = 7% and Maximum = 98%
3. Thunderstorm activity	Severe Thunderstorms

Table 2 – Climatological Data

6.2 ELECTRICAL SYSTEM IN BLOEMFONTEIN

6.2.1 Voltage: 11 000 /400 Volt
6.2.2 Phase: 3 (A-Red, B-Yellow and C-Blue)
6.2.3 Frequency: 50 Hz
6.2.4 On the 11 kV side at the transformers 33/11 kV and 132kV/11kV in distribution centers in Bloemfontein; the neutral is earthed through a resistor to limit the maximum current to 300 A, 20Ω or 600 A, 10Ω. Please note that the circuit breakers must still be designed to a fault level capacity of 350 MVA.
6.2.5 Phase rotation is non-standard. (Red, Yellow, Blue) Must be labeled on switchgear.
6.2.6 The load on the system consists mainly of lighting, heating and inductive loads.
6.2.7 The three types of cable mainly used on the 11 kV network are 240 mm² Cu paper insulated lead, 185mm² Al paper insulated lead and 70 mm² Cu paper insulated lead, cable.
6.2.8 The insulation level for the voltage transformers must be according to SANS 780: 2009.

6.3 SPECIFICATIONS ON SWITCHGEAR:

6.3.1 Busbar insulation: -

Busbars, cable termination points and all live metal shall be fully and suitably insulated. Busbars which use air only as insulating medium is not acceptable. Switchgear and busbar insulation shall be designed to prevent the risk of accidental short circuit due to animals and vermin. Busbar connections must be tinted (Silver plate).
The degree of Ingress-Protection for the metal-clad switchgear shall conform to IP4X.

6.3.2 Rated insulation level: -

Switchgear must have a basic impulse insulation withstand level of 95 kV.

6.3.3 Voltage transformers: -

a. Voltage transformer shall comply with the requirements of SANS (SANS) IEC 60044-2, 3 phase, 100VA, Class 0.5 and shall be the encapsulated type that is fully encapsulated in epoxy resin and must be fitted with an earthed metal screen. Only the LIMB /swivel type with interlocking busbar shutters will be considered on switchgear type A2, A3 and A10. The phasing must be labeled clearly.

b. **Take note of the primary connection position of all 11000/110 Volt voltage transformers on the switchgear.** The position of voltage transformer shall be Cable side

mounted as specified in the schedule unless specifically specified otherwise on an order.

c. The 110-volt DC (secondary side) fuses must be accessible and easy to replace without isolation of the voltage transformer or removing of covers.

d. Installation of a panel mounted voltmeter is only necessary if the protection relay is unable to display the primary voltage.

6.3.4 Metering: -

a. Circuit breaker panels, schedule A2, A3 and A10, metering CT's must be installed as specification unless otherwise specified on order, according to schedule A11.6.

b. Connection points (HV side) on current transformers base must be such that it can be easily taped close.

6.3.5 Protection and auxiliary equipment: -

All Protection Relays offered in the main offer must be consistent with the technical specifications as listed and described in the schedules under item 6.4 below including the dimensions. All Current transformers will be studded type where all small wiring will be terminated labeled and numbered.

6.3.6 Protection Relay and Bus Wiring must be as follows: -

The auxiliary DC supply (protection relay auxiliary supply) and the tripping/closing DC supply must be separated and individually supplied (Moulded Case Circuit Breakers). Both DC supply circuits must be wired to the rear terminal box.

6.3.7 Install arc flash protection in cable termination chamber and busbar chamber to trip each individual circuit breaker. Light sensors must be installed at the specific points that have the greatest risk of arc flash. Light sensors must be linked to the protective relay. The protective relay must be easily integrated with the supervisory and control system, enabling remote settings and configuration, and must have a high-speed pickup. Light sensors must be interconnected to the protective relay by fiber optic cables to eliminate the need for other components inside the cubicles.

6.3.8 Hand-held remote control (Pendant control), for closing and tripping the circuit breaker, must be standard on all panels. This can be accomplished by a plug-in type of extension lead with trip / close control (minimum 15m in length).

6.3.9 Auxiliary wiring between the switchgear panel and the withdrawable circuit breaker shall be by means of a wire harness with a detachable socket. Interlocking to prevent operation of the switchgear is required if the detachable socket is not firmly in position.

6.3.10 Provision must be made for the circuit breaker status (“open” or “closed”) to be indicated on the panel, using a LED type lamp indicator.

6.3.11 All spare circuit breaker auxiliary contacts (“a” and “b”) must be wired to rear terminal box.

6.3.12 Auto-reclose status and sensitive earth fault status must be flagged on the protection relay display.

6.3.13 Auto-reclose on sensitive earth fault must be selectable via a front panel selector switch. This must be duplicated on the protective relay.

6.3.14 Auto-reclose, “On” and “Off” must be selectable via a front panel selector switch. This may be duplicated on the relay.

6.3.15 Ammeters are only to be installed if the protection relays are incapable of displaying instantaneous current values. In this case, only a single meter must be installed on the yellow phase, with the appropriate interposing CT.

6.3.16 Cable termination boxes: -

a. Surge Arresters must be installed on all type A7 panels and be situated in the power cable termination box as close as possible to the terminal fixing point of the cable. Surge arresters installed must not have an integral disconnecting device.
b. All power cable termination boxes must cater for split gland plates and include a PVC wedge type non-ferrous, cable retaining cleat to accommodate from 70mm^2 Cu PILC cable, 185 mm^2 Al PILC cable and 240mm^2 Cu PILC cable.

6.3.17 Labels (All labels shall conform to SANS 1885: 2001 clause 4.17).

6.3.18 All panels with manual spring charge circuit breakers (non-motorized circuit breaker mechanisms) a label must be provided on the circuit breaker, red text on white background that reads: “Hand charge - Closing and Tripping must be done with using Pendant Control or standoff push button cable”.

6.4 PART A: -
METAL-CLAD SWITCHGEAR 12kV (SBV4-E, SBV3-E types) or equivalent, Complete Colom, PARTICILARS OFFERED AND GURANTEED, from schedule A1 to A11.

6.4.1 A1 SWITCH-DISCONNECTOR

SCHEDULE A1: SWITCH-DISCONNECTOR PANEL – COMPATIBLE WITH ALL SWITCHGEAR PANELS		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A1	**UNITS**	**SPECIFIED RE-QUIREMENT**	**SANS CLAUSE**	**PARTICULARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Switch Dis-connectors		
Insulation Medium		Vacuum/oil	4.3.1.1.3	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Manual	4.3.1.9	
Trip Coil	V	Hand Oper-ated	4.3.1.10	
Spring Release Coil	V	N/A	4.3.1.10	
Indication for Trip/Close		YES	4.3.1.2	
Status Indication Lamps (open/close)	LED	N/A	4.3.2.2 a)	
Circuit Earthing Facilities		Bottom Entry	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PLIC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Ca-ble.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		N/A (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:				
Install CT’s		N/A	4.8	
Purpose		N/A		
Ratio		N/A		
Burden		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		
Install Ct’s (Metering/Differential)		N/A	4.8	
Purpose		N/A		
Burden		N/A		

Ratio		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		

SCHEDULE A1: SWITCH-DISCONNECTOR PANEL – COMPATIBLE WITH ALL SWITCH-GEAR PANELS		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A1	**UNITS**	**SPECIFIED REQUIRE-MENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-7		
Spare auxiliary Contacts required		N/A	4.14	
		N/A		
Marking/Labeling/Documentation		N/A	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		N/A	4.10	
High Speed Pilot wire protection-“Sol-kor RF” or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature trip-ping relay Hand reset Flag (SEL 751A)		N/A	4.10	
D.C Circuit Protection		N/A	4.14.3	
Location of Fuses inside RC		N/A		
Location of Test Terminal Blocks RC Door		N/A	4.14.7	
Battery Charger with Batteries – 30 Volt		No		
Number of copies of Drawings sup-plied with Panel on delivery		2	7.3	
Number of copies of Routine Test Re-port Certificates on delivery		2	7.4	

6.4.2 **A2 CIRCUIT BREAKER**

SCHEDULE A2: CIRCUIT BREAKER -	PART A – METAL-CLAD SWITCHGEAR

MV CONNECTION < 1MVA		(WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A2	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GUARANTEED**
SWITCHGEAR GENERAL				
Panel Function		MV Connection < 1MVA		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PLIC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		100/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		60/30/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE A2: CIRCUIT BREAKER - MV CONNECTION < 1MVA	PART A – METAL-CLAD SWITCHGEAR (WITH METERING)

DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A2	UNITS	SPECIFIED REQUIREMENT	SANS CLAUSE	PARTICILARS OFFERED AND GURANTEED
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio		11000/110 V		
Burden and Accuracy		0.5		
Voltage Factor		1.9		
Limbs		3		
Primary Connection		Cable side		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		Yes	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS -9- 7		
Spare auxiliary Contacts required		"a"-2	4.14	
		:b"-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 - 250 Vdc (External wetting); Inputs should be individually user-configured to operate. viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A	4.10	

		continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or equivalent		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		Yes	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber		
D.C Circuit Protection		MCB's	4.14.3	
Location of MCB inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.3 A3 CIRCUIT BREAKER

SCHEDULE A3: CIRCUIT BREAKER - MV CONNECTION > 1MVA		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A3	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		MV Connection > 1MVA		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Hand Spring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PLIC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		600/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		300/200/100/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE A3: CIRCUIT BREAKER - MV CONNECTION >1MVA		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A3	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio		11000/110 V		
Burden and Accuracy		0.5		
Voltage Factor		1.9		
Limbs		3		
Primary Connection		Cable side		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		Yes	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-8		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No v. **Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 - 250 Vdc (External wetting); Inputs should be individually user-configured to operate.	4.10	

		viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		Yes	4.10	
Arc Flash sensors		Cable, Circuit Breaker and Busbar chamber		
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.4 **A4 CIRCUIT BREAKER SECONDARY FEEDER**

SCHEDULE A4: CIRCUIT BREAKER - SECONDARY FEEDER	**PART A – METAL-CLAD SWITCHGEAR**

DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A4	UNITS	SPECIFIED REQUIREMENT	SANS CLAUSE	PARTICILARS OFFERED AND GURANTEED
SWITCHGEAR GENERAL				
Panel Function		Secondary Feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PILC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		600/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		No	4.8	
Purpose		N/A		
Burden		N/A		
Ratio		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		

SCHEDULE A4: CIRCUIT BREAKER - SECONDARY FEEDER	PART A – METAL-CLAD SWITCHGEAR

DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A4	UNITS	SPECIFIED REQUIREMENT	SANS CLAUSE	PARTICILARS OFFERED AND GURANTEED
VOLTAGE TRANSFORMER				
Install VT		N0	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-8		
Spare auxiliary Contacts required		"a"-2	4.14	
		"b"-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 – 250 Vdc (External wetting), Inputs should be individually user-configured to operate. viii. **Digital Optoisolated high speed and high current**	4.10	

		Outputs: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		N/A	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.5 A5 CIRCUIT BREAKER PRIMARY OUT GOING FEEDER

SCHEDULE A5: CIRCUIT BREAKER – PRIMARY OUT-GOING FEEDER		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A5	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Primary Out-Going Feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)		Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PILC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		600/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Pilot wire protection		
Burden				
Ratio		600/1		
Class		X or TPS or PX		
Quantity		3		
Insulation Level		IL 12/28/95 KV		

SCHEDULE A5: CIRCUIT BREAKER – PRIMARY OUT-GOING FEEDER		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A5	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GUARANTEED**
VOLTAGE TRANSFORMER				
Install VT		N0	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS -9- 8		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 – 250 Vdc (External wetting), Inputs should be	4.10	

		individually user-configured to operate. viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection-" Solkor RF" or compatible		Yes	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		N/A	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.6 **A6 CIRCUIT BREAKER TRANSFORMER FEEDER.**

SCHEDULE A6: CIRCUIT BREAKER TRANSFORMER FEEDER.		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A6	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Transformer Feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Hand Spring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PLIC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS AND FINISH	Paint	Light Grey G29		
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		60/30/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		N/A	4.8	
Purpose		N/A		
Burden		N/A		
Ratio		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		

SCHEDULE A6: CIRCUIT BREAKER TRANSFORMER FEEDER.	PART A – METAL-CLAD SWITCHGEAR

DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A6	UNITS	SPECIFIED REQUIREMENT	SANS CLAUSE	PARTICILARS OFFERED AND GURANTEED
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-9		
Spare auxiliary Contacts required		"a"-2	4.14	
		"b"-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 - 250 Vdc (External wetting), Inputs should be individually user-configured to operate. viii. **Digital Optoisolated high speed and high current**	4.10	

		Outputs: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		N/A	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.7 **A7 CIRCUIT BREAKER OVERHEAD LINE FEEDER**

SCHEDULE A7: CIRCUIT BREAKER OVERHEAD LINE FEEDER	**PART A – METAL-CLAD SWITCHGEAR (WITH METERING)**

DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A7	UNITS	SPECIFIED REQUIREMENT	SANS CLAUSE	PARTICILARS OFFERED AND GURANTEED
SWITCHGEAR GENERAL				
Panel Function		Overhead line feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Auto Spring Charge	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PILC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		Yes, Cable side 12kV	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		600/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10 VA		
Ratio		300/200/100/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE A7: CIRCUIT BREAKER OVERHEADLINE FEEDER.		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A7	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**

VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio		11000/110		
Burden and Accuracy		0.5		
Voltage Factor		1.9		
Limbs		3		
Primary Connection		Cable side		
AMMETER:				
Scale		Yes	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		Yes	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-9		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** 24Vdc to 48VDC ii. **Secondary Input Current:** 3 phase 1 Amp AC current input/ 50mA Neutral AC current input. iii. **Voltage Input**: $V_{NOM\ (L-L)}$ should have the following specifications; 20 to 440V for DELTA_Y for DELTA and WYE iv. **Configurable labels**: Yes v. **Programmable pushbuttons**: Minimum of four programable pushbuttons, each with programable LEDs **vi. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: 1 x Serial Port vii. **Communications Protocol**: DNP3 level 2 minimum. viii. **Digital Optoisolated Inputs**: Minimum of 8 inputs (External wetting), Inputs should be individually user-configured to operate.	4.10	

		ix. **High Speed, High current Interruption (Outputs)**: Must be able to carry 6A continuous current. Minimum of 8 outputs. x. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. xi. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		Yes	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		Yes	4.10	
Auto-reclose facility.		Yes: 30V DC electrical closing via ARC relay.	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.8 **A8 CIRCUIT BREAKER PRIMARY INCOMER FEEDER**

SCHEDULE A8: CIRCUIT BREAKER PRIMARY INCOMER FEEDER		**PART A – METAL-CLAD SWITCHGEAR**		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A8	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED**

				AND GU-RANTEED
SWITCHGEAR GENERAL				
Panel Function		Primary Incomer feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PILC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		No	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes Differential	4.8	
Purpose		Pilot wire protection		
Ratio		600/1		
Burden		10VA		
Class		X or TPS or PX		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		300/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE A8: CIRCUIT BREAKER PRIMARY INCOMER FEEDER	**PART A – METAL-CLAD SWITCHGEAR**

DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A8	UNITS	SPECIFIED REQUIREMENT	SANS CLAUSE	PARTICILARS OFFERED AND GURANTEED
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		Yes	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		Yes	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-10		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		No	4.10	
High Speed Pilot wire protection- “Solkor RF” or compatible		Yes	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		No	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		No	4.10	
Auto-reclose facility.		No	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB’s	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	
PROTECTION:				
ARC FLASH MONITOR		Yes: The Relay must have these capabilities: Arc faults monitor 20 – 60 VDC i. Should have a tri-colour LED, ii. Front push button reset,	4.10	

		iii. Maximum of three arc sensor inputs iv. Two high speed tripping duty arc sense output contacts: 2 N/O, 1 N/C for the power supply. v. **Output contact ratings:** Continuous current carrying ability should be 5A AC or DC. vi. **Transient overvoltage:** Between all terminals and earth – 5kV 1.2/50 microseconds, 0,5 J. Between independent circuits without damage or flashover – 5kv 1.2/50 microseconds 0.5 J. vii. **Temperature range:** Operating: -5 to +55 degree Celsius. viii. **Case:** ZA12 flash or DIN rail mount type ix. Must have a continuous arc sensor supervision, x. Should have Integrated self-supervision, xi. Should have a fail alarm contact xii. **Operating voltage**: 20 - 60Vdc xiii. Should provide three optical arc fault sensors that is applicable to the device. The sensor should have the following characteristics: Compact rugged design, three optical detectors, high speed arc detection, Optional 20m and screened cable, heavy duty 6m terminal cables, sealed unit for harsh environments.		

6.4.9 A9 CIRCUIT BREAKER BUS- SECTION SWITCH

SCHEDULE A9: CIRCUIT BREAKER BUS- SECTION SWITCH		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICU-LARS NOTE: PANEL MUST BE MARKED ON TOP A9	**UNITS**	**SPECIFIED RE-QUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GU-RANTEED**
SWITCHGEAR GENERAL				
Panel Function		Bus-Section Switch		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Hand Spring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		N/A	4.3.1.9	
Main Cable Detail		Busbars to Link bus-bars through Circuit breaker.		
Main Cable Termination		N/A		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		No	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		No	4.8	
Purpose		N/A		
Ratio		N/A		
Burden		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		300/200/100/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE A9: CIRCUIT BREAKER BUS- SECTION SWITCH		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A9	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GUARANTEED**
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS -9- 10		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 – 250 Vdc (External wetting); Inputs should be individually	4.10	

		user-configured to operate. viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		No	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		No	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		No	4.10	
Auto-reclose facility; 1A Phase and 50mA neutral.		No	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.10 **A10 FUSED SWITCH DISCONNECTOR COMPATIBLE TO ALL PANELS**

SCHEDULE A10: FUSED SWITCH DISCONNECTOR COMPATIBLE TO ALL PANELS	**PART A – METAL-CLAD SWITCHGEAR (WITH METERING)**

DESCRIPTION OF PARTICULARS. NOTE: PANEL MUST BE MARKED ON TOP A10	UNITS	SPECIFIED REQUIREMENT	SANS CLAUSE	PARTICILARS OFFERED AND GURANTEED
SWITCHGEAR GENERAL				
Panel Function		Fused-Switch Disconnector with metering.		
Insulation Medium		Vacuum/Oil	4.3.2.1.6	
System Voltage	kV	11	4.1.1.1	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	No	4.3.1.10	
Spring Release Coil	V	No	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		PVC Wedge cleat 70 to 185 mm Cable		
Main Cable Termination		1x 185mm x 3 core PILC.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		No	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		No	4.8	
Purpose		N/A		
Ratio		N/A		
Burden		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		60/30/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE A10: FUSED SWITCH DISCONNECTOR COMPATIBLE TO ALL PANELS		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS. NOTE: PANEL MUST BE MARKED ON TOP A10	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GUARANTEED**
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio	V	11000/110 V		
Burden and Accuracy		0.5		
Voltage Factor		1.9		
Limbs		3		
Primary Connection		Cable side		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS -9- 10		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		No	4.10	
High Speed Pilot wire protection- “Solkor RF” or compatible		No	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		No	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter- solid state		No	4.10	
Auto-reclose facility; SEL 751AMOT: 751ABCBOX74810020		No	4.10	
Arc Flash Sensors		No	4.10	
D.C Circuit Protection		MCB’s	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

METAL-CLAD SWITCHGEAR 22kV (SBV4-E, types) or equivalent, Complete Colom, PARTICILARS OFFERED AND GURANTEED, from schedule 22A1 to 22A11. Please label the panels accordingly.

6.4.11 22A1 SWITCH-DISCONNECTOR

SCHEDULE 22A1: SWITCH-DISCONNECTOR PANEL – COMPATIBLE WITH ALL SWITCHGEAR PANELS		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A1	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICULARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Switch Disconnectors		
Insulation Medium		Vacuum/Oil	4.3.1.1.3	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Manual	4.3.1.9	
Trip Coil	V	Hand Operated	4.3.1.10	
Spring Release Coil	V	N/A	4.3.1.10	
Indication for Trip/Close		YES	4.3.1.2	
Status Indication Lamps (open/close)	LED	N/A	4.3.2.2 a)	
Circuit Earthing Facilities		Bottom Entry	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PLIC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		N/A (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:				
Install CT's		N/A	4.8	
Purpose		N/A		
Ratio		N/A		
Burden		N/A		
Class		N/A		
Quantity		N/A		

Insulation Level		N/A		
Install Ct's (Metering/Differential)		N/A	4.8	
Purpose		N/A		
Burden		N/A		
Ratio		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		

SCHEDULE 22A1: SWITCH-DISCON-NECTOR PANEL – COMPATIBLE WITH ALL SWITCHGEAR PANELS		**PART A – METAL-CLAD SWITCHGEAR**		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP A1	**UNITS**	**SPECIFIED REQUIRE-MENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-7		
Spare auxiliary Contacts required		N/A	4.14	
		N/A		
Marking/Labeling/Documentation		N/A	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		N/A	4.10	
High Speed Pilot wire protection-"Sol-kor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature trip-ping relay Hand reset Flag (SEL 751A)		N/A	4.10	
D.C Circuit Protection		N/A	4.14.3	
Location of Fuses inside RC		N/A		
Location of Test Terminal Blocks RC Door		N/A	4.14.7	
Battery Charger with Batteries – 30 Volt		No		
Number of copies of Drawings sup-plied with Panel on delivery		2	7.3	
Number of copies of Routine Test Re-port Certificates on delivery		2	7.4	

6.4.12 22A2 CIRCUIT BREAKER

SCHEDULE 22A2: CIRCUIT BREAKER - MV CONNECTION < 1MVA		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22 A2	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		MV Connection < 1MVA		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PLIC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		100/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		60/30/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE 22A2: CIRCUIT BREAKER - MV CONNECTION < 1MVA		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A2	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio		22000/110 V		
Burden and Accuracy		0.5		
Voltage Factor		1.9		
Limbs		3		
Primary Connection		Cable side		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		Yes	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS -9- 7		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No v. **Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 - 250 Vdc (External wetting); Inputs should be individually user-configured to operate.	4.10	

		viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		Yes	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber		
D.C Circuit Protection		MCB's	4.14.3	
Location of MCB inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.12.1 22A3 CIRCUIT BREAKER

SCHEDULE 22A3: CIRCUIT BREAKER - MV CONNECTION > 1MVA		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A3	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		MV Connection > 1MVA		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Hand Spring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PLIC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		100/60/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		300/200/100/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE 22A3: CIRCUIT BREAKER - MV CONNECTION >1MVA		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A3	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio		22000/110 V		
Burden and Accuracy		0.5		
Voltage Factor		1.9		
Limbs		3		
Primary Connection		Cable side		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		Yes	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-8		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 - 250 Vdc (External wetting); Inputs	4.10	

		should be individually user-configured to operate. viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		Yes	4.10	
Arc Flash sensors		Cable, Circuit Breaker and Busbar chamber		
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.12.2 22A4 CIRCUIT BREAKER SECONDARY FEEDER

SCHEDULE 22A4: CIRCUIT BREAKER - SECONDARY FEEDER		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A4	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Secondary Feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PILC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		100/60/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		No	4.8	
Purpose		N/A		
Burden		N/A		
Ratio		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		

SCHEDULE 22A4: CIRCUIT BREAKER - SECONDARY FEEDER		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A4	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		N0	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-8		
Spare auxiliary Contacts required		“a”-2	4.14	
		“b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 – 250 Vdc (External wetting);	4.10	

		Inputs should be individually user-configured to operate. viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		N/A	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.13 22A5 CIRCUIT BREAKER PRIMARY OUT GOING FEEDER

SCHEDULE 22A5: CIRCUIT BREAKER – PRIMARY OUT-GOING FEEDER		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICU-LARS NOTE: PANEL MUST BE MARKED ON TOP 22A5	**UNITS**	**SPECIFIED REQUIRE-MENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Primary Out-Going Feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)		Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PILC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		100/60/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Pilot wire protection		
Burden		15VA		
Ratio		600/1		
Class		X or TPS or PX		
Quantity		3		
Insulation Level		IL 12/28/95 KV		

SCHEDULE 22A5: CIRCUIT BREAKER – PRIMARY OUT-GOING FEEDER		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A5	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		N0	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS -9- 8		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No v. **Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 – 250 Vdc (External wetting); Inputs should be	4.10	

		individually user-configured to operate. viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection-" Solkor RF" or compatible		Yes	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		N/A	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.14 22A6 CIRCUIT BREAKER TRANSFORMER FEEDER.

SCHEDULE 22A6: CIRCUIT BREAKER TRANSFORMER FEEDER.		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A6	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Transformer Feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Hand Spring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PLIC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		N/A	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS AND FINISH	Paint	Light Grey G29		
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		60/30/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		N/A	4.8	
Purpose		N/A		
Burden		N/A		
Ratio		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		

SCHEDULE 22A6: CIRCUIT BREAKER TRANSFORMER FEEDER.		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A6	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-9		
Spare auxiliary Contacts required		"a"-2	4.14	
		"b"-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting voltage range should be 24 – 250 Vdc (External wetting); Inputs should be	4.10	

		individually user-configured to operate. viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		N/A	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		N/A	4.10	
Transformer Over Temperature tripping relay Hand reset Flag or LEDs		N/A	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.15 22A7 CIRCUIT BREAKER OVERHEAD LINE FEEDER

SCHEDULE 22A7: CIRCUIT BREAKER OVERHEAD LINE FEEDER		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A7	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Overhead line feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Auto Spring Charge	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PILC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		Yes, Cable side 12kV	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes	4.8	
Purpose		OC/EF Protection		
Ratio		100/60/1		
Burden		10VA		
Class		10P10		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10 VA		
Ratio		300/200/100/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE 22A7: CIRCUIT BREAKER OVERHEADLINE FEEDER.		**PART A – METAL-CLAD SWITCHGEAR (WITH METERING)**		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A7	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio		22000/110		
Burden and Accuracy		0.5		
Voltage Factor		1.9		
Limbs		3		
Primary Connection		Cable side		
AMMETER:				
Scale		Yes	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		Yes	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-9		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** 24Vdc to 48VDC ii. **Secondary Input Current:** 3 phase 1 Amp AC current input/ 50mA Neutral AC current input. iii. **Voltage Input**: $V_{NOM\ (L-L)}$ should have the following specifications: 20 to 440V for DELTA_Y for DELTA and WYE iv. **Configurable labels**: Yes v. **Programmable pushbuttons**: Minimum of four programable pushbuttons, each with programable LEDs **vi. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: 1 x Serial Port	4.10	

		vii. **Communications Protocol**: DNP3 level 2 minimum. viii. **Digital Optoisolated Inputs**: Minimum of 8 inputs (External wetting), Inputs should be individually user-configured to operate. ix. **High Speed, High current Interruption (Outputs)**: Must be able to carry 6A continuous current. Minimum of 8 outputs. x. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. xi. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		N/A	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		Yes	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		Yes	4.10	
Auto-reclose facility.		Yes: 30V DC electrical closing via ARC relay.	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.16 22A8 CIRCUIT BREAKER PRIMARY INCOMER FEEDER

SCHEDULE 22A8: CIRCUIT BREAKER PRIMARY INCOMER FEEDER		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A8	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GUARANTEED**
SWITCHGEAR GENERAL				
Panel Function		Primary Incomer feeder		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		70 to 185mm x 3core XLPE/PILC	4.3.1.2	
Main Cable Termination		PVC wedge cleat 70 to 185 mm Cable.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		No	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes Differential	4.8	
Purpose		Pilot wire protection		
Ratio		100/60/1		
Burden		10VA		
Class		X or TPS or PX		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		300/5		
Class		0.5		
Quantity		2		

Insulation Level		IL 12/28/95 KV		
PROTECTION:				
ARC FLASH MONITOR		Yes: The Relay must have these capabilities: Arc faults monitor 20 – 60 VDC i. Should have a tri-colour LED, ii. Front push button reset, iii. Maximum of three arc sensor inputs iv. Two high speed tripping duty arc sense output contacts: 2 N/O, 1 N/C for the power supply. v. Output contact ratings: Continuous current carrying ability should be 5A AC or DC. vi. Transient overvoltage: Between all terminals and earth – 5kV 1.2/50 microseconds, 0,5 J. Between independent circuits without damage or flashover – 5kv 1.2/50 microseconds 0.5 J. vii. Temperature range: Operating: -5 to +55 degree celcius. viii. Case: ZA12 flash or DIN rail mount type ix. Must have a continuous arc sensor supervision, x. Should have Intergrated self-supervision, xi. Should have a fail alarm contact xii. Operating voltage: 20 - 60Vdc xiii. Should provide three optical arc fault sensors that is applicable to the device. The sensor should have the following characteristics: Compact rugged design, three optical detectors, high speed arc detection, Optional 20m and screened cable, heavy duty 6m	4.10	

		terminal cables, sealed unit for harsh environments.		

SCHEDULE 22A8: CIRCUIT BREAKER PRIMARY INCOMER FEEDER		PART A – METAL-CLAD SWITCHGEAR		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A8	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		Yes	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		Yes	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS-9-10		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		No	4.10	
High Speed Pilot wire protection- “Solkor RF” or compatible		Yes	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		No	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		No	4.10	
Auto-reclose facility.		No	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB’s	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.17 22A9 CIRCUIT BREAKER BUS- SECTION SWITCH

SCHEDULE 22A9: CIRCUIT BREAKER BUS- SECTION SWITCH		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICU-LARS NOTE: PANEL MUST BE MARKED ON TOP 22A9	**UNITS**	**SPECIFIED RE-QUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GU-RANTEED**
SWITCHGEAR GENERAL				
Panel Function		Bus-Section Switch		
Insulation Medium		Vacuum	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Hand Spring	4.3.1.9	
Trip Coil	V	30 V D.C	4.3.1.10	
Spring Release Coil	V	30 V D.C	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		N/A	4.3.1.9	
Main Cable Detail		Busbars to Link bus-bars through Circuit breaker.		
Main Cable Termination		N/A		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		No	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		No	4.8	
Purpose		N/A		
Ratio		N/A		
Burden		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		
Ratio		300/200/100/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE 22A9: CIRCUIT BREAKER BUS- SECTION SWITCH		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED ON TOP 22A9	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GUARANTEED**
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS -9- 10		
Spare auxiliary Contacts required		"a"-2	4.14	
		:b"-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		Yes: The Relay must have these capabilities: i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:**3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**: 110V phase to phase AC Voltage. iv. **Configurable labels**: No **v. Communication Ports:** **Rear**: 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front**: None vi. **Communications Protocol**: DNP3_level 2 minimum vii. **Digital Optoisolated Inputs**: must have 10 inputs. Wetting	4.10	

		voltage range should be 24 – 250 Vdc (External wetting); Inputs should be individually user-configured to operate. viii. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous current carrying capabilities, Minimum of 5 outputs. Outputs must have a voltage range of 19.2 – 275 Vdc. ix. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. x. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xi. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.		
High Speed Pilot wire protection- "Solkor RF" or compatible		No	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		No	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		No	4.10	
Auto-reclose facility; 1A Phase and 50mA neutral.		No	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.18 22A10 FUSED SWITCH DISCONNECTOR COMPATIBLE TO ALL PANELS

SCHEDULE 22A10: FUSED SWITCH DISCONNECTOR COMPATIBLE TO ALL PANELS		PART A – METAL-CLAD SWITCHGEAR (WITH METERING)		
DESCRIPTION OF PARTICULARS. NOTE: PANEL MUST BE MARKED ON TOP 22A10	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
SWITCHGEAR GENERAL				
Panel Function		Fused-Switch Disconnector with metering.		
Insulation Medium		Vacuum/Oil	4.3.2.1.6	
System Voltage	kV	22	4.1.1.1	
Rated Voltage	kV	24	4.1.1.1	
Circuit Normal Rated Current	Amp	800	4.1.1.3	
Busbar Normal Rated Current	Amp	800	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.4.2	
Short Circuit Breaking Capacity	kA	20	4.1.1.5	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type		Handspring	4.3.1.9	
Trip Coil	V	No	4.3.1.10	
Spring Release Coil	V	No	4.3.1.10	
Indication for Trip/Close		Yes	4.3.1.2	
Status Indication Lamps (open/close)	LED	Yes	4.3.2.2 a)	
Circuit Earthing Facilities		Yes	4.2.8.2	
System Earthing		NER 300 A Max	4.3.1.1.3	
Cable Entry		Bottom Entry	4.3.1.9	
Main Cable Detail		PVC Wedge cleat 70 to 185 mm Cable		
Main Cable Termination		1x 185mm x 3 core PILC.		
Circuit Earthing Facility		Yes	4.2.8.1	
Interlocks		Yes		
Surge Arrestors (suppressors)		No	4.2.7	
Remote Control Unit		Yes (open and close)	4.3.1.7	
DIMENSIONS				
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		No	4.8	
Purpose		N/A		
Ratio		N/A		
Burden		N/A		
Class		N/A		
Quantity		N/A		
Insulation Level		N/A		
Install Ct's (Metering/Differential)		Yes	4.8	
Purpose		Metering		
Burden		10VA		

Ratio		60/30/5		
Class		0.5		
Quantity		2		
Insulation Level		IL 12/28/95 KV		

SCHEDULE 22A10: FUSED SWITCH DISCONNECTOR COMPATIBLE TO ALL PANELS		**PART A – METAL-CLAD SWITCHGEAR**		
DESCRIPTION OF PARTICULARS. NOTE: PANEL MUST BE MARKED ON TOP 22A10	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GUARANTEED**
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio	V	22000/110 V		
Burden and Accuracy		0.5		
Voltage Factor		1.9		
Limbs		3		
Primary Connection		Cable side		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		No	4.14.4	
Phase Selector Switch		N/A		
GENERAL:				
Configuration of Switchgear		TS -9- 10		
Spare auxiliary Contacts required		“a”-2	4.14	
		:b”-2		
Marking/Labeling/Documentation		Yes	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Overcurrent and Earth fault- 3 Pole Phase plus Earth Fault (IDMT)		No	4.10	
High Speed Pilot wire protection- “Solkor RF” or compatible		No	4.10	
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state		No	4.10	
3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter- solid state		No	4.10	
Auto-reclose facility; SEL 751AMOT: 751ABCBOX74810020		No	4.10	
Arc Flash Sensors		No	4.10	
D.C Circuit Protection		MCB’s	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.19 **(A) 12kV Secondary Feeder 110VDC panel:**

Tender must be for single and double busbars. (Upper bar / Lower Bar and Front / back bar) Complete with busbars. (SBV3 and SBV4 or compatible equivalent without juggle boxes)

SCHEDULE 12: SBV 3E FEEDER PANEL COMPATIBLE WITH ALL SWITCHGEAR PANELS (110VDC)		**PART C – METAL-CLAD SWITCHGEAR**		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED	**UNITS**	**SPECIFIED REQUIRE-MENT**	**SANS CLAU SE**	**PARTICILARS OFFERED AND GU-RANTEED**
Panel Function		**Feeder**		
Insulation Medium		Vacuum		
System Voltage	kV	12	4.3.2 .1.6	
Rated Voltage	kV	12	4.1.1 .1	
Circuit Normal Rated Current	Amp	800	4.1.1 .1	
Busbar Normal Rated Current	Amp	2500	4.1.1 .3	
Fault Level Capacity	MVA	350	4.1.1 .3	
Impulse Withstand Voltage	kV	95	4.1.1 .3	
Short Circuit Breaking Capacity	kA	20	4.1.1 .4.2	
Duration of Short Circuit	s	3	4.1.1 .5	
Peak Withstand Current	kA	63	4.1.1 .5	
Mechanism Type	M.W .S	Auto spring charges	4.1.1 .5	
Trip Coil 120VDC	V	YES	4.3.1 .9	
Spring Release Coil 110VDC	V	YES	4.3.1 .10	
Indication for Trip/Close 110VDC		YES	4.3.1 .10	
Status Indication Lamps (open/close) VCB open; Green LED indication. VCB Close: Red LED indication VCB Earthed: White LED indication. VCB In Service Position Amber indi-cation.	LED	YES	4.3.1 .2	
Local Remote selector switch		YES		
Circuit Earthing Facilities		Bottom Entry	4.3.2 .2 a)	
System Earthing		NER 300 A,20Ω Max	4.2.8 .2	
Cable Entry		Bottom Entry	4.3.1 .1.3	

Main Cable Detail		70 to 240mm^2 x 3core XLPE/PILC 300 to 500mm^2 Single Core Cable	4.3.1.9	
Main Cable Termination		PVC wedge cleat 70 to 240 mm^2 Cable. PVC wedge cleat 300 to 500 mm^2		
Circuit Earthing Facility		Yes		
Interlocks		Yes	4.2.8.1	
Surge Arrestors (suppressors)		Yes		
Remote Control Unit. Panel fitted with cannon standoff trip/close socket.		Open and Close	4.2.7	
Panel heater (220V)		YES		
VCB Chamber light (110VDC)		YES		
DIMENSIONS			4.3.1.7	
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes		
Purpose		OC / EF	4.8	
Ratio		600/1		
Burden		10VA		
Class		5P20		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Differential)		YES		
Purpose		FEEDER	4.8	
Burden		kPV = 300V		
Ratio		600/1		
Class		X/TPS/PX		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install test block PK2-4way		YES (OC/EF)		
Install Ct's (Metering)		YES		
Purpose		Metering	4.8	
Burden		600/300/200/1		
Ratio		10VA		
Class		0.5		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install test block PK2-4way		YES (Diff / Metering)		
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		
Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		

AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		YES	4.14.4	
Phase Selector Switch		YES		
GENERAL:				
Configuration of Switchgear				
Spare auxiliary Contacts required		"a"-2	4.14	
		:b"-2		
Marking/Labeling/Documentation		Yes (Blank)	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state. Auto Re-Close: 3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		Yes: The Relay must have these capabilities: **i Power Supply:** Universal – 110 to 240 Vac/VDC. **ii Secondary Input Current:**3 x AC 1A plus a 50mA Neutral Input. **iii Voltage Input:** VNOM (L-L) should have the following specifications: 20 to 440V for DELTA_Y for DELTA and WYE **iv Configurable labels:** Yes **v Programmable pushbuttons:** Minimum of four programmable pushbuttons, each with programmable LEDs **vi Front panel LEDs:** Status and Trip Target LEDs **vii Communication Ports:** Rear: 1 x 10/100 base-T plus 1 x 1 RS 232 port. Front: 1 x Serial Port **viii Communications Protocol:** Should have the following protocols: DNP3 level 2 minimum, standard plus IEC 61850, Modbus RTU, Modbus TCU, **ix Digital Optoisolated Inputs:** Minimum of 8. Universal – 110 Vac/VDC digital inputs	4.10	

		with an operating range of 88 to 137,5 VDC (External wetting); Inputs should be individually user-configured to operate. **x High Speed, High current Interruption (Outputs):** Minimum of 6A continuous current – Minimum of 8 Universal – with a rated operating voltage of 264 VDC and a rated voltage range of 19.2 to 275 VDC. Should have a mechanical durability with a minimum of 100 000 no load operations." **xi Arc Flash capability:** 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. **xii Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **xiii Protection elements:** Relay should have the following elements: Phase, neutral, residual, and negative-sequence overcurrent elements; Phase, neutral, residual, and negative-sequence time-overcurrent elements; Current-based over- and under frequency; Arc-flash detection and arc-flash overcurrent; Over-and under voltage; Power elements; Voltage-based over- and under frequency; Rate-of-change of frequency; Measured residual overcurrent		
High Speed Pilot wire protection- "Solkor R or RF" or compatible. Differential protection.		Pilot wire Protection Relay, 1A or 5A and must be compatible with Solkor R/RF Relay.	4.10	

Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's 110VDC	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.20 **(B) Incomer 110VDC panel: Tender must be for single and double busbars. (Upper bar / Lower bar and Front / back bar) Complete with busbars.**

SCHEDULE 12: SBV 3E INCOMER PANEL COMPATIBLE WITH ALL SWITCHGEAR PANELS (110VDC)		**PART C – METAL-CLAD SWITCHGEAR**		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
Panel Function		Feeder		
Insulation Medium		Vacuum		
System Voltage	kV	11	4.3.2.1.6	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	1250	4.1.1.1	
Busbar Normal Rated Current	Amp	2500	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.3	
Short Circuit Breaking Capacity	kA	20	4.1.1.4.2	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type	M.W.S	Auto spring charges	4.1.1.5	
Trip Coil 120VDC	V	YES	4.3.1.9	
Spring Release Coil 110VDC	V	YES	4.3.1.10	
Indication for Trip/Close 110VDC		YES	4.3.1.10	
Status Indication Lamps (open/close) VCB open; Green LED indication. VCB Close: Red LED indication VCB Earthed: White LED indication. VCB In Service Position Amber indication.	LED	YES	4.3.1.2	
Local Remote selector switch		YES		
Circuit Earthing Facilities		Bottom Entry	4.3.2.2 a)	
System Earthing		NER 300 A,20Ω Max	4.2.8.2	

Cable Entry		Bottom Entry	4.3.1.1.3	
Main Cable Detail	Provision for 9 x Cables, 3 x per phase	70 to 240mm^2 x 3core XLPE/PILC 300 to 500mm^2 Single Core Cable	4.3.1.9	
Main Cable Termination	Provision for 9 x Cables, 3 x per phase	PVC wedge cleat 70 to 240 mm^2 Cable. PVC wedge cleat 300 to 500 mm^2		
Circuit Earthing Facility		Yes		
Interlocks		Yes	4.2.8.1	
Surge Arrestors (suppressors)		Yes		
Remote Control Unit. Panel fitted with cannon standoff trip/close socket.		Open and Close	4.2.7	
Panel heater (220V)		YES		
VCB Chamber light (110VDC)		YES		
DIMENSIONS			4.3.1.7	
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes		
Purpose		OC / EF	4.8	
Ratio		600/1		
Burden		10VA		
Class		5P20		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Differential)		YES		
Purpose		FEEDER	4.8	
Burden		kPV = 300V		
Ratio		600/1		
Class		X/TPS/PX		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install test block PK2-4way		YES (OC/EF)		
Install Ct's (Metering)		YES		
Purpose		Metering	4.8	
Burden		600/300/200/1		
Ratio		10VA		
Class		0.5		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install test block PK2-4way		YES (Diff / Metering)		
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio		11000/110/63.5 Volts		
Burden and Accuracy		100 VA Class 0.5		
Voltage Factor		1.9		
Limbs		3 or 5		
Primary Connection		Cable side		

AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		YES	4.14.4	
Phase Selector Switch		YES		
GENERAL:				
Configuration of Switchgear				
Spare auxiliary Contacts required		"a"-2	4.14	
		:b"-2		
Marking/Labeling/Documentation		Yes (Blank)	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state. Auto Re-Close: 3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		Yes: The Relay must have these capabilities: **i Power Supply:** Universal – 110 to 240 Vac/VDC. **ii Secondary Input Current:**3 x AC 1A plus a 50mA Neutral Input. **iii Voltage Input:** VNOM (L-L) should have the following specifications: 20 to 440V for DELTA_Y for DELTA and WYE **iv Configurable labels:** Yes **v Programmable pushbuttons:** Minimum of four programmable pushbuttons, each with programmable LEDs **vi Front panel LEDs :** Status and Trip Target LEDs **vii Communication Ports:** **Rear:** 1 x 10/100 base-T plus 1 x 1 RS 232 port. **Front:** 1 x Serial Port **viii Communications Protocol:** Should have the following protocols: DNP3 level 2 minimum, standard plus IEC 61850, Modbus RTU, Modbus TCU, **ix Digital Optoisolated Inputs:** Minimum	4.10	

		of 8. Universal – 110 Vac/VDC digital inputs with an operating range of 88 to 137,5 VDC (External wetting); Inputs should be individually user-configured to operate. **x High Speed, High current Interruption (Outputs):** Minimum of 6A continuous current – Minimum of 8 Universal – with a rated operating voltage of 264 VDC and a rated voltage range of 19.2 to 275 VDC. Should have a mechanical durability with a minimum of 100 000 no load operations." **xi Arc Flash capability:** 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay **xii Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **xiii Protection elements:** Relay should have the following elements: Phase, neutral, residual, and negative-sequence overcurrent elements; Phase, neutral, residual, and negative-sequence time-overcurrent elements; Current-based over- and under frequency; Arc-flash detection and arc-flash overcurrent; Over-and under voltage; Power elements; Voltage-based over- and under frequency; Rate-of-change of frequency; Measured residual overcurrent.		

High Speed Pilot wire protection- "Solkor R or RF" or compatible. Differential protection.		NO	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's 110VDC	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.21 **(C) Bus Coupler 110VDC panel: Tender must be for single and double busbars. (Upper / Lower bar and Front / back bar) Complete with busbars and boxes.**

SCHEDULE 12: SBV 3E BUS COUPLER PANEL COMPATIBLE WITH ALL SWITCHGEAR PANELS (110VDC)		**PART C – METAL-CLAD SWITCHGEAR**		
DESCRIPTION OF PARTICULARS NOTE: PANEL MUST BE MARKED	**UNITS**	**SPECIFIED REQUIREMENT**	**SANS CLAUSE**	**PARTICILARS OFFERED AND GURANTEED**
Panel Function		Feeder		
Insulation Medium		Vacuum		
System Voltage	kV	11	4.3.2.1.6	
Rated Voltage	kV	12	4.1.1.1	
Circuit Normal Rated Current	Amp	2000	4.1.1.1	
Busbar Normal Rated Current	Amp	2500	4.1.1.3	
Fault Level Capacity	MVA	350	4.1.1.3	
Impulse Withstand Voltage	kV	95	4.1.1.3	
Short Circuit Breaking Capacity	kA	20	4.1.1.4.2	
Duration of Short Circuit	s	3	4.1.1.5	
Peak Withstand Current	kA	63	4.1.1.5	
Mechanism Type	M.W.S	Auto spring charges	4.1.1.5	
Trip Coil 120VDC	V	YES	4.3.1.9	
Spring Release Coil 110VDC	V	YES	4.3.1.10	
Indication for Trip/Close 110VDC		YES	4.3.1.10	
Status Indication Lamps (open/close) VCB open; Green LED indication. VCB Close: Red LED indication VCB Earthed: White LED indication. VCB In Service Position Amber indication.	LED	YES	4.3.1.2	
Local Remote selector switch		YES		
Circuit Earthing Facilities		Bottom Entry	4.3.2.2 a)	
System Earthing		NER 300 A,20Ω Max	4.2.8.2	
Cable Entry		Bottom Entry	4.3.1.1.3	

Main Cable Detail		70 to 240mm^2 x 3core XLPE/PILC 300 to 500mm^2 Single Core Cable	4.3.1.9	
Main Cable Termination		PVC wedge cleat 70 to 240 mm^2 Cable. PVC wedge cleat 300 to 500 mm^2		
Circuit Earthing Facility		Yes		
Interlocks		Yes	4.2.8.1	
Surge Arrestors (suppressors)		Yes		
Remote Control Unit. Panel fitted with cannon standoff trip/close socket.		Open and Close	4.2.7	
Panel heater (220V)		YES		
VCB Chamber light (110VDC)		YES		
DIMENSIONS			4.3.1.7	
Height	mm	Max 1800		
Depth	mm	Max 1500		
Width	mm	Max 600		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes		
Purpose		OC / EF	4.8	
Ratio		600/1		
Burden		10VA		
Class		5P20		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Differential)		YES		
Purpose		FEEDER	4.8	
Burden		kPV = 300V		
Ratio		600/1		
Class		X/TPS/PX		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install test block PK2-4way		YES (OC/EF)		
Install Ct's (Metering)		YES		
Purpose		Metering	4.8	
Burden		600/300/200/1		
Ratio		10VA		
Class		0.5		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install test block PK2-4way		YES (Diff / Metering)		
VOLTAGE TRANSFORMER				
Install VT		No	4.9	
Ratio		N/A		
Burden and Accuracy		N/A		

Voltage Factor		N/A		
Limbs		N/A		
Primary Connection		N/A		
AMMETER:				
Scale		No	4.14.4	
Interposing CT		N/A		
Maximum Demand Indicator		N/A		
VOLTMETER:				
Voltmeter		YES	4.14.4	
Phase Selector Switch		YES		
GENERAL:				
Configuration of Switchgear				
Spare auxiliary Contacts required		"a"-2	4.14	
		:b"-2		
Marking/Labeling/Documentation		Yes (Blank)	4.17	
Main Circuit Designation Label		Blank	4.17	
PROTECTION:				
Sensitive Earth Fault – Time delay range 0.01-25 sec – solid state. Auto Re-Close: 3Pole Multi Shot Auto-Reclose Relay – min. 4 Shot Programmable with counter-solid state		Yes: The Relay must have these capabilities: **i Power Supply:** Universal – 110 to 240 Vac/VDC. **ii Secondary Input Current:**3 x AC 1A plus a 50mA Neutral Input. **iii Voltage Input:** VNOM (L-L) should have the following specifications: 20 to 440V for DELTA_Y for DELTA and WYE **iv Configurable labels:** Yes **v Programmable pushbuttons**: Minimum of four programmable pushbuttons, each with programmable LEDs **vi Front panel LEDs:** Status and Trip Target LEDs **vii Communication Ports: Rear:** 1 x 10/100 base-T plus 1 x 1 RS 232 port.	4.10	

		Front: 1 x Serial Port viii Communications Protocol: Should have the following protocols: DNP3 level 2 minimum, standard plus IEC 61850, Modbus RTU, Modbus TCU, **ix Digital Optoisolated Inputs:** Minimum of 8. Universal – 110 Vac/VDC digital inputs with an operating range of 88 to 137,5 VDC (External wetting); Inputs should be individually user-configured to operate. **x High Speed, High current Interruption (Outputs):** Minimum of 6A continuous current – Minimum of 8 Universal – with a rated operating voltage of 264 VDC and a rated voltage range of 19.2 to 275 VDC. Should have a mechanical durability with a minimum of 100 000 no load operations." **xi Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay **xii Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control;		

		At no additional costs (free issue with the relay). **xiii Protection elements:** Relay should have the following elements: Phase, neutral, residual, and negative-sequence overcurrent elements; Phase, neutral, residual, and negative-sequence time-overcurrent elements; Current-based over- and under frequency; Arc-flash detection and arc-flash overcurrent; Over-and under voltage; Power elements; Voltage-based over- and under frequency; Rate-of-change of frequency; Measured residual overcurrent.		
High Speed Pilot wire protection-"Solkor R or RF" or compatible. Differential protection.		NO	4.10	
Arc Flash Sensors		Cable, Circuit Breaker and Busbar chamber	4.10	
D.C Circuit Protection		MCB's 110VDC	4.14.3	
Location of Fuses inside RC		Yes		
Location of Test Terminal Blocks RC Door		Yes	4.14.7	
Number of copies of Drawings supplied with Panel on delivery		2	7.3	
Number of copies of Routine Test Report Certificates on delivery		2	7.4	

6.4.22 **Description of the 12kV and 22kV Joint (J)-, Switch (S)-, Test (T) - AND Panel (P)-packs according, to SANS 1885: 2001 and latest amendments, for 400A, 800A and 2000A specifications.**

Detail breakdown of "P, J, T and S-Packs"			
DESCRIPTION	**QTY**	**Part No.**	**COMMENTS**
"P-pack" (A12.1)			
38w scotch fill putty	18		1 set per panel. Packed in one box and labeled "P-pack".
Electrical scotch no 23 tapes	9		
18w no 33 tapes	18		
250 ml tin panel touch-up paint	1		
All bolts to bolt panels together (sink coated)	Box		
Busbar end covers (Painted red)	2		
100mm x 10 mm anchor bolts and nuts	6		

"J-pack" (A12.2 B)			
6x25mm inter panel earth bar	1		1 set per panel. Packed in one box labeled "J-pack".
800 Amp insulated, tinted busbars	3		
800 Amp lh/half joint shroud	3		
800 Amp rh/half joint shroud	3		
M12 washers for busbars	12		
M12 x 55 high tension busbar bolts (sink coated)	6		
M12 nuts	6		
M12 spring washers	6		
Insulated-lock cable ties	6		

"J-pack" (A12.2 B)			
6x25mm inter panel earth bar	1		1 set per panel. Packed in one box labeled "J-pack".
400 Amp insulated, tinted busbars	3		
400 Amp lh/half joint shroud	3		
400 Amp rh/half joint shroud	3		
M12 washers for busbars	12		
M12 x 55 high tension busbar bolts (sink coated)	6		
M12 nuts	6		
M12 spring washers	6		
Insulated-lock cable ties	6		

"J-pack" (A12.2 C)			
6x25mm inter panel earth bar	1		1 set per panel. Packed in one box labeled "J-pack".
2000 Amp insulated, tinted busbars	3		
2000 Amp lh/half joint shroud	3		
2000 Amp rh/half joint shroud	3		
M12 washers for busbars	12		
M12 x 55 high tension busbar bolts (sink coated)	6		
M12 nuts	6		
M12 spring washers	6		
Insulated-lock cable ties	6		

"S-pack" (A12.3)			
			1 set as per order. Packed in one box labeled "S-pack".
Circuit breaker ramp plate	1		
Circuit breaker spring charge handle	1		
Circuit breaker racking handle	1		
Hand-held remote control (pendant control 15m extension lead)	1		

Wall mounted Steel lockable cabinet for all items in "S-pack"	1		
"T-pack" (A12.4)			
Tests spouts Circuit breaker wear gauge Trollies (if applicable) Set of special tools (if applicable)	1 1 1 1		1 set as per order. Packed in one box labeled "T-pack".

6.4.23 **Schedule Packs**

ITEM	DESCRIPTION	SPECIFIC REQUIREMENT	SANS CLAUSE	PARTICULARS OFFERED AND GUARANTEED
A12.1	Panel Packs as specify in description 5.4.12 above	As per SANS	4.15.1	
A12.2	Jointing Packs as specify in description 5.4.12 above	As per SANS	4.15.2	
A12.3	Switchboard Accessories Packs as specify in description 6.4.22 above	Yes – Wall mounted	4.15.3	
A12.4	Test Packs as specify in description 5.4.12 above	As per NRS	4.15	

Part B: Fixed pattern metal clad ring main unit and associated accessories according to the applicable standards, non-extendable (Metering Unit).

6.5.1 **A Ring Main Units12kV**

SCHEDULE B1; B2, B3: - **METAL ENCLOSED RING MAIN UNITS**				
DESCRIPTION OF PARTICULARS:	**UNITS**	**SPECIFIEID REQUIREMENTS**	**SANS 1874 CLUASES**	**PARTICULARS OFFERED AND GURANTEED (SCHEDULE B)**
Manufacturer				
Country of origin				
Catalogue/Type designation				
Total switchgear mass	kg	Total mass with kiosk		
Nominal voltage	kV	12		
Rated voltage	kV	12	4.1.1	
Circuit rated normal current	A	200 to 500Amp (LV fuse Units)	4.3.1.2	

Busbar rated normal current	A	630		
System earthing method	A	NER - 300 A maximum, 20Ω		
Fault breaking capacity	MVA	350		
Fault making capacity	kA	33,4		
Through fault rating for 3 seconds	kA	20		
Standard 1/50 microsecond impulse rating at sea level	kV	95		
Is an indoor or outdoor unit required?		Indoor/outdoor	4.2.1.5	
Is an extensible or non-extensible unit required?		Non- extensible	4.2.2.1	
Degree of protection of unit offered			4.2.3.2	
Specify the configuration	**B1.** Ring main unit with fused transformer t-off feeder – without metering, fitted inside metal clad outdoor kiosk. (Preferably SF6 gas) **B2**. Ring main unit with fused Medium Voltage connection feeder – with metering unit, fitted inside metal clad outdoor kiosk. The CT's must be fitted in the cable connection box, easily accessible when test or replaced. The CT's must be studded for secondary wiring and numbering. The Power transformer fuses on the secondary side must be easily accessible for testing. **B3.** Ring main unit with two fused t-off feeders- One with metering for medium voltage connection feeder and the other one without metering for a transformer, fitted inside metal clad outdoor kiosk. The CT's must be fitted in the cable connection box of the medium voltage connection, easily accessible when test or replaced. The CT's must be studded for secondary wiring and numbering. The Power transformer fuses on the secondary side must be easily accessible for testing or replacement.		4.2.4	
Integral cable earth facility with lock-out mechanism required		Yes	4.2.5.1	
Type of cable testing facility offered		1	4.2.5.2	
The insulation medium, or the interruption medium (or both) of switch disconnectors, if there is a preference		SF6 Gas and vacuum is preferred as insulation medium. Price on both.	4.3.2.1	
The insulating medium, or the interrupting medium (or both) of switch disconnectors offered		SF6 Gas and vacuum is preferred as insulation medium. Price on both.	4.3.2.2	
Maximum transformer load to be protected	kVA	1000	4.4.2.1	
Rated current of fuse link	A	35.5 to 63 (Max)	4.2.1.5	
Type of fuse link offered		Fuse – Striker pin type HRC HT	4.2.2.1	

Dimensions of fuse link offered			4.2.3.2	
Metering CT/PT unit to fit fused isolator		60-30/5 10 VA Class 0.5	4.4.3.2	
Metering Potential Transformer		11kV/110V Star/Star 100VA Class 0.5 Dry type with remote secondary terminals. Low voltage PT fuses must be outside.	4.4.3.3	
Type of protection required on transformer feeder		Fuse– striker pin type HRC HT	4.5.2.1	
What is the insulation medium of the busbar chamber?			4.6.5	
Is a cable boxes required?		Yes	4.7.1.1	
Compound-filled or air-filled cable box required?		Air filled	4.7.1.2	
Cable type		PILC or XLPE	4.7.1.3	
Maximum size(s)		35mm to 185 mm		
Dimensions of cable trench: aa) depth bb) width	 mm mm	 400 600	4.7.1.4	
Termination type		Heat Shrink	4.7.2.2	
Are only type C bushings required?		Yes	4.7.4.2	
Are the accessories for cable terminations to be supplied		No	4.7.5.1	
Are cable glands to be insulated and fitted with an earth strap?		No	4.7.5.2	
Required method of clamping the cables		PVC wedge cleats	4.7.5.4	
Is a pressure-checking device required?		Yes, If it is SF6 gas and Oil level glass if it is oil filled.	4.9.3	
Quantity of SF_6	l	Indicate the unit gas pressure.	4.9.5	
Recommended types of tools to install and maintain unit		All special tools must be supplied on order if specified. SF6 gauges and fitting must be supplied with switchgear.	4.14.2	
Method used to attach rating plates		Screwed on	4.15.1	
Method used to attach labels		Screwed on	4.16.1.1	
Is engraving of main circuit designation labels required?		No	4.16.2.5	
If yes, state details		Leave it blank		
Colour of unit		Light - grey	4.17.4	
Is the ring main unit required for a corrosive or a non-corrosive environment?		Non-corrosive	4.17.7	
Details of internal arc tests		Supply test certificates	5.1.3	
Documentation required		Supply all factory tests	5.2(k)	

Number of sets of manuals required, if more than one set		One per each unit delivered.	6.1	
All mounting material necessary to mount the unit is to be supplied with every unit				

6.5.2 **B Ring Main Units 22kV**

SCHEDULE B1; B2, B3: - **METAL ENCLOSED RING MAIN UNITS**				
DESCRIPTION OF PARTICULARS:	**UNITS**	**SPECIFIEID REQUIREMENTS**	**SANS 1874 CLUASES**	**PARTICULARS OFFERED AND GURANTEED (SCHEDULE B)**
Manufacturer				
Country of origin				
Catalogue/Type designation				
Total switchgear mass	kg	Total mass with kiosk		
Nominal voltage	kV	22		
Rated voltage	kV	24	4.1.1	
Circuit rated normal current	A	200 to 500Amp (LV fuse Units)	4.3.1.2	
Busbar rated normal current	A	630		
System earthing method	A	NER - 300 A maximum, 20Ω		
Fault breaking capacity	MVA	350		
Fault making capacity	kA	33,4		
Through fault rating for 3 seconds	kA	20		
Standard 1/50 microsecond impulse rating at sea level	kV	95		
Is an indoor or outdoor unit required?		Indoor/outdoor	4.2.1.5	
Is an extensible or non-extensible unit required?		Non- extensible	4.2.2.1	
Degree of protection of unit offered			4.2.3.2	
Specify the configuration	**B1.** Ring main unit with fused transformer t-off feeder – without metering, fitted inside metal clad outdoor kiosk. (Preferably SF6 gas) **B2**. Ring main unit with fused Medium Voltage connection feeder – with metering unit, fitted inside metal clad outdoor kiosk. The CT's must be fitted in the cable connection box, easily accessible when test or replaced. The CT's must be studded for secondary wiring and numbering. The Power transformer fuses on the secondary side must be easily accessible for testing. **B3.** Ring main unit with two fused t-off feeders- One with metering for medium voltage connection feeder and the other one without metering for a transformer,		4.2.4	

		fitted inside metal clad outdoor kiosk. The CT's must be fitted in the cable connection box of the medium voltage connection, easily accessible when test or replaced. The CT's must be studded for secondary wiring and numbering. The Power transformer fuses on the secondary side must be easily accessible for testing or replacement.		
Integral cable earth facility with lock-out mechanism required		Yes	4.2.5.1	
Type of cable testing facility offered		1	4.2.5.2	
The insulation medium, or the interruption medium (or both) of switch disconnectors, if there is a preference		SF6 Gas and Vacuum is preferred as insulation medium. Price on both.	4.3.2.1	
The insulating medium, or the interrupting medium (or both) of switch disconnectors offered		SF6 Gas and Vacuum is preferred as insulation medium. Price on both.	4.3.2.2	
Maximum transformer load to be protected	kVA	1000	4.4.2.1	
Rated current of fuse link	A	35.5 to 63 (Max)	4.2.1.5	
Type of fuse link offered		Fuse – Striker pin type HRC HT	4.2.2.1	
Dimensions of fuse link offered			4.2.3.2	
Metering CT/PT unit to fit fused isolator		60-30/5 10 VA Class 0.5	4.4.3.2	
Metering Potential Transformer		22kV/110V Star/Star 100VA Class 0.5 Dry type with remote secondary terminals. Low voltage PT fuses must be outside.	4.4.3.3	
Type of protection required on transformer feeder		Fuse– striker pin type HRC HT	4.5.2.1	
What is the insulation medium of the busbar chamber?			4.6.5	
Is a cable boxes required?		Yes	4.7.1.1	
Compound-filled or air-filled cable box required?		Air filled	4.7.1.2	
Cable type		PILC or XLPE	4.7.1.3	
Maximum size(s)		35mm to 185 mm		
Dimensions of cable trench: aa) depth bb) width	 mm mm	 400 600	4.7.1.4	
Termination type		Heat Shrink	4.7.2.2	
Are only type C bushings required?		Yes	4.7.4.2	
Are the accessories for cable terminations to be supplied		No	4.7.5.1	
Are cable glands to be insulated and fitted with an earth strap?		No	4.7.5.2	

Required method of clamping the cables		PVC wedge cleats	4.7.5.4	
Is a pressure-checking device required?		Yes, If it is SF6 gas and Oil level glass if it is oil filled.	4.9.3	
Quantity of SF_6	l	Indicate the unit gas pressure.	4.9.5	
Recommended types of tools to install and maintain unit		All special tools must be supplied on order if specified. SF6 gauges and fitting must be supplied with switchgear.	4.14.2	
Method used to attach rating plates		Screwed on	4.15.1	
Method used to attach labels		Screwed on	4.16.1.1	
Is engraving of main circuit designation labels required?		No	4.16.2.5	
If yes, state details		Leave it blank		
Colour of unit		Light - grey	4.17.4	
Is the ring main unit required for a corrosive or a non-corrosive environment?		Non-corrosive	4.17.7	
Details of internal arc tests		Supply test certificates	5.1.3	
Documentation required		Supply all factory tests	5.2(k)	
Number of sets of manuals required, if more than one set		One per each unit delivered.	6.1	
All mounting material necessary to mount the unit is to be supplied with every unit				

6.5.3 **A Supply and/or repairs of NULEC N-series ACR N12 and E-series ACR Pole mounted Automatic Circuit Reclosing Breakers (12kV).**

The N-Series three phase pole/structure mounted auto recloser circuit breaker, must be Sf6 gas filled with vacuum arc interrupters. Supply with integrated CT's and Vt's and with remote control complete with all the brackets and small cabling. Complete with pole top and communication cubicle. **The replacement of the existing Switchgear and Control Panels, with equivalent and compatible equipment, is required should the existing equipment be discontinued or obsolete.**

1.	Rated Voltage	15 kV
2.	Rated Short circuit current	16kA
3.	Rated Load Current	800Amp
4.	Stainless Steel Tank	316 grades, Sf6 gas filled
5.	Arc Interruption	Vacuum
6.	Battery back up	24 VDC (2X12VDC, 7Ah)
7.	Battery charger	24VDC
8.	Sf6 gas refill kit Nulec	Connecting fittings, pipes and gauges. Complete set.
9.	SCADA	Supporting DNP3 Protocol – Level 2

6.5.4 B Supply and/or repairs of NULEC N-series ACR N12 and E-series ACR Pole mounted Automatic Circuit Reclosing Breakers (22kV).

The N-Series three phase pole/structure mounted auto recloser circuit breaker, must be Sf6 gas filled with vacuum arc interrupters. Supply with integrated CT's and Vt's and with remote control complete with all the brackets and small cabling. Complete with pole top and communication cubicle. **The replacement of the existing Switchgear and Control Panels, with equivalent and compatible equipment, is required should the existing equipment be discontinued or obsolete.**

10.	Rated Voltage	24 kV
11.	Rated Short circuit current	16kA
12.	Rated Load Current	800Amp
13.	Stainless Steel Tank	316 grades, Sf6 gas filled
14.	Arc Interruption	Vacuum
15.	Battery back up	24 VDC (2X12VDC, 7Ah)
16.	Battery charger	24VDC
17.	Sf6 gas refill kit Nulec	Connecting fittings, pipes and gauges. Complete set.
18.	SCADA	Supporting DNP3 Protocol – Level 2

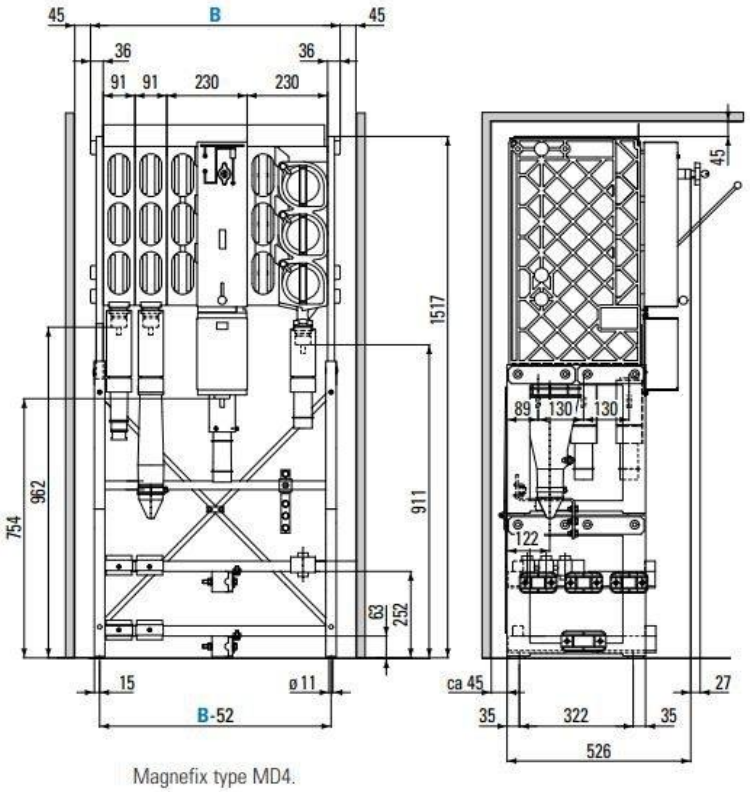
6.5.5 A Magnefix / Interswitch Type MF disconnector switch 12kV

The Magnefix MF disconnector switches must be supplied complete with brackets and fuses to fit in a miniature substation HT kiosk.

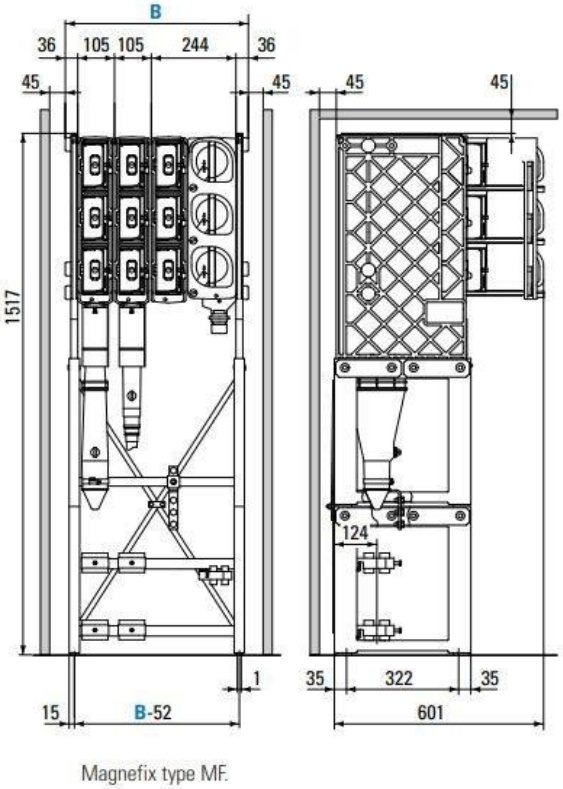
MAGNEFIX TYPE MF		
1.	Cable unit	105 mm
2.	Busbar connection unit	105 mm
3.	Cable unit for top connection	210 mm
4.	Busbar Sectionalizer	210 mm
5.	Fuse protection tee-off	244 mm (30.5 Amp fuses)
6.	Circuit-breaker protection tee-off	-
7.	Total width calculations	B = C x 105 + T x 244 + 72
(C= number of cable units, T = number of protected tee-offs)		

	Magnefix type MF					
1.	Normal current	A	450	450	450	450
2.	Mainly active load breaking current	A	450	450	450	450
3.	Short-circuit making current peak value	kA	50	50	50	50
4.	Short time withstand current	kV - 1s	20	20	20	20

5.	Earth fault breaking current	A	240	240	240	240
6.	Cable charging breaking current	A	25	25	25	25
7.	Normal current	A	450	450	450	450



Magnefix type MD4.



Magnefix type MF.

Picture on the right Magnefix MF

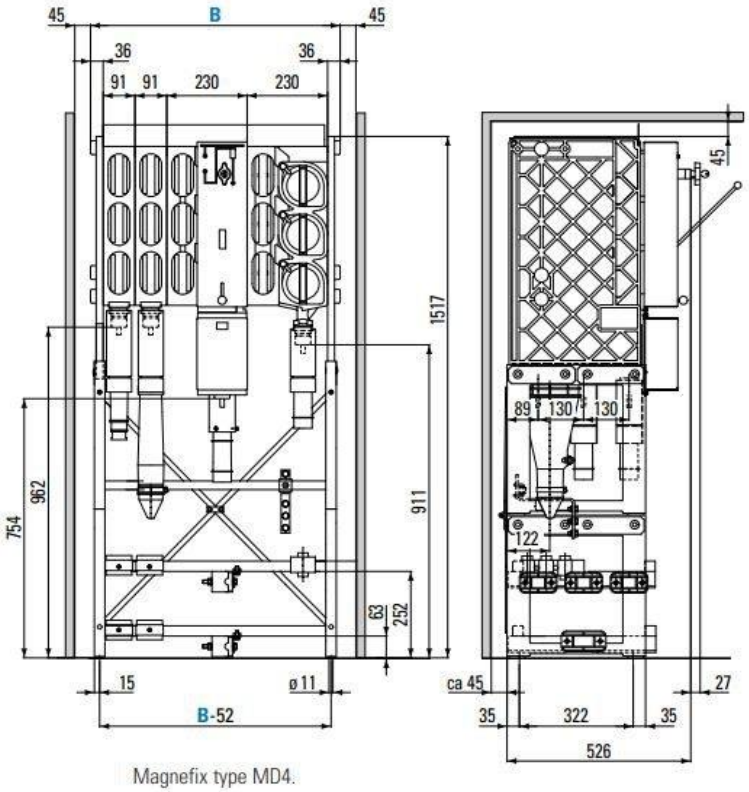
6.5.6 B Magnefix / Interswitch Type MF disconnector switch 22kV

The Magnefix MF disconnector switches must be supplied complete with brackets and fuses to fit in a miniature substation HT kiosk.

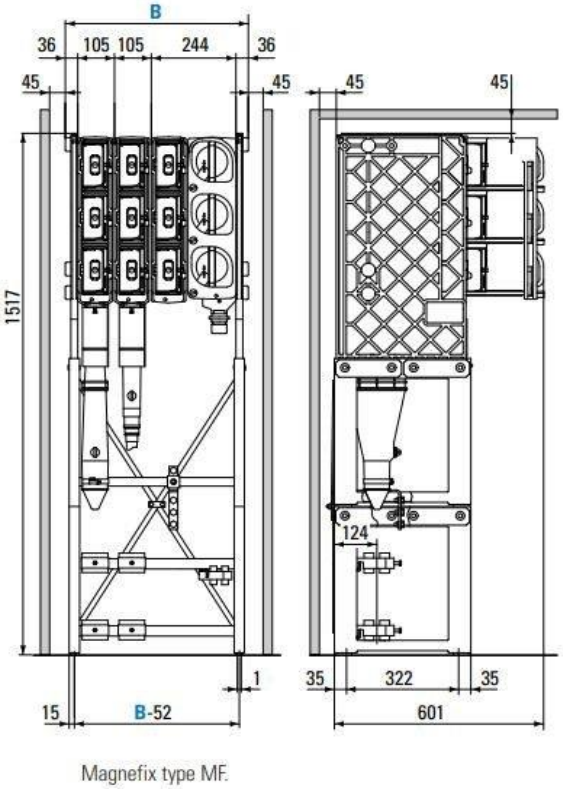
MAGNEFIX TYPE MF		
8.	Cable unit	105 mm
9.	Busbar connection unit	105 mm
10.	Cable unit for top connection	210 mm
11.	Busbar Sectionalizer	210 mm
12.	Fuse protection tee-off	244 mm (30.5 Amp fuses)
13.	Circuit-breaker protection tee-off	-
14.	Total width calculations	B = C x 105 + T x 244 + 72
(C= number of cable units, T = number of protected tee-offs)		

	Magnefix type MF					
8.	Normal current	A	450	450	450	450
9.	Mainly active load breaking current	A	450	450	450	450
10.	Short-circuit making current peak value	kA	50	50	50	50
11.	Short time withstand current	kV - 1s	20	20	20	20

12.	Earth fault breaking current	A	240	240	240	240
13.	Cable charging breaking current	A	25	25	25	25
14.	Normal current	A	450	450	450	450



Magnefix type MD4.



Magnefix type MF.

Picture on the right Magnefix MF 22kV

Part C: Vacuum circuit breakers to replace AG16 oil type circuit breakers and the repairs of 12kV switchgear on Adhoc quotation bases. **(Retrofit)**The service provider will be responsible for strip and quote quotations on repairs of 11kV switchgear and related equipment and the transport from Bloemfontein to their premises and back.

SCHEDULE C1: VACUUM CIRCUIT BREAKER REPAIR AND RETROFIT (NOTE: No alternations to panel will be allowed, the new vacuum breaker must fit in existing panel)

6.5.7 **A. Existing Switch Gear GEC, AG16, to vacuum.**

DESCRIPTION OF PARTICULARS	UNITS	SPECIFIED REQUIREMENT	SANS 1874 CLAUSE	PARTICULARS OFFERED AND GUARANTEED SCHEDULE C
Manufacturer				

Country of origin				
Catalogue/Type designation				
Total switchgear mass	kg			
Nominal voltage	kV	11		
Rated voltage	kV	12	4.1.1	
Circuit rated normal current	A	800	4.3.1.2	
Busbar rated normal current	A	800		
Fault breaking capacity	MVA	350		
Fault making capacity	kA	33,4		
Through fault rating for 3 seconds	kA	20 kA		
Standard 1/50 microsecond impulse rating at sea level	kV	95		
Circuit Breaker to fit Panel		GEC type AG16 (without any alternations to the existing panel)		

B. Existing Switchgear Reyrolle LMS, LMR, LMT to VD4-LMT ABB-Reyrolle CB. (Vacuum) or equivalent manufacturing.

DESCRIPTION OF PARTICULARS	UNITS	SPECIFIED REQUIREMENT	SANS 1874 CLAUSE	PARTICULARS OFFERED AND GUARANTEED SCHEDULE C
Manufacturer				
Country of origin				
Catalogue/Type designation				
Total switchgear mass	kg			
Nominal voltage	kV	11		
Rated voltage	kV	12	4.1.1	
Circuit rated normal current	A	1250	4.3.1.2	
Busbar rated normal current	A	1250		
Fault breaking capacity	MVA	350		
Fault making capacity	kA	31.5		
Through fault rating for 3 seconds	kA	20 kA		
Standard 1/50 microsecond impulse rating at sea level	kV	95		
Circuit Breaker to fit Panel		Circuit Breaker to fit in existing panel		

		without alternations to panel.		
Replacement of Reyrolle Panel, Current transformers and Voltage Transformers.				
Reyrolle Panel complete with busbars and shutters.	A	1250		
VOLTAGE TRANSFORMER				
Install VT		Yes	4.9	
Ratio		11000/110/63.5 Volts		
Burden and Accuracy		100 VA Class 0.5		
Voltage Factor		1.9		
CURRENT TRANSFORMERS:		**Studded 6mm Brass S connections.**		
Install CT's		Yes		
Purpose		OC / EF	4.8	
Ratio		600/1		
Burden		10VA		
Class		5P20		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install Ct's (Differential)		Yes		
Purpose		Diff	4.8	
Burden				
Ratio		600/1		
Class		X or PX		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install test block PK2-4way		YES (OC/EF)		
Install Ct's (Metering)		YES		
Purpose		Metering	4.8	
Burden		600/300/200/1		
Ratio		10VA		
Class		0.5		
Quantity		3		
Insulation Level		IL 12/28/95 KV		
Install test block PK2-4way		YES (Diff / Metering)		
Required method of clamping the cables		PVC wedge cleats	4.7.5.4	

6.5.8 **Existing Switch Gear. The following Existing Circuit breakers must be repaired: (Strip &Quote)**

Make	**Type**
Reyrolle LMS	LMS/X1/QMRO
Reyrolle LMR	LMR/X2/QMRO

Reyrolle LMT	LMT2/X31/QM
Actom	SBV4E/2000/25/SI
Johnson & Phillips	PDB/A/2Z and TSB16
GEC	PDB/A/400
HAWKER SIDDELEY	VIL-6 and R4/1 and V4/1 and D6XD
FIRST ELECTRIC	JB621
BRUSH	W4/11 and S4
LONG & CRAWFORD	AVS2
ALSTOM	AGVB-800/20/S and SBV4/800/20-S1
SACE BERGAMO	RM1235
BRITISH THOMPSON	BTH/JB621 and LC/B3
BRUSH	W4/11
NULEC	N24S-ACR-SF6-24-12-150
JG STATTER	VTGR150
YORKSHIRE	YSF6
RMU Actom	K3 oil and gas
RMU Magenefix	Dry Type Air
RMU GEC	T3 oil
RMU ABB	Gas
RMU Schneider	Gas
RMU Tiger	oil
Nulec Switchgear outdoor pole mounted.	Sf6 Gas

6.5.9 **Supply of switching- and spring charges handles on the following types of existing switchgear.**

Make	**Type**
Reyrolle LMS	LMS/X1/QMRO
Reyrolle LMR	LMR/X2/QMRO
Reyrolle LMT	LMT2/X31/QM
Actom	SBV4E/2000/25/SI
Johnson & Phillips	PDB/A/2Z and TSB16
GEC	PDB/A/400
HAWKER SIDDELEY	VIL-6 and R4/1 and V4/1 and D6XD
FIRST ELECTRIC	JB621
BRUSH	W4/11 and S4
LONG & CRAWFORD	AVS2
ALSTOM	AGVB-800/20/S and SBV4/800/20-S1
SACE BERGAMO	RM1235
BRITISH THOMPSON	BTH/JB621 and LC/B3
BRUSH	W4/11
NULEC	N24S-ACR-SF6-24-12-150
JG STATTER	VTGR150
YORKSHIRE	YSF6
RMU Actom	K3 oil and gas
RMU Magenefix	Dry Type Air

RMU GEC	T3 oil
RMU ABB	Gas
RMU Schneider	Gas
RMU Tiger	oil
Nulec switchgear outdoor pole mounted.	Sf6 Gas
Supply a lockable steel cabinet to accommodate all the above handles.	Steel wall mounted cabinet.

7. HEALTH AND SAFETY REQUIREMENTS

7.1 The equipment must be plastic wrapped and secure when transport.
7.2 All the Items must be properly labeled with sticker, after wrapping, to identify the offloading without unwrapping the plastic rapping.
7.3 The offloading of equipment on CENTLEC premises must be done safely.
7.4 All chemical data sheets must be delivered with equipment.
7.5 Maintenance manuals must be delivered with equipment.

8. EVALUATION CRITERIA

All proposals submitted will be evaluated in accordance with the criteria set out in the policy of Supply Chain Management of the Entity.
The most suitable candidate will then be selected. Please take note that CENTLEC is not bound to select any of the bidders' submitting proposals.
Furthermore, technical competence is the principal selection criteria, CENTLEC will evaluate the technical criteria first, and will only look at the price and specified goals if it is satisfied with the technical evaluation. As a result of this, CENTLEC does not bind itself in any way to select the bidder offering the lowest price.

8.1 The relative evaluation criteria are as follows:

No.	Criteria	Description	Points
8.1.1	Track record and experience	Submit reference letter(s), signed off by an authorized official to confirm the successful completion of manufacturing, supplying, and delivering of similar equipment to a local authority. Two (2) letters = **10 points** Three (3) or more letters = **20 points**.	20

No.	Criteria	Description	Points
8.1.2	Capability	The bidder(s) must provide proof of their ability to manufacture this equipment by submit prove of the following: (Submit contracts of agreements, on signed letter head, if outsourced, for the duration of contract.) Manufacturer Licensed facility = **10 Points** Testing facilities (submit a valid accreditation certificate) = **10 Points** Field services for installation (Letter of commitment) = **10 Points**	30
8.1.3	Technical schedules	Did the Manufacturer complete all the Schedules and submit it? **Spare list must be completed = 30 Points**	30
8.1.4	Guarantee and Warranty	Submit Ten Year (10) warranty and guarantee that is signed by the manufacturer of the relays = **10 points**	10
8.1.5	Local (Mangaung) operational capability and economic investment	Does the bidder have a local office with operational capability? (a) Existing and established local office = **10 points** (b) If not, but within RSA = **5 points**	10
		TOTAL	**100**

A bidder who gets a minimum of 85 points and above will qualify to the next stage. Individual tenders would have to be evaluated according to the preferential point system.

The bidder must score minimum points as follows:
Item 1 – 10 points
Item 2 – 30 points
Item 3 – 30 points
Item 4 – 10 points
Item 5 – 5 points in the Evaluation Criteria.

8.2 PRICE AND REFERENTIAL POINTS SCORING – STAGE 2 (Price and Specified Goals)

All Bidders that have passed the technical evaluation threshold of 85 points would also be scored based the 80/20 principle where 80 Points is for the Price and 20 points for Specified Goals as per the detail given below.

8.3 Points awarded for price.

A maximum of 80 Points is allocated for price on the following basis:

Where $Ps = 80[1 - \frac{\text{Pt} - \text{P min}}{\text{P min}}]$

Ps = Points Scored for comparative price of bid under consideration
Pt = Comparative Price of bid under consideration
P min = Comparative Price of lowest acceptable bid

8.4 Points awarded for Specific Goals Requirement

In terms of Regulation 3.(1) An organ of state must, in the tender documents, stipulate— (a) the applicable preference point system as envisaged in regulations 4, 5, 6 or 7; (b) the specific goal in the invitation to submit the tender for which a point may be awarded, and the number of points that will be awarded to each goal, and proof of the claim for such goals in accordance with the table below;

Table 3: Specified Goals for Preferential Point System

Specified Goals	**Points Allocation**
50% Black owned	6
50% Women owned	2
50% Youth owned <35 years	2
Total Points	**10**

9. PRICING SCHEDULES

9.1 Quotation Price

9.1.1 The bid price(s) shall be SEIFSA based priced.

9.1.2 The bid price(s) shall be subject to a negotiated increase, if unavoidable, should the contract be extended for one or more further periods, each period not exceeding 12 months.

9.2 PRICE SCHEDULE FOR SPARES, Current transformers on special order. (Ad-hoc purchase) Prices must exclude VAT and include delivery to our CENTLEC stores.

Item	Description	Unit of meas-ure-ment	Manufacturer	Price in (R)	Delivery Time
9.2.1	100-50/5, 10 VA, Class 0.5 IL12/28/75 kV	**Each**			
9.2.2	100-50/10VA, 10P10 IL12/28/75 kV	**Each**			
9.2.3	Combined CT, 100-50/5, 10 VA Class 0.5, IL12/28/75 kV 100-50/5, 10VA, 10P10 IL12/28/75 kV	**Each**			
9.2.4	Combined CT 100-50/5, 10 VA Class 0.5, IL12/28/75 kV 600/1, 10VA, 10P10 IL12/28/75 kV	**Each**			
9.2.5	300-200-100/5, 10VA, Class 0.5 IL12/28/75 kV 600/1, 10VA, 10P10	**Each**			

Item	Description	Unit of meas-ure-ment	Manufacturer	Price in (R)	Delivery Time
	IL12/28/75 kV				
9.2.6	60/30/5, 10VA, 10P10, Ring type IL12/28/75 kV	**Each**			
9.2.7	600/5, 10VA, 10P10, Ring Type IL12/28/75 kV	**Each**			
9.2.8	60-30/5, 10 VA, Class 0.5, IL12/28/75 kV	**Each**			
9.2.9	100-50/5, 10 VA, Class 0.5, IL12/28/75 kV	**Each**			
9.2.10	200/100/60/1, 10VA, 10P10, Ring type	**Each**			
9.2.11	100/60/1, 10VA, 10P10, Ring type	**Each**			

9.3 NOTE: PRICES OF SPARES, for existing infrastructure, on the SBV3, SBV4, GEC, J&P and English Electrical Switch gear. Please include a circuit breaker list for spares. Prices must exclude VAT and include delivery to our CENTLEC stores.

Item	Description	Unit of Meas-ure-ment	Manufacturer	Unit Price in (R)	Delivery Time
9.3.1	32 Volt trip coil 32 Volt Closing coil	Each Each			
9.3.2	110 Volt trip coil	Each			
9.3.3	110 Volt Closing coil	Each			
9.3.4	110 Volt DC Spring charges motor	Each			
9.3.5	Circuit Breaker Contacts 400 Amp	Set of Three			

Item	Description	Unit of Meas-ure-ment	Manufacturer	Unit Price in (R)	Delivery Time
9.3.6	Circuit Breaker Contacts 800 Amp	Set of Three			
9.3.7	Circuit Breaker contacts 1600 Amp	Set of Three			
9.3.8	Circuit Breaker contacts 2000 Amp	Set of Three			
9.3.9	Vacuum Bottle replacement per set 400 Amp	Set of Three			
9.3.10	Vacuum Bottle replacement per set 1600 Amp	Set of Three			
9.3.11	Vacuum Bottle replacement per set 2000 Amp	Set of Three			
9.3.12	SF6 gas gauges for refilling of Sf6 gas	Set of Three			
9.3.13	Auxiliary contacts rotor switch for 110 Volt breaker	Each			
9.3.14	Auxiliary contacts rotor switch for 32 Volt breaker	Each			
9.3.15	Set of limit switches per circuit breaker	Per/set			
9.3.16	Touch-up paint 1 litre tin for panels	500ml			
9.3.17	400Amp Copper Busbars silver plated per/set of 3 with all Bolts & nuts	Set of Three			
9.3.18	Set of Three (3) 400 Amp Cable side spouts (Mono blocks)	Set of Three			
9.3.19	Set of Three (3) 400amp Busbar side spouts (Mono blocks)	Set of Three			
9.3.20	Set of Three (3) 800 Amp Cable side spouts (Mono blocks)	Set of Three			
9.3.21	Set of Three (3) 800amp Busbar side spouts (Mono blocks)	Set of Three			

Item	Description	Unit of Meas-ure-ment	Manufacturer	Unit Price in (R)	Delivery Time
9.3.22	Set of Three (3) 2000amp Busbar side spouts (Mono blocks)	Set of Three			
9.3.23	Set of Three (3) 2000 Amp Cable side spouts (Mono blocks)	Set of Three			
9.3.24	LED type lamp indicator Red, Yellow, Clear and green.	Set of Three			
9.3.25	12 kV Surge arresters x Three (3)	Set of Three			
9.3.26	Voltage Transformer, 11000/110 V, 100VA, 3 limb, Voltage factor 1.9, accuracy class 0.5. Complete with base.	Each			
9.3.27	Set of Three (3) Voltage transformer, Cu busbar raisers on the cable side.	Set of Three			
9.3.28	Set of Three (3) Voltage transformer, Cu busbar raisers on the busbar side.	Set of Three			
9.3.29	Current transformers 600/1,5P20, 10VA, IL 12/28/75 kV.	Each			
9.3.30	Current transformers 600/1, class X, IL 12/28/75 kV.	Each			
9.3.31	Current transformers 300/200/100/5, class 0.5, IL 12/28/75 kV.	Each			
9.3.32	Current transformers 60/30/5, class 0.5, IL 12/28/75 kV.	Each			
9.3.33	Dual Current transformers 600/1,10P10, 10VA, IL 12/28/75 kV. Current transformers 300/200/100/5, class 0.5, IL 12/28/75 kV.	Each			

Item	Description	Unit of Meas-ure-ment	Manufacturer	Unit Price in (R)	Delivery Time
9.3.34	Dual Current transformers 600/1,10P10, 10VA, IL 12/28/75 kV. Current transformers 60/30/5, class 0.5, IL 12/28/75 kV.	Each			
9.3.35	Plug sock for pendant control on panels, price per each.	Each			
9.3.36	All weather door for ring main K-3 type unit three cable entries.	Each			
9.3.37	Safety side wall for panels (Fire wall)	Each			
9.3.38	Hand-held remote control	Each			
9.3.39	J-packs for SBV3 2000Amp	Each			
9.3.40	J-packs for SBV3-E 2000Amp	Each			
9.3.41	J-packs for AG16 GEC Panel 800Amp	Each			
9.3.42	Nulec Battery charger 24VDC	Each			
9.3.43	Sf6 gas refill kit Nulec. Connecting fittings, pipes and gauges. Complete set.	Each			
9.3.44	GEC AG16 tank rubber packings	Each			
9.3.45	GEC AG16 inside tank insulation	Each			
9.3.46	230V AC panel heaters	Each			
9.3.47	Spring charges motors SBV4 & SBV3E	Each			
9.3.48	Spring charges motors LMR,LMT& LMS	Each			
9.3.49	110 VDC Trip coils for SBV 3	Each			
9.3.50	32 VDC trip coils for SBV4	Each			
9.3.51	32VDC Trip Coils for LMR, LMT & LMS	Each			

9.4 PRICE SCHEDULE FOR SPARES, for existing infrastructure, 30VDC RELAYS: (Ad-hoc purchase) Prices must exclude VAT and include delivery to our CENTLEC stores.

Item	Description	Unit of measurement	Manufacturer	Price in (R)	Delivery Time
9.4.1	**Overcurrent, Earth Fault and Sensitive Earth Fault Numerical Relay. Compliant to the Technical Specifications below:** **i.** **Power Supply:** 24 to 48VDC **ii.** **Secondary Input Current:** 3 x AC 1A plus a 50mA Neutral Input. **iii.** **Voltage Input:** VNOM (L-L) should have the following specifications: 20 to 440V for DELTA_Y for DELTA and WYE **iv.** **Configurable labels:** Yes **v.** **Programmable pushbuttons:** Minimum of four programmable push button, each with programable LEDs **vi.** **Communication Ports:** **vii.** **Rear:** 1 x 10/100 Base-T plus 1 x 1 RS 232 port. **viii.** **Front:** 1 x Serial Port **ix.** **Communications Protocol:** DNP3 level 2 minimum. **x.** **Digital Optoisolated Inputs:** Minimum of 8. Universal – 24VDC (External wetting); Inputs should be individually user-configured to operate. **xi.** **High Speed, High current Interruption (Outputs):** Minimum of 6A continuous current – Minimum of 8 Universal – 19.2 to 60 VDC for the 24 to 48 power supply.	Each			

	xii. Arc Flash capability: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. **xiii. Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **xiv. Relay dimensions:** Must be able to fit onto the control panel portion of the switchgear.				
9.4.2	50mA neutral SEF Element as a replaceable card or component. 30VDC. (Only the card or component alone)	Each			
9.4.3	1Amp OC/EF Element as a replaceable card or component. 30VDC. (Only the card or component alone)	Each			
9.4.4	**Pilot Wire Current Differential Protection** **i.** High transient stability **ii.** High speed operation **iii.** Low phase and earth fault settings **iv.** Little or no variation of settings with pilot length **v.** In zone bleed off up to 20% of rated load **vi.** 15kV pilot isolation option **vii.** Be connected as either Solkor-Rf or Solkor-R **viii. Rated Frequency: 50Hz/60Hz** **ix. Operating Frequency range:**47Hz to 52Hz **x. Max. Loop resistance:** **For R Mode:** 1000 ohm **For Rf Mode:** 2000 ohm **xi.** Peak Voltage applied to pilots under fault conditions: **For R Mode:** 300v **For RF Mode:** 450v **xii.** Maximum current carried by pilots under fault conditions:	Each			

	For R Mode: 200mA **For Rf Mode:** 250mA **NB! It is critical that it be noted that the existing Pilot Wire Protection relays are the Solkor R or RF make. The relays on Offer must be compatible with them.**				
9.4.5	**Overcurrent, Earth Fault and Sensitive Earth Fault Numerical Relay. Compliant to the Technical Specifications below:** **i.** **Power Supply:** 24–48 VDC nominal **ii.** **Secondary Input Current:** 1 Amp Phase, 1 Amp Neutral; 5Amp Phase, 5Amp Neutral; 1Amp Phase, 50mA Neutral (nondirectional Sensitive Earth fault [SEF]). **iii.** **Voltage Input:** Nominal range: **iv.** Line-to-Neutral: 67-120 Vrms **v.** Line-to-Line: 115-120 Vrms **vi.** **Configurable labels:** Yes **vii.** **Pushbuttons:** Minimum of eight operator control push buttons. **viii.** **Front panel LEDs:** Status and Trip Target LEDs. **ix.** **Communication Ports:** **x.** **Rear:** 1 x 10/100 Base-T plus 1 x 1 RS 232 port. **xi.** **Front:** 1 x Serial Port; EIA-485 **xii.** **Firmware:** Standard **xiii.** **Communications Protocol:** Should have the following protocols: DNP 3.00 Level 2 Slave. **xiv.** **Digital Optoisolated Inputs:** Minimum of 10. VDC control inputs range of 12.8–30.0 Vac for Vac control inputs; Inputs should be individually user-configured to operate. **xv.** **High Speed, High current Interruption (Outputs):** Minimum of 15 Universal outputs with the following criteria: Make: 30 A; Carry: 6 A continuous carry; MOV Protection: 270 Vac/360 VDC; 40 J. **xvi.** **Arc Flash capability**: No	Each			

	xvii. **Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **xviii.** **Protection elements:** Phase Fault Overcurrent Protection; Adaptive Phase Overcurrent Elements; Ground Fault Overcurrent Protection; Directional Ground Protection; Under- and Overvoltage Elements; Under- and Over Frequency Protection; Rate-of-Change-of-Frequency Protection; Harmonic Blocking; Sequence Voltage Elements; Fault Locator **xix.** **Relay Logic/Automation:** Relay should have local control logic points; remote control logic points; latching logic points; counters; math variables; logic variables; timers. **xx.** **Monitoring and reporting:** Event Reporting and Sequential Events Recorder (SER)				
9.4.6	**Bus Differential and Breaker failure protection Numerical Relay. Compliant to the Technical Specifications below:** **i.** **Power Supply:** 48/125 VDC or 110-120 VAC **ii.** **Mainboard Input Voltage:**110 VDC **iii.** **Secondary Input Current:** 1 Amp Phase, 1 Amp Neutral. **iv.** **Voltage Input:** 3 AC Voltage, 21 AC Current **v.** **Configurable labels:** Yes **vi.** **Programmable pushbuttons:** Trip/Close Pushbuttons; 8 operator control pushbuttons **vii.** **Front panel LEDs:** Status and Trip Target LEDs (minimum of 16) **viii.** **Communication Ports:** **ix.** **Rear:** Ethernet Card with Two 10/100 Base-T plus 1 x 1 RS 232 port **x.** **Front:** 1 x Serial Port; EIA-485 **xi.** **Firmware:** Includes Mirrored Bits and Load Profile.				

	xii. **Communications Protocol:** Should have the following protocols: DNP 3.00 Level 2 Slave, FTP, Telnet, and DNP3 LAN/WAN **xiii.** **Digital Optoisolated Inputs:** Minimum of 10 digital inputs with a pickup 88–132 VDC; Dropout 66 VDC (External wetting); Inputs should be individually user-configured to operate. **xiv.** **High Speed, High current Interruption (Outputs):** Minimum of 15 Universal outputs with the following criteria: Make: 30 A; Carry: 6 A continuous carry; MOV Protection: 270 Vac/360 VDC; 40 J; **xv.** **Arc Flash capability:** No **xvi.** **Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **xvii.** **Protection elements:** Phase Fault Overcurrent Protection; Adaptive Phase Overcurrent Elements; Ground Fault Overcurrent Protection; Directional Ground Protection; Under- and Overvoltage Elements; Under- and Over Frequency Protection; Rate-of-Change-of-Frequency Protection; Harmonic Blocking; Sequence Voltage Elements; Fault Locator **xviii.** **Relay Logic/Automation:** Relay should have local control logic points; remote control logic points; 2 latching logic points; counters; math variables; logic variables; timers. **xix.** **Monitoring and reporting**: Event Reporting and Sequential Events Recorder (SER)				
9.4.7	**Transformer differential protection, Numerical Relay. Compliant to the Technical Specifications below:** **i.** **Power Supply:** 125/250 VDC or VAC; 85–350 VDC or 85–264 Vac				

	ii. **AC Secondary Input Current:** Secondary Input Current 1 Amp Phase, 1 Amp Neutral, including 2xREF Element; 3 A continuous, 100 A for 1 s; **iii.** **Voltage Input:** No **iv.** **Configurable labels:** No **v.** **Front panel LEDs:** Status and Trip Target LEDs **vi.** **Programmable pushbuttons:** Minimum of eight operator control pushbuttons **vii.** **Communication Ports:** **viii.** **Rear:** 1 x 10/100 Base-T plus 1 x 1 RS 232 port. **ix.** **Front:** 1 x Serial Port **x.** **Communications Protocol:** Should have the following protocols: DNP 3.00 Level 2 Slave, **xi.** **Digital Optoisolated Inputs:** Minimum of 10 digital inputs with a pickup 88–132 VDC; Dropout 66 VDC (External wetting); Inputs should be individually user-configured to operate. **xii.** **High Speed, High current Interruption (Outputs):** Minimum of 15 Universal outputs with the following criteria: Make: 30 A; Carry: 6 A continuous carry; MOV Protection: 270 Vac/360 VDC; 40 J; **xiii.** **Arc Flash capability:** No **xiv.** **Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **xv.** **Relay Logic/Automation:** Relay should have local control logic points; remote control logic points; latching logic points; counters; math variables; logic variables; timers **xvi.** **Monitoring and reporting:** Event Reporting and Sequential Events Recorder (SER) **xvii.** **Protection elements:** Relay should have the following protection elements: Percentage Differential Protection; Harmonic and DC Elements; Unrestrained Differential Protection; Overcurrent Fault Protection; Restricted Earth Fault Protection; Through-Fault Event Monitor; CT Phase Angle Compensation				

9.4.8	**Overcurrent, Earth Fault and Sensitive Earth Fault Numerical Relay. Compliant to the Technical Specifications below:** **i.** **Power Supply:** 125VDC or 120 VAC. **ii.** **Secondary Input Current:** 1 Amp Phase, 1 Amp Neutral; 5Amp Phase, 5Amp Phase;1Amp Phase, 0.05Amp Neutral (nondirectional Sensitive Earth fault [SEF]). **iii.** **Voltage Input:** No **iv.** **Configurable labels:** Yes **v.** **Pushbuttons:** Minimum of eight operator control push buttons; Trip/Close Pushbuttons **vi.** **Front panel LEDs:** Status and Trip Target LEDs **vii.** **Communication Ports:** **viii.** **Rear:** 1 x 10/100 Base-T plus 1 x 1 RS 232 port. **ix.** **Front:** 1 x Serial Port; EIA-485 **x.** **Firmware:** Includes Mirrored Bits and Load Profile. **xi.** **Communications Protocol:** Should have the following protocols: DNP 3.00 Level 2 Slave, standard protocols; IEC 61850 **xii.** **Digital Optoisolated Inputs:** Minimum of 10 digital inputs with a pickup 88–132 VDC; Dropout 66 VDC (External wetting); Inputs should be individually user-configured to operate. **xiii.** **High Speed, High current Interruption (Outputs):** Minimum of 15 Universal outputs with the following criteria: Make: 30 A; Carry: 6 A continuous carry; MOV Protection: 270 Vac/360 VDC; 40 J; **xiv.** **Arc Flash capability**: No **xv.** **Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **xvi.** **Protection elements:** Phase Fault Overcurrent Protection; Adaptive Phase Overcurrent Elements; Ground Fault Overcurrent Protection; Directional Ground Protection; Under- and Overvoltage Elements; Under- and Over				

	Frequency Protection; Rate-of-Change-of-Frequency Protection; Harmonic Blocking; Sequence Voltage Elements; Fault Locator **xvii.** **Relay Logic/Automation:** Relay should have: local control logic points; remote control logic points; latching logic points; counters; math variables; logic variables; timers **xviii.** **Monitoring and reporting:** Event Reporting and Sequential Events Recorder (SER)				
9.4.9	**Overcurrent, Earth Fault and Sensitive Earth Fault Numerical Relay. Compliant to the Technical Specifications below:** i. **Power Supply:** Universal – 24 to 120V DC/AC. ii. **Secondary Input Current:** 3 x AC 5A/1A plus a 1A/5A Neutral Input. iii. **Voltage Input**:110V phase to phase AC Voltage. iv. **Configurable labels**: Yes v. **Communication Ports:** vi. **Rear**: 1 x 10/100 Base-T plus 1 x 1 RS 232 port. vii. **Front**: 1 x Serial Port viii. **Communications Protocol**: DNP3_level 2 minimum ix. **Digital Optoisolated Inputs**: Minimum of 8. Universal – 24 to 120V DC/AC voltage application (External wetting); Inputs should be individually user-configured to operate. x. **Digital Optoisolated high speed and high current Outputs**: Minimum of 6A continuous – Minimum of 8. Universal – 24 to 120V DC/AC voltage application. xi. **Arc Flash capability**: 4 x Arc Flash detection inputs. Four Fiber-optic point sensors for ARC flash must be provided with the relay. xii. **Software**: Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). xiii. **Relay dimensions**: Must be able to fit onto the control panel portion of the switchgear.				

9.4.10	**Line differential protection, Numerical Relay. Compliant to the Technical Specifications below:** **i.** **Power Supply:** 125VDC or 120 VAC, range 85 – 350 Vdc. **ii.** **Secondary Input Current:** 1 Amp Phase, 1 Amp Neutral; 5Amp Phase, 5Amp Phase;1Amp Phase, 0.05Amp Neutral (nondirectional Sensitive Earth fault [SEF]). **iii.** **Voltage Input:** Nominal should be 67V_{L-N} three-phase four wire connection. Continuous it should be: 150V_{L-N} any voltage up to 150 Vac. **iv.** **Configurable labels:** No **v.** **Pushbuttons:** Minimum of eight operator control push buttons; Trip/Close Pushbuttons **vi.** **Front panel LEDs:** Status and Trip Target LEDs **vii.** **Communication Ports:** **Rear:** 1 x 10/100 Base-T plus 1 x 1 RS 232 port. **Front:** 1 x Serial Port; EIA-485 **viii.** **Firmware:** Includes Mirrored Bits and Load Profile. **ix.** **Communications Protocol:** Should have the following protocols: DNP 3.00 Level 2 Slave, standard protocols; IEC 61850 **x.** **Digital Optoisolated Inputs:** Minimum of 8 digital inputs with a pickup 88–132 VDC; Dropout 66 VDC (External wetting); Inputs should be individually user-configured to operate. **xi.** **High Speed, High current Interruption (Outputs):** Minimum of 15 Universal outputs with the following criteria: Make: 30 A; Carry: 6 A continuous carry. **xii.** **Arc Flash capability**: No **xiii.** **Software:** Windows-based PC software for setting, report retrieval, metering, HMI, and control; At no additional costs (free issue with the relay). **xiv.** **Protection elements**: Current differential protection, Distance protection, Overcurrent fault protection, Bus stub				

	protection, Auto-reclosing control, Frequency, Voltage elements, Event recording and sequential events recorder, fault locator.				
9.4.11	**Voltage regulator: Relay for voltage control & transformer monitoring: Compliant to the Technical Specifications below.** **i.** **Power supply:** External AC – 85V, 110V, 264 V, 50 to 60 Hz. DC – 88V, 220V, 280V **ii.** **Input current**: Should be Ir = 1A. **iii.** **Serial interface:** RS 232 with SUB-D connector (9-pin male), USB **iv.** **Communication:** Dual ELAN interface COM2, COM3 and one mA input channel. **v.** **Inputs:** Should have a minimum of 16 binary inputs. **vi.** **Outputs:** Should have a minimum of 12 relay outputs. **vii.** **Voltage and Current measurements:** Three-wire three phase; balanced load. **viii.** **Recorder function for network quantities:** Should have recorder functionality with max. 3 channels. **ix.** **Transformer monitoring:** Without transformer monitoring. **x.** **Parallel operation:** Should include the firmware to parallel operation. **xi.** **Additional analogue inputs and outputs:** No. **xii.** **Binary inputs and tap change potentiometer input:** should have a minimum of 16 binary inputs AC/DC, 48 to 250 range. **xiii.** **COM 3 Interface:** RS485				

	xiv. Integrated SCADA connection in conformity with: IEC61850, IEC60870-5-104, DNP 3.0 or MODBUST, additionally must be able to connect to SCADA. **xv. Protocol:** Must have DNP 3.00 capabilities. **xvi. Software:** Windows-based PC software for setting, At no additional costs (free issue with the relay). **High -Impedance Differential relay.** **Compliant to the Technical Specifications below.** **i. Power supply:** Operating range of 24V to 250V dc and 115V to 230 V ac, Permissible voltage ranges should be between 19.2 V to 300V d.c. **ii. Construction:** In housing 7XP20 for panel flush mounting with the terminals at the rear. **iii. Pickup Voltage:** Should have a pickup voltage of 240V. **iv. Inputs/Outputs:** Should have a pickup current of 20mA with a max operating voltage 24V to 240Vdc, and 115 to 230V AC. Should have a thermal rating for current input of 5 times max. settings for 1sec. **v. Command Relay (Trip):** The relay should have a minimum of 2 normally open contacts with a switching capacity of 1000W/VA for making and 30W/VA for breaking. vi. **Alarm Relays:** The relay should have a minimum of 1 alarm relay contact for power supply monitoring and 1 contact for bus wire supervision. **vii. LEDs:** The relay should have a minimum of 4 LED used for indication on front panel.				

9.5 PRICES AND DELIVERY SCHEDULE - Prices must exclude VAT and include delivery to our CENTLEC stores.

PART A – 12kV PRICING FOR METAL-CLAD SWITCHGEAR:

Item	Schedule	Description	Unit of meas-ure-ment	Manufacturer	Price per unit in (R)for vacuum VCB's	Delivery period in weeks
9.5.1	A1	Switch - Disconnector panel - dia-gram 1/10	Each			
9.5.2	A2	Circuit breaker panel - diagram 2/10 MV Connection < 1 MVA	Each			
9.5.3	A3	Circuit breaker panel - diagram 3/10 MV Connection > 1 MVA	Each			
9.5.4	A4	Circuit breaker panel - diagram 4/10 Secondary feeder	Each			
9.5.5	A5.	Circuit breaker panel - diagram 5/10 Primary feeder (out-going)	Each			
9.5.6	A6	Circuit breaker panel - diagram 6/10 Transformer feeder	Each			
9.5.7	A7	Circuit breaker panel - diagram 7/10 Overhead line feeder	Each			
9.5.8	A.8	Circuit breaker panel - diagram 8/10 Primary feeder - (in-coming)	Each			
9.5.9	A.9	Circuit breaker panel - diagram 9/10 Bus- Section switch (busbar coupler)	Each			
9.5.10	A.10	Fused switch disconnector - diagram 10/10	Each			

PART A – 22kV PRICING FOR METAL-CLAD SWITCHGEAR:

Item	Sched-ule	Description	Unit of meas-urement	Manufacturer	Price per unit in (R)for vacuum VCB's	Delivery period in weeks
9.5.11	22A1	Switch - Disconnector panel - diagram 1/10	Each			
9.5.12	22A2	Circuit breaker panel - diagram 2/10 MV Connection < 1 MVA	Each			
9.5.13	22A3	Circuit breaker panel - diagram 3/10 MV Connection > 1 MVA	Each			
9.5.14	22A4	Circuit breaker panel - diagram 4/10 Secondary feeder	Each			
9.5.15	22A5.	Circuit breaker panel - diagram 5/10 Primary feeder (out-going)	Each			
9.5.16	22A6	Circuit breaker panel - diagram 6/10 Transformer feeder	Each			
9.5.17	22A7	Circuit breaker panel - diagram 7/10 Overhead line feeder	Each			
9.5.18	22A.8	Circuit breaker panel - diagram 8/10 Primary feeder - (in-coming)	Each			
9.5.19	22A.9	Circuit breaker panel - diagram 9/10 Bus- Section switch (bus-bar coupler)	Each			
9.5.20	22A.10	Fused switch disconnector - diagram 10/10	Each			

9.6 5.4.11 PRICING FOR 110VDC PANELS: Tender must be for single and double busbars. (Upper bar and back bar) Complete with busbars. (SBV3 and SBV3 E or compatible equivalent without juggle boxes)

Item	Sched-ule	Description	Unit	Manufacturer	Price per unit in (R) for Single Bar	Price per unit in (R)for Front and Back Bar	Price per unit in (R)for Up-per and Lower Bar	Delivery period weeks
9.6.1	5.4.11 A	Feeder panel	Each					
9.6.2	5.4.11 B	Incomer panel with 3Limb VT	Each					
9.6.3	5.4.11 B	Incomer panel with 5Limb VT	Each					
9.6.4	5.4.11.C	Bus Coupler panel	Each					
9.6.5	5.4.12. D	Voltage transformer 11000/110 V, 100VA, 5 limb, Voltage factor 1.9, accuracy class 0.5. Complete with base and busbar rais-ers.	Each					
9.6.6	5.4.13. E	Voltage transformer 11000/110 V, 100VA, 3 limb, Voltage factor 1.9, accuracy class 0.5. Complete with base and busbar rais-ers.	Each					

9.7 PRICING FOR PACKS: 12kV

Item	Schedule	Description	Unit of measurement	Manufacturer	Price per unit in (R)	Delivery period in weeks
9.7.1	A12.1	Panel packs "P"-packs (all tapes, bolts and nuts for panels included)	Each			
9.7.2	A12.2A	a) Jointing packs "J"-packs 400 Amp silver coated on the connection points. (Bolts and nuts included)	Each			
9.7.3	A12.2B	b) Jointing packs "J"-packs 800 Amp silver coated on the connection points. (Bolts and nuts included)	Each			
9.7.4	A12.2C	c) Jointing packs "J"-packs 2000 Amp silver coated on the connection points. (Bolts and nuts included)	Each			
9.7.5	A12.3	Switchboard accessories "S"-packs, with wall mounted steel lockable cabinet.	Each			
9.7.6	A12.4	Test packs "T"-packs	Each			
9.7.7	A12.3	Hand-held remote control	Each			

9.8 PRICING FOR PACKS: 22kV (boxes must be marked clearly)

Item	Schedule	Description	Unit of measurement	Manufacturer	Price per unit in (R)	Delivery period in weeks
9.8.1	22A12.1	Panel packs "P"-packs (all tapes, bolts and nuts for panels included)	Each			
9.8.2	22A12.2A	a) Jointing packs "J"-packs 400 Amp silver coated on the connection points. (Bolts and nuts included)	Each			
9.8.3	22A12.2B	b) Jointing packs "J"-packs 800 Amp silver coated on the connection points. (Bolts and nuts included)	Each			
9.8.4	22A12.2C	c) Jointing packs "J"-packs 2000 Amp silver coated on the connection points. (Bolts and nuts included)	Each			
9.8.5	22A12.3	Switchboard accessories "S"-packs, with wall mounted steel lockable cabinet.	Each			
9.8.6	22A12.4	Test packs "T"-packs	Each			
9.8.7	22A12.3	Hand-held remote control	Each			

9.9 PART B – NON-EXTENSIBLE RING MAIN UNITS 12kV–

Prices must exclude VAT and include delivery to our CENTLEC stores.

Item	Schedule	Description	Unit of measure-ment	Manufacturer	Price per unit (R) for Oil	Price per unit (R) for SF6 Gas	Delivery period in weeks
9.9.1	B1	Ring main unit with fused trans-former feeder without metering	Each				
9.9.2	B2	Ring main unit with fused trans-former feeder with metering unit, fit-ted inside metal clad outdoor kiosk	Each				
9.9.3	B3	Ring main unit with two fused trans-former feeders- One with metering and the other one without metering	Each				

9.10 PART B – NON-EXTENSIBLE RING MAIN UNITS 22kV.

Prices must exclude VAT and include delivery to our CENTLEC stores.

Item	Schedule	Description	Unit of measure-ment	Manufacturer	Price per unit (R) for Oil	Price per unit (R) for SF6 Gas	Delivery period in weeks
9.10.1	B1	Ring main unit with fused trans-former feeder without metering	Each				
9.10.2	B2	Ring main unit with fused trans-former feeder with metering unit, fit-ted inside metal clad outdoor kiosk	Each				
9.10.3	B3	Ring main unit with two fused trans-former feeders- One with metering and the other one without metering	Each				

9.11 A Supply and/or repairs of NULEC N-series ACR N12 and E-series ACR Pole mounted Automatic Circuit Reclosing Breakers (12kV).

Item	Description	Unit of measurement	Manufacturer	Price per unit (R) for SF6 Gas	Delivery period in weeks
9.11.1	**NULEC N-series ACR N12 Pole mounted Automatic Circuit Reclosing Breakers (12kV).**	Each			

9.12 A Supply and/or repairs of NULEC N-series ACR N12 and E-series ACR Pole mounted Automatic Circuit Reclosing Breakers (22kV).

Item	Description	Unit of measurement	Manufacturer	Price per unit (R) for SF6 Gas	Delivery period in weeks
9.12.1	NULEC N-series ACR N12 Pole mounted Automatic Circuit Reclosing Breakers (22kV).	**Each**			

9.13 B Magnefix / Interswitch Type MF disconnector switch 12kV

The Magnefix MF disconnector switches must be supplied complete with brackets and fuses to fit in a miniature substation HT kiosk.

Item	Description	Unit of measurement	Manufacturer	Price per unit (R) for SF6 Gas	Delivery period in weeks
9.13.1	**Magnefix / Interswitch Type MF disconnector switch 12kV** The Magnefix MF disconnector switches must be supplied complete with brackets and fuses to fit in a miniature substation HT kiosk.	Each			

9.14 B Magnefix / Interswitch Type MF disconnector switch 22kV

The Magnefix MF disconnector switches must be supplied complete with brackets and fuses to fit in a miniature substation HT kiosk.

Item	Description	Unit of measurement	Manufacturer	Price per unit (R) for SF6 Gas	Delivery period in weeks

9.14.1	**Magnefix / Interswitch Type MF disconnector switch 22kV** **The Magnefix MF disconnector switches must be supplied complete with brackets and fuses to fit in a miniature substation HT kiosk.**	**Each**			

9.15 PART C – 1. A. Oil to Vacuum Circuit Breakers Retrofit and Repair of The Listed Circuit Breakers, 12kV.

Prices must exclude VAT and include delivery to our CENTLEC Premises.

Item	Schedule	Description	Unit	Manufacturer	Unit total price in (R)	Delivery period in weeks
9.15.1	C1 a)	Vacuum circuit breaker to retrofit type PDB oil circuit breaker to fit the panel without any alternations to the panel. This must be for GEC, English-Electric and Johnson & Phillips. Type AG 16.12kV switchgear.	Each			
9.15.2	C1 b)	Transport of circuit breaker	p/km			
9.15.3	C1 c)	Labour	p/hour			
9.15.4	C1 d)	Repair CB on existing switchgear list below.	Each		"Strip & Quote" will be applicable.	
9.15.5	C1 e)	Retrofit the Reyrolle breakers spring charge mechanism with new spring charges motors.				

9.16 B. Retrofit existing Switch Reyrolle LMS, LMR, LMT to VD4-LMT ABB-Reyrolle CB. (Vacuum for 110 and 32 VDC panels)

Replacement circuit breaker for LMS, LMR, LMT – 800 Amp and delivered at CENTLEC premises.

Item	DESCRIPTION OF PARTICULARS	UNITS	SPECIFIED REQUIREMENT	Unit	Price in (R)	Delivery period in weeks
9.16.1	Manufacturer			**Each**		
	Country of origin					
	Total switchgear mass	kg				
	Nominal voltage	kV	12			
	Rated voltage	kV	12			
	Circuit rated normal current	A	800			
	Busbar rated normal current	A	800			
	Fault breaking capacity	MVA	350			
	Fault making capacity	kA	31.5			
	Through fault rating for 3 seconds	kA	20 kA			
	Standard 1/50 microsecond impulse rating at sea level	kV	95			
	Spring charges		110VDC			
	Spring charges		32VDC			
	Circuit Breaker to fit Panel		Circuit Breaker to fit in existing panel without alternations to panel.			

9.17 Replacement circuit breaker for LMS, LMR, LMT – 1250 Amp and delivered at CENTLEC premises.

Item	DESCRIPTION OF PARTICULARS	UNITS	SPECIFIED REQUIREMENT	Unit	Price in (R)	Delivery period in weeks

9.17.1	Manufacturer			**Each**		
	Country of origin					
	Total switchgear mass	kg				
	Nominal voltage	kV	12			
	Rated voltage	kV	12			
	Circuit rated normal current	A	1250			
	Busbar rated normal current	A	1250			
	Fault breaking capacity	MVA	350			
	Fault making capacity	kA	31.5			
	Through fault rating for 3 seconds	kA	20 kA			
	Standard 1/50 microsecond impulse rating at sea level	kV	95			
	Spring charges		110VDC			
	Spring charges		32VDC			
	Circuit Breaker to fit Panel		Circuit Breaker to fit in existing panel without alternations to panel.			

9.18 Replacement of a complete Reyrolle panel delivered to CENTLEC premises.

Item		**Replacement of Reyrolle Panel.**			
1	**DESCRIPTION OF PARTICULARS**	**SPECIFIED REQUIREMENT**	**UNITS**	**Manufacturer**	**Price in (R)**

2	Reyrolle **Panel** complete with busbars and shutters.	1250	**Each**		
3	Reyrolle **Panel** complete with busbars and shutters.	800	**Each**		

9.19 Replacement Reyrolle Voltage Transformer delivered at CENTLEC premises. (complete)

	VOLTAGE TRANSFORMER (Cable side)				
Item	**DESCRIPTION OF PARTICULARS**	**SPECIFIED REQUIREMENT**	**UNITS**	**Manufacturer**	**Unit total price in (R)**
9.19.1	Install VT	Yes	**Each**		
	Ratio	11000/110/63.5 Volts			
	Burden and Accuracy	100 VA Class 0.5			
	Voltage Factor	1.9			
	HT Fuses	3Amp			
	VT busbar risers	12kV			
	VT Base plate	Yes			

9.20 Replacement Reyrolle Current Transformer delivered at CENTLEC premises. (complete)

	CURRENT TRANSFORMERS: Studded 6mm Brass "S" connections.					
Item	**DESCRIPTION OF PARTICULARS**	**SPECIFIED REQUIREMENT**	**UNITS**	**Manufacturer**	**Price in (R)**	**DESCRIPTION OF PARTICULARS**

9.20.1	Purpose	OC / EF	**Per set**			
	Ratio	600/1				
	Burden	10VA				
	Class	5P20				
	Quantity	3				
	Insulation Level	IL 12/28/95 KV				
9.20.2	Purpose	Diff	**Per set**			
	Burden	10VA				
	Ratio	600/1				
	Class	PX				
	Quantity	3				
	Insulation Level	IL 12/28/95 KV				
9.20.3	Purpose	Metering	**Per set**			
	Burden	600/300/200/1				
	Ratio	10VA				
	Class	0.5				
	Quantity	3				
	Insulation Level	IL 12/28/95 KV				
9.20.4	Ratio	60/30/5 (price for local Panel CT's)	**Per set**			
	Purpose	OC / EF				
	Burden	10VA				
	Class	5P20				
	Insulation Level	IL 12/28/95 KV				
	Quantity	3				
9.20.5	Test block PK2-4way	YES (OC/EF, Differential and Metering)	**Each**			

9.21 The following EXISTING CIRCUIT BREAKERS must be repaired: (Strip &Quote)

Repair, Strip & Quote means that the Service provider must submit a quotation for the repairs and then invoice after repairs.

Item	Make	Type
9.21.1	Reyrolle LMS	LMS/X1/QMRO
9.21.2	Reyrolle LMR	LMR/X2/QMRO
9.21.3	Reyrolle LMT	LMT2/X31/QM
9.21.4	Actom	SBV4E/2000/25/SI and SBV4/80/20/S1
9.21.5	Actom	SBV3E/2000/25/SI
9.21.6	Johnson & Phillips	PDB/A/2Z and TSB16
9.21.7	GEC	PDB/A/400
9.21.8	HAWKER SIDDELEY	VIL-6 and R4/1 and V4/1 and D6XD
9.21.9	FIRST ELECTRIC	JB621
9.21.10	BRUSH	W4/11 and S4
9.21.11	LONG & CRAWFORD	AVS2
9.21.12	ALSTOM	AGVB-800/20/S and SBV4/800/20-S1
9.21.13	SACE BERGAMO	RM1235
9.21.14	BRITISH THOMPSON	BTH/JB621 and LC/B3
9.21.15	BRUSH	W4/11
9.21.16	NULEC	N24S-ACR-SF6-24-12-150
9.21.17	JG STATTER	VTGR150
9.21.18	YORKSHIRE	YSF6
9.21.19	RMU Actom	K3 oil and gas
9.21.20	RMU Magenefix	Dry Type Air
9.21.21	RMU GEC	T3 oil
9.21.22	RMU ABB	Gas
9.21.23	RMU Schneider	Gas
9.21.24	RMU Tiger	oil

9.21.25	N-Series NULEC switchgear outdoor pole mounted.	Sf6 Gas
9.21.26	E-Series NULEC switchgear outdoor pole mounted.	Sf6 Gas
9.21.27	Transport costs	Transport for **strip and quote only** AA rates basis

9.22 Price for switching and spring-charges handles (set) on the following types of existing switchgear.

Item	Make	Type	Price per set	Delivery period in weeks
9.22.1	Reyrolle LMS	LMS/X1/QMRO		
9.22.2	Reyrolle LMR	LMR/X2/QMRO		
9.22.3	Reyrolle LMT	LMT2/X31/QM		
9.22.4	Actom	SBV4E/2000/25/SI		
9.22.5	Johnson & Phillips	PDB/A/2Z and TSB16		
9.22.6	GEC	PDB/A/400		
9.22.7	SIDDELEY	VIL-6 and R4/1 and V4/1 and D6XD		
9.22.8	FIRST ELECTRIC	JB621		
9.22.9	BRUSH	W4/11 and S4		
9.22.10	LONG & CRAWFORD	AVS2		
9.22.11	ALSTOM	AGVB-800/20/S and SBV4/800/20-S1		
9.22.12	SACE BERGAMO	RM1235		
9.22.13	BRITISH THOMPSON	BTH/JB621 and LC/B3		
9.22.14	BRUSH	W4/11		
9.22.15	NULEC	N24S-ACR-SF6-24-12-150		
9.22.16	JG STATTER	VTGR150		

9.22.17	YORKSHIRE	YSF6 (Sf6gas)		
9.22.18	RMU Actom	K3 oil and gas		
9.22.19	RMU Magenefix	Dry Type Air		
9.22.20	RMU GEC	T3 oil		
9.22.21	RMU ABB	Gas		
9.22.22	RMU Schneider	Gas		
9.22.23	RMU Tiger	oil		
9.22.24	Nulec switchgear outdoor pole mounted.	Sf6 Gas		
9.22.25	Lockable wall mounted cabi-net to house all switching handle and specific tools.	Steel 1,5 m wide x 2mHigh and 500 mm deep.		

9.23 General spare list that must be supplied

Item	Make	Type	Unit	Price in (R)
9.23.1	Reyrolle switchgear	LMT.LMR& LMS 32Vdc trip coils	Each	
9.23.2	Reyrolle switchgear	LMT,LMR&LMS 32Vdc Spring Charge motors	Each	
9.23.3	Reyrolle switchgear	Mono Block bus bar side, complete with shutters. LMT,LMR&LMS	Each	
9.23.4	Reyrolle switchgear	Monoblock Cable side, complete with shutters. LMT,LMR&LMS	Each	
9.23.5	Reyrolle switchgear	800Amp Circuit breaker contacts (Female)		
9.23.6	GEC Type AG16	32Vdc trip coils	Each	
9.23.7	GEC Type AG16	32Vdc Closing coils	Each	
9.23.8	GEC Type AG16	Rubber tank packing	Each	

9.23.9	GEC Type AG16	800A, Mono Block bus bar side, complete with shutters. (female)	Each	
9.23.10	GEC Type AG16	800Amp, Monoblock Cable side, complete with shutters and bus bar brass connector blocks/bus bars. (female)	Each	
9.23.11	GEC Type AG16	1250A, Mono Block bus bar side, complete with shutters. (male)	Each	
9.23.12	GEC Type AG16	1250Amp, Monoblock Cable side, complete with shutters and bus bar brass connector blocks/bus bars. (male)	Each	
9.23.13	GEC Type AG16	800Amp U-poke moving contacts	Set of 3	
9.23.14	GEC Type AG16	1250Amp U-Poke moving contacts	Sey of 3	
9.23.15	GEC Type AG16	800Amp rose fix contacts	Set of 6	
9.23.16	GEC Type AG16	1250Amp rose fix contacts	Set of 6	
9.23.17	GEC Type AG16	110Vdc trip coils	Each	
9.23.18	GEC Type AG16	110Vdc Closing coils	Each	
9.23.19	Actom SBV4	110Vdc trip coils	Each	
9.23.20	Actom SBV4	110Vdc Closing coils	Each	
9.23.21	Actom SBV4	32Vdc trip coils	Each	
9.23.22	Actom SBV4	32Vdc Closing coils	Each	
9.23.23	Actom SBV4-E	110Vdc trip coils	Each	
9.23.24	Actom SBV4-E	110Vdc Closing coils	Each	
9.23.25	Actom SBV4-E	32Vdc trip coils	Each	
9.23.26	Actom SBV4-E	32Vdc Closing coils	Each	
9.23.27	Actom SBV4	32Vdc spring charge motors	Each	
9.23.28	Actom SBV4	110Vdc spring charge motors	Each	
9.23.29	Actom SBV4-E	32Vdc spring charge motors	Each	
9.23.30	Actom SBV4-E	110Vdc spring charge motors	Each	
9.23.31	Actom SBV4	800A, Mono Block bus bar side, complete with shutters. (female)	Each	
9.23.32	Actom SBV4	800Amp, Monoblock Cable side, complete with shutters and bus bar brass connector blocks/bus bars. (female)	Each	

9.23.33	Actom SBV4-E	1250A, Mono Block bus bar side, complete with shutters. (male)	Each	
9.23.34	Actom SBV4-E	1250Amp, Monoblock Cable side, complete with shutters and bus bar brass connector blocks/bus bars. (male)	Each	
9.23.35	Actom SBV4-E	2000A, Mono Block bus bar side, complete with shutters. (male)	Each	
9.23.36	Actom SBV4-E	2000Amp, Monoblock Cable side, complete with shutters and bus bar brass connector blocks/bus bars. (male)	Each	
9.23.37	Actom SBV4-E	800Amp, Crip contacts on circuit breaker, complete with in-sulated bus bar.	Set of 6	
9.23.38	Actom SBV4-E	1250Amp, Crip contacts on circuit breaker, complete with in-sulated bus bar.	Set of 6	
9.23.39	Actom SBV4-E	2000Amp, Crip contacts on circuit breaker, complete with in-sulated bus bar.	Set of 6	
9.23.40	Actom SBV4-E	Rack-in block on panel for circuit breaker spiral.	Each	
9.23.41	Actom SBV4-E	230 Vac rack-in motor for circuit breaker into panel.	Each	
9.23.42	Actom SBV4-E	Remote pendant control, 8m long with plug sock on panel.	Each	
9.23.43	Actom SBV4-E	12kV Potential transformer with top plate base and shutters. 1. Ratio=11000/110V, 2. Burden & Accuracy=0.5 3. Voltage factor= 1.9 4. 3 Limps. 5. Cable side with 3 insulated VT risers bus bars.	Each	
9.23.44	Actom SBV4-E	3Amp HT HRC fuses.	Each	
9.23.45	3M	10m x120mm Red heat shrink (Before shrink)	Per/roll	
9.23.46	3M	10m x180mm Red heat shrink (Before shrink)	Per/roll	
9.23.47	3M	Scotch Fill tape	Per/roll	
9.23.48	3M	23 rubber tape	Per/roll	
9.23.49	Reyrolle	Sf6 gas fittings, 5m pipe and gages for LMR,LMT,LMS type breakers.	Per set.	

8. CONTACT INFORMATION

8.1 For any further technical information regarding the document contents please contact P.J. Niemann at piet.niemann@centlec.co.za , Lindiwe Kalane at lindiwe.kalane@centlec.co.za or Teboho Nkala at teboho.nkala@centlec.co.za and all queries must be done in writing, the email address provided serves this purpose. The answer to one question will be sent to all the other prospective bidders that have bought the bid documents.

8.2 For Supply Chain Related questions, please contact Me. Palesa Makhele at Palesa.makhele@centlec.co.za

9. ANNEXURES

The same drawings for panel construction and layout must be utilized for 11kV and 22kV switchgear. Only the labeling must be as follows:

1. 11kV switchgear must be labeled A1 to A10
2. 22kV switchgear must be labeled 22A1 to 22A10.

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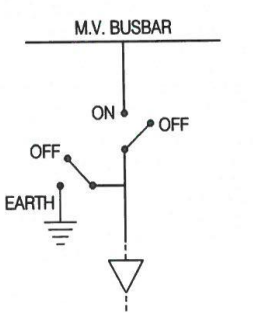


DIAGRAM 1/10
SCHEDULE A1
SWITCH-DISCONNECTOR

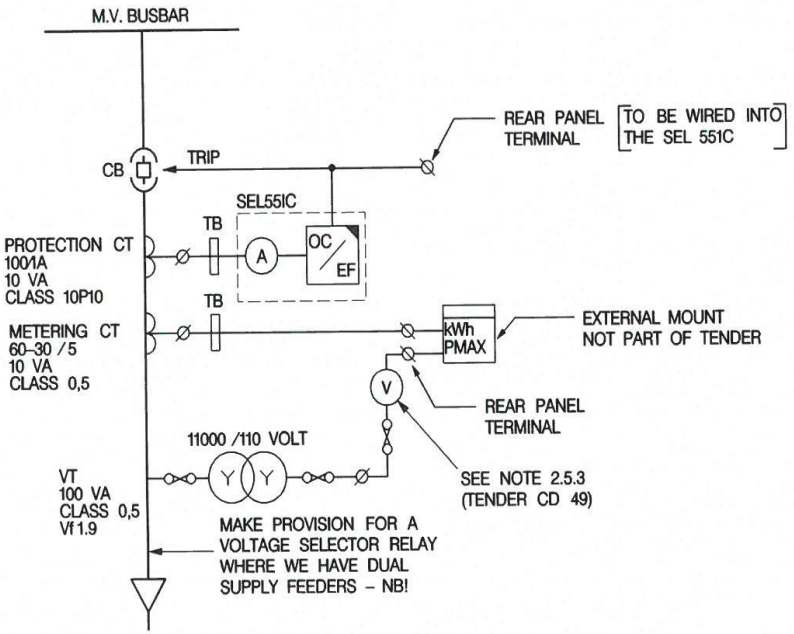
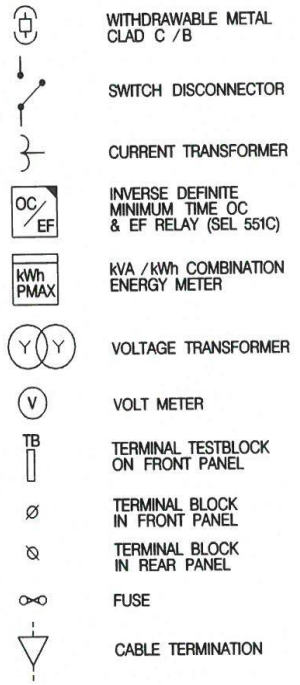


DIAGRAM 2/10
SCHEDULE A2
MV CONNECTION <1 MVA



NOTE 2.5.2

THE CONNECTION OF THE HT SIDE OF VT, SHALL BE CONNECTED ON THE CABLE SIDE, UNLESS OTHERWISE INDICATED.

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A	05 AUGUST 2009

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	DRAWN A.C. DE WET	DATE 1997 - 11 - 20	PLANNING DIVISION W DE JAGER (Chief Eng. Ass. DESIGN)	PLANNING DIVISION M RADEBE (MANAGER DESIGN) ACT.	PLANNING DIVISION B MOTSHWENE (GEN. MANAGER D & D) ACT.	NETWORK OPP. & MAINTENANCE (GEN. MANAGER)	RETAIL SERVICES (GEN. MANAGER)	L KRITZINGER (Pr. ENG.) TECHNICAL ADVISOR ACT.	A MGOQI (Pr. TECH. ENG.) C.E.O.	DRAWING Nr. TS - 9 - 7 TEKENING No. REV. C

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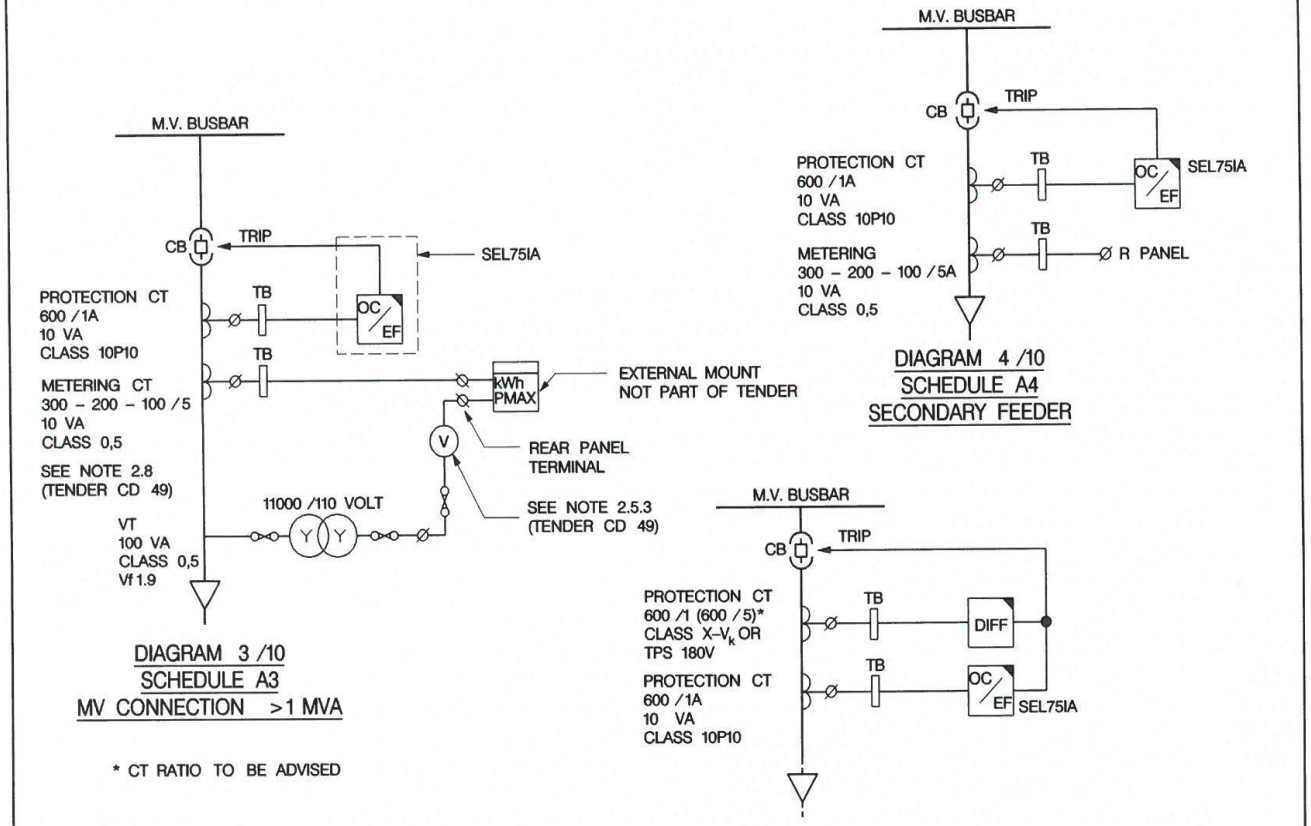

DIAGRAM 3 /10
SCHEDULE A3
MV CONNECTION >1 MVA

* CT RATIO TO BE ADVISED

DIAGRAM 4 /10
SCHEDULE A4
SECONDARY FEEDER

DIAGRAM 5 /10
SCHEDULE A5
PRIMARY FEEDER (OUT-GOING)

NOTE 2.5.2

THE CONNECTION OF THE HT SIDE OF VT, SHALL BE CONNECTED ON THE CABLE SIDE, UNLESS OTHERWISE INDICATED.

OC / EF	WITHDRAWABLE METAL CLAD C /B
	CURRENT TRANSFORMER
	INVERSE DEFINITE MINIMUM TIME OC & EF RELAY (SEL551C)
DIFF	PILOT WIRE PROTECTION RELAY (SOLKOR RF)
kWh PMAX	kVA /kWh COMBINATION ENERGY METER
TRF TEMP TRIP	TRANSFORMER TEMPERATURE TRIP RELAY (SEL551C)
Y Y	VOLTAGE TRANSFORMER
V	VOLT METER
TB	TERMINAL TESTBLOCK ON FRONT PANEL
⌀	TERMINAL BLOCK IN FRONT PANEL
⌀	TERMINAL BLOCK IN REAR PANEL
	FUSE
	CABLE TERMINATION

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	DRAWN THEA VAN REENEN	DATE 1997 – 11 – 20	PLANNING DIVISION W DE JAGER (Chief Eng. Ass. DESIGN)	PLANNING DIVISION M RADEBE (MANAGER DESIGN) ACT.	PLANNING DIVISION B MOTSHWENE (GEN. MANAGER D & D) ACT.	NETWORK OPP. & MAINTENANCE (GEN. MANAGER)	RETAIL SERVICES (GEN. MANAGER)	L KRITZINGER (Pr. ENG.) TECHNICAL ADVISOR ACT.

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C.E.O.

TITLE
SCHEMATIC DIAGRAM FOR MV SWITCHGEAR

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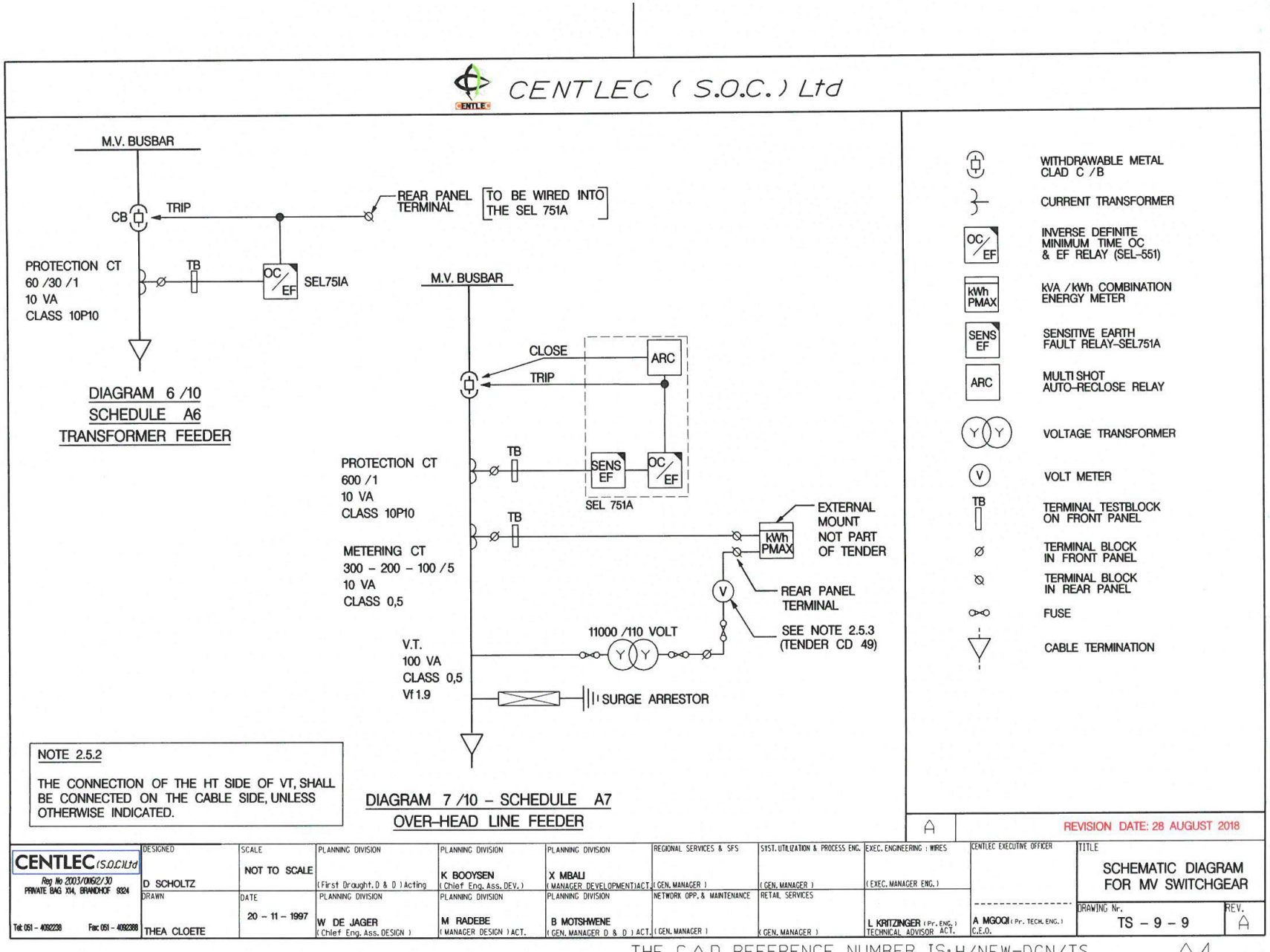
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M.V. BUSBAR
CB
TRIP
REAR PANEL TERMINAL
TO BE WIRED INTO THE SEL 751A
PROTECTION CT
60 /30 /1
10 VA
CLASS 10P10
TB
OC/EF
SEL751A
DIAGRAM 6 /10
SCHEDULE A6
TRANSFORMER FEEDER
M.V. BUSBAR
CLOSE
TRIP
ARC
PROTECTION CT
600 /1
10 VA
CLASS 10P10
TB
SENS EF
OC/EF
SEL 751A
METERING CT
300 – 200 – 100 /5
10 VA
CLASS 0,5
TB
kWh PMAX
EXTERNAL MOUNT NOT PART OF TENDER
V
REAR PANEL TERMINAL
SEE NOTE 2.5.3 (TENDER CD 49)
11000 /110 VOLT
V.T.
100 VA
CLASS 0,5
Vf 1.9
SURGE ARRESTOR
NOTE 2.5.2
THE CONNECTION OF THE HT SIDE OF VT, SHALL BE CONNECTED ON THE CABLE SIDE, UNLESS OTHERWISE INDICATED.
DIAGRAM 7 /10 – SCHEDULE A7
OVER-HEAD LINE FEEDER
WITHDRAWABLE METAL CLAD C /B
CURRENT TRANSFORMER
INVERSE DEFINITE MINIMUM TIME OC & EF RELAY (SEL-551)
kVA /kWh COMBINATION ENERGY METER
SENSITIVE EARTH FAULT RELAY-SEL751A
MULTI SHOT AUTO-RECLOSE RELAY
VOLTAGE TRANSFORMER
VOLT METER
TERMINAL TESTBLOCK ON FRONT PANEL
TERMINAL BLOCK IN FRONT PANEL
TERMINAL BLOCK IN REAR PANEL
FUSE
CABLE TERMINATION
A
REVISION DATE: 28 AUGUST 2018
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20 – 11 – 1997
PLANNING DIVISION
(First Draught. D & D) Acting
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(Chief Eng. Ass. DESIGN)
K BOOYSEN
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M RADEBE
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(EXEC. MANAGER ENG.)
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A
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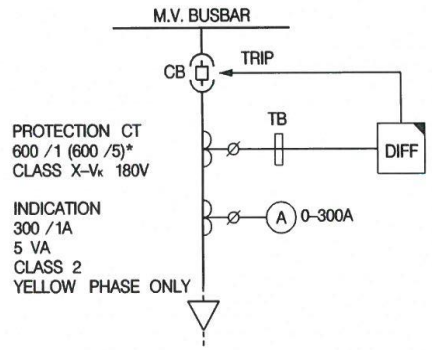
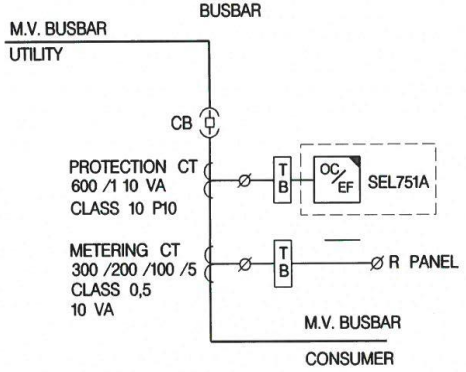


DIAGRAM 8 /10 – SCHEDULE A8
PRIMARY FEEDER (IN–COMING)

VT TO BE INSTALLED ON THE ADJACENT FEEDER ON THE UTILITY BUSBAR



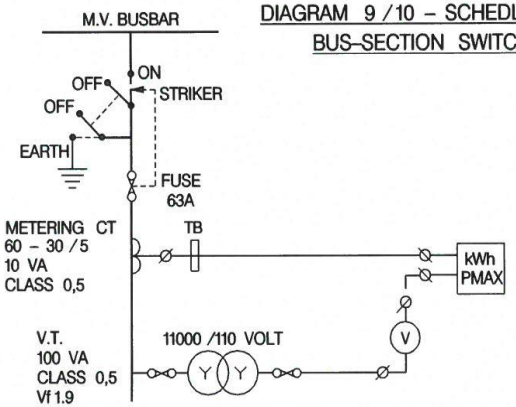


DIAGRAM 9 /10 – SCHEDLUE A9
BUS–SECTION SWITCH

DIAGRAM 10 /10 SCHEDULE A10
FUSED SWITCH DISCONNECTOR
WITH METERING

NOTE 2.5.2

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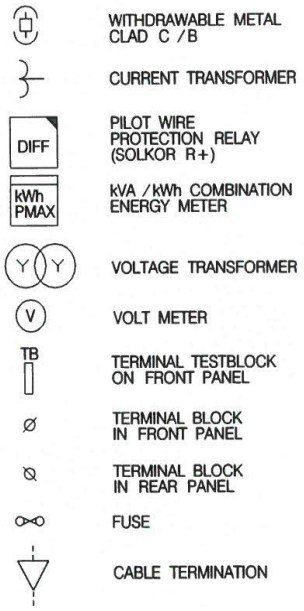

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