SCOPE OF WORK

1.1 This specification covers the City of Tshwane (CoT) requirements for the manufacture, testing at the factory, delivery, offloading, installation, testing and commissioning of indoor switchgear panels having withdrawable circuit breakers.

Tenderers are required to complete the Schedule B of Annexure A and the Deviation Schedule Annexure B. The numbering of clauses of this specification corresponds with the standards.

1.2 Tenderers are required to submit prices for all the items **listed in** Section I: single busbar and/or Section II: double busbar switchgear items.

The tender will be evaluated on the total price offered per section.

Single busbar: items for items 1 to 9;

Double busbar: items 10 to 14.

The omission to quote for any one item shall disqualify the tender.

The Spares: items will be evaluated per item.

Section I

Single busbar

a) Switchgear panels for installation in supply and consumer substations for the following items:

Item 1: Transformer feeder (F11) drawing A-1307 (Amdt).

Item 2: Consumer Feeder Panel (F12M) drawing A-1398.

Item 3: Switch-disconnector/Isolator panel (SW12).

Item 4: Radial feeder (F12)drawing A-1291**.**

Item 5: Main feeder metering (F13M) drawing A-1293**.**

Item 6: Main feeder (F13). drawing A-1295**.**

Item 7: Main feeder (F13 + VT). drawing A-1296**.**

Item 8: Bus-section panel (B12).

b) Installation and commissioning of panels:

Item 9 (i-iv): Installation and commissioning of items 1 to 8.

Section II

Double busbar

a) Switchgear panels for installation in satellite substations, the following items to SANS 1885 are required:

Item 10: Radial feeder (F22) drawing A-1291.

Item 11: Main feeder metering (F23M)with multifunctional protection relay drawing A-1293.

Item 12: Main feeder (F23)with multifunctional protection relay drawing A-1295.

Item 13: Main feeder (F23 + VT) with multifunctional protection relay. Drawing A-1296.

Item 14: Bus-coupler panel (C22).

Installation and commissioning of panels:

Item15 (i-iv): Installation and commissioning of items 10 to 14.

Item 16: Installation and commissioning of protection relays Multifunctional protection relay

d) Spares:

Item 17: Protection relays; Over current and earth fault (OC-EF)

Item 18: Protection relays; Multifunctional protection relay

Item 19: Protection relays; Sensitive earth fault protection

Item 20: Current Transformers for Overcurrent and earth fault protection

Item 21: Current Transformers for Multifunctional protection relay

Item 22: Voltage transformers for SBB and DBB

Item 23: Bus Bar (1)

Item 24: C/B

Item 25

NB. All the multifunctional protection relays must comply with IEC/SANS 61850.

2. NORMATIVE REFERENCES

The latest editions of the following standards apply:

- SANS1885: Metal-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 36kV.
- IEC/SANS 61850 Communication networks and systems in substations

3. TERMS, DEFINITIONS AND ABBREVIATED TERMS

The definitions of SANS1885 and IEC/SANS 61850 apply together with the following.

CoT: City of Tshwane
SBB: single busbar.
DBB: Double busbar.

4.Requirements

The requirements of SANS 1885 and Schedule A, together with the following apply. The clauses refer to SANS 1885.

4.1 Ratings

4.1.1 Main circuits

4.1.1.1 b) Rated voltage: 12kV.

4.1.1.2 Rated frequency: 50Hz.

4.1.1.3 Rated current: SBB: 800A; DBB: 1250A.

4.1.1.4 Rated insulation level: Table 1 (95/28kV).

4.1.1.5 Rated short-time and peak withstand current: Table 2 (20/50kA).

4.1.1.6-4.1.1.8: The requirements of SANS 1885 apply.

4.1.2 Rated supply voltage of SBB, DBB closing and opening devices and auxiliary and control circuits.

a) SBB CB Closing device (closing coil) voltage: 30V DC
b) SBB CB Opening device (tripping coil) voltage: 30V DC
c) SBB CB spring charge motor circuit voltage: 230V AC

d) DBB CB Closing device (closing coil) voltage: 110V DC
e) DBB CB Opening device (tripping coil) voltage: 110V DC
f) DBB CB spring charge motor circuit voltage: 230V DC

4.1.3 The requirements of SANS 1885 apply.

4.2 Switchgear Design and construction

4.2.1 General requirements of switchgear panels

4.2.1.1 Item 1-8 and 10-14: Factory assembled, metal-enclosed, modular switchgear panels complete with withdrawable circuit breakers. Refer to clause 4.3.1.6 for pendant and remote control panels.

4.2.1- 4.2.17: The requirements of SANS 1885 apply.

4.2.2 Design and construction of switchgear

The requirements of SANS 1885 apply.

4.2.3 SF6 Insulation

The requirements of SANS 1885 apply.

4.2.4 Earthing

The requirements of SANS 1885 apply.

4.2.5 Power cable termination compartment

4.2.5.1 The power cable compartment shall be suitable to accommodate an 11/11kV general purpose three-core belted cable manufactured to Table 18 of SANS 97.

4.2.6-4.2.7 The requirements of SANS 1885 apply.

4.2.8 Busbar

4.2.8.1 – 4.2.8.3 The requirements of SANS 1885 apply.

4.2.9 Protection against corrosion

4.2.9.1-4.2.9.3: The requirements of SANS 1885 apply.

4.2.10 Cable test facility

4.2.10.1 ICTF that are independent of the cable enclosure shall be provided on CB and SD.

4.3 Circuit-breaker and associated panel enclosure

4.3.1.1 Circuit breakers CB

4.3.1.1.1 The CB current rating: 400A

4.3.1.1.2 - 4.3.1.1.4: The requirements of SANS 1885 apply.

4.3.1.2 - 4.3.1.3: The requirements of SANS 1885 apply.

4.3.1.4 Accessibility: The requirements of SANS 1885 apply.

4.3.1.5 Earthing

4.3.1.5.1 Main circuit (busbar) earthed-state requirement?

4.3.1.6 **Local electrical operation**

4.3.1.6.1 DBB: Control panels are required for Items 10-14).

Switchgear panels shall be controlled from a separate control panel/board erected approximately 20 metre from the switchboard. The function of the control panels for the switchboard shall be limited to remote tripping and closing, with indications of the condition of the circuit-breakers (open/close/earth) on the corresponding switchboard/circuit-breaker and they shall be made up as wall mounted units or cubicles having three panels per cubicle. The local/remote selection switch shall be located on the circuit breaker panel.

Each cubicle shall be limited to a maximum width of 250mm and height of 600mm. Cubicles shall be designed to be bolted together to form a continuous wall mounted board.

Control panels, including spares shall be complete having the following functionalities:

a) Inhibit local control when selected onto remote.
b) Inhibit remote control when selected onto local, and
c) Switchgear panel status indications (open/close/earth).
d) Circuit breaker control switch.
e) Ammeter.
f) Volt meter for all panels equipped with VT.
g) Cable earth position indicator.
h) Mimic diagram and circuit breaker status indication lights with test and select indication.
i) Indication to which set of busbars the circuit-breaker is connected.
j) Designation label.

4.3.1.6.2 Item 10-14: MF panels with multifunction protection relays shall be managed from a modular substation computer (Bay controller), remote control panel or FOX.

4.3.1.7 SBB: Pendant control is required for Items 1 to 8.

4.3.1.7.2 – 4.3.1.7.4: The requirements of SANS 1885 apply.

4.3.1.8 Racking operation for withdrawable CB

4.3.1.8.1 – 4.3.1.8.2: Motorized racking devices shall be supplied.

The operating voltage shall be 230V AC

4.3.1.9.8 The electrical tripping circuit of a circuit breaker shall be provided with a test trip facility wired to the instrument panel terminals.

4.3.1.10 CB auxiliary contacts

4.3.1.10.1 – 4.3.1.11.4 The requirements of SANS 1885 and schedule A apply.

4.3.2 Withdrawable CB

4.3.2.1 – 4.3.2.7.3: The requirements of SANS 1885 and schedule A apply.

4.3.3 Fixed type CB

4.3.3.1 – 4.3.3.5.2: not required.

4.4 SD panels

4.4.1 General

4.4.1.1 A SD panel shall have non-withdrawable three-pole SD.

(Withdrawable specified in NRS003).

4.4.1.2 – 4.4.2.4: The requirements of SANS 1885 and schedule A apply.

4.5 Auxiliary Components

4.5.1 Current measuring devices

4.5.1.1 Item 1-8 and 10 to 14: Current and voltage sensors (transducer) and associated wiring shall be installed in the white phase of each protection circuit through a 5/5A interposing CT. The transducer output (0-5mA) wiring shall be wired to the auxiliary cable box.

4.5.1.2 Current transformers CTs

4.5.1.2.1 – 4.5.1.2.2 The requirements of SANS 1885 apply.

4.5.1.2.9 Current transformers shall have short time current (STC) rating not less than the STC of the switchgear panel, 20kA for 3 seconds.

4.5.1.2.2 The number of CT cores required (schedule A):

a) overcurrent and earth fault: 3CTs;

b) Differential protection: 3CTs;

c) Metering: 2CTs

4.5.1.2.3 CT selection for each application is indicated below:

Single busbar SBB:

Protection: Class: 5P15 5P20;

Differential: Class X;

Burden: 15VA;

CT ratios (refer schedule A);

1. SBB: Item 1, 2: (F11; F12M):

    a) Over-current, earth-fault and;
    b) Current measurement.

2. SBB: Item 4: (F12):

    a) Over-current, earth-fault and;
    b) Current measurement.

3. SBB: Item 5, 6 and 7: (F13M; F13; F13+VT):

    a) Over-current, earth-fault, bus-zone blocking;
    b) Differential protection;
    c) Current measurement (ammeter).
    d) Differential protection (Multifunctional(IEC/SANS 61850)) relays.

4. SBB: Item 5 and 7: (F13M ;F13+VT):

    e) Voltage transformers;
    f) Voltage measurement (voltmeter).

5. SBB: Item 8: (B12):

    a) Over-current, earth-fault, bus-zone blocking

Double busbar DBB

Protection: Class: 5P15, 5P20;

Differential: Class X;

Burden: 15VA;

CT ratios: (refer schedule A);

1 DBB: Item 10: (F22):

a) Over-current and earth fault (busbar blocking):
b) Current measurement (ammeter).

2 DBB: Item 11; 12; to 13: (F23; F23+VT; F23M):

a) Over-current, earth-fault, bus-zone blocking;
b) Differential protection;
c) Current measurement (ammeter);
d) Voltage transformers;
e) Voltage measurements (voltmeter);
f) Panels to be wired for differential multifunctional relays.

3 DBB: Item 14: Bus-coupler panel (C22):

a) Over-current, earth-fault, bus-zone blocking,
b) Current measurement (ammeter).

4.5.1.2.4 The requirements of SANS 1885 apply for SBB CT.

4 DBB: Items 11 and 14: Multifunctional current differential protection relays(IEC/SANS 61850) which are suitable for use with fibre-optic and multiplexing interface equipment having the following functionalities/facilities:

a) Over-current, earth fault, bus-zone blocking;
b) Differential protection relay: differential communication provided to be compatible/match with the remote end. The communication port option shall be RS485 and or direct fibre;
c) Supervision of the communication channel and configurability;
d) Master lock-out relay for each busbar;
e) Facilitate the transfer of supervisory and control data between the relay and the CoT main control centre via a SCADA system, which utilizes DNP3protocol (FOX panel) ;
f) Detail of hardware and software requirements, as well as the additional cost involved for protocol conversion equipment shall be submitted with the tender.

4.5.1.2.4 The requirements of SANS 1885 apply for DBB CT.

4.5.1.2.5 to 4.5.1.2.14: The requirements of SANS 1885 apply.

4.5.4 Voltage measuring devices for indication

4.5.4.1 EVTs

4.5.4.1.1: The requirements of SANS 1885 apply.

4.5.4.1.2: Voltage transducer and associated wiring is to be installed in the white phase of the VT circuit. The transducer output (0-5mA) wiring shall be wired to the auxiliary cable box.

4.5.4.2 Voltage transformers VTs

4.5.4.2.1 and 4.5.4.2.2: The requirements of SANS 1885 apply.

4.5.4.2.3: VTs The requirements of SANS 1885 and schedule A apply.

Single busbar SBB and DBB:

a) Withdrawable type;
b) Three-phase;
c) Fused;
d) Ratio: 1100/110V;
e) Class: class 1;
f) Burden: 100VA;
g) Voltage factor: 1.9;
h) Connection: busbar side.

4.5.4.2.4 to 4.5.4.2.6: VTs: The requirements of SANS 1885 and schedule A apply.

4.5.5 Protection relays

4.5.5.1: The requirements of SANS 1885 and schedule A apply.

4.5.5.2: protection (overcurrent, earth fault, SEF), arc protection, and bus-zone (busbar blocking) relays required are stated in Schedule A.

4.5.5.3 to 4.5.5.4: The requirements of SANS 1885 A apply.

4.5.6 Instruments and transducers

4.6.6.1 General

4.5.6.1.1 to 4.5.6.1.6: The requirements of SANS 1885 and schedule A apply.

4.5.6.2 Ammeters

4.5.6.2.1 to 4.5.6.2.9: The requirements of SANS 1885 and schedule A apply.

4.5.6.3 Voltmeters

4.5.6.3.1 to 4.5.6.3.3: The requirements of SANS 1885 and schedule A apply.

4.5.7 Luminous indicators

4.6.7.1 General

4.5.7.1.1 to 4.5.7.1.2: The requirements of SANS 1885 and schedule A apply.

4.5.7.2 VPI system

4.5.7.2.1 to 4.5.7.2.2: not required.

4.5.7.3 VDS system

4.5.7.3.1: The requirements of SANS 1885 and schedule A apply.

4.5.7.4 Other indication

4.5.7.4.1 to 4.5.7.4.4: The requirements of SANS 1885 and schedule A apply.

4.5.8 Alarm circuits: The requirements of SANS 1885 and schedule A apply.

4.5.9 Auxiliary circuitry

4.5.9.1 – 4.5.9.3.6: The requirements of SANS 1885 and schedule A apply.

4.5.9.4 Ammeter and voltmeter selector switch: 4.5.9.4.1 - 4.5.9.4.6: The requirements of SANS 1885 and schedule A apply.

4.5.9.5 contacts for auxiliary switches

4.5.9.5.1 – 4.5.9.6.6: The requirements of SANS 1885 and schedule A apply.

4.5.9.7 Terminals/terminal blocks/CCT functions designations

4.5.9.7.1 – 4.5.9.10: The requirements of SANS 1885 and schedule A apply.

4.6 Accessories

4.6.1 – 4.6.12: The requirements of SANS 1885 and schedule A apply.

4.7 Labels

4.7.1 General

4.7.1.1 – 4.7.1.3: The requirements of SANS 1885 and schedule A apply.

4.7.2 Main cct label designations

4.7.2.1 – 4.7.2.4: The requirements of SANS 1885 and schedule A apply.

4.7.3 Function labels

4.7.3.1 – 4.7.3.4: The requirements of SANS 1885 and schedule A apply.

4.7.4 On, Off and Earth Position Labels

4.7.4.1 – 4.7.4.4: The requirements of SANS 1885 and schedule A apply.

4.7.5 Other labels

4.7.5.1 – 4.7.5.5: The requirements of SANS 1885 and schedule A apply.

5 TESTS

5.1 General

5.1.1 – 5.1.3: The requirements of SANS 1885 and schedule A apply.

5.2 Type tests: The requirements of SANS 1885 apply.

5.2.2 Mandatory tests: The requirements of SANS 1885 apply.

5.3 Routine tests: The requirements of SANS 1885 apply.

6 Guide to the selection of metal enclosed SG

6.1: The requirements of SANS 1885 apply.

6.2: The requirements of SANS 1885 apply.

7 Recommended spares: The requirements of SANS 1885 apply.

8 Installation of SG

8.1 – 8.5: The requirements of SANS 1885 and schedule A apply.

8.6 A separate order for the installation of the switchgear panel will be issued as and when required. In instances where the contractor is required to extend onto an existing switchgear panel, details of the panels will be made available.

8.7 The tenderer shall include this in the price and shall be responsible for the supply and installation of all control cable and accessories items such as:

a) Racks and mounting rails;
b) LV control cables between the SG and remote control panels:
c) LV control cables between the charger and SG panel;
d) Any other cables required for commissioning of the SG panels etc.

9.1 Documentation with tender: The requirements of SANS 1885 and schedule A apply.

(i) A-1291/2:(F22); A1293/4: (F23M); A-1295/7: (F23); A-1296/7:(F23+VT); A-1297/1: DC schematic; A-1397: (F11); A-1398: (F12M).

9.1.1 Tenderers are required to complete schedule B and submit with the tender.

9.3 to 9.4: The requirements of SANS 1885 and schedule A apply.

Annexure A
RETURNABLE SCHEDULES
SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR (SANS1885)

SCHEDULE A: Purchaser's specific requirements

SCHEDULE B: Particulars of equipment supplied

ITEM	SUB-CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
	4.1	**Ratings**		
1.	4.1.1.1b)	Rated voltage	12kV	
2.	4.1.1.3	Rated normal current.		
		Single busbar: Double busbar:	min800A min 1250A	
3.	4.1.1.4.2	Rated insulation level, Table 1.	95/28kV	
4.	4.1.1.5.2	Rated short-time and peak withstand current, Table 2.	20/50kA	
5.	4.1.2	Auxiliary supply voltage:		
6.		SBB closing coil voltage.	30V DC	
7.		SBB opening coil voltage.	30V DC	
8.		SBB spring wind motor.	230V AC	
9.		DBB closing coil voltage.	110V DC	
10.		DBB opening coil voltage.	110V DC	
11.		DBB spring wind motor.	230V AC	
	4.2	**Switchgear design and construction**		
12.				
13.	4.2.10.1	Circuit breaker to incorporate integral type circuit test facility.	Required.	
14.	4.2.10.3	Type of test facility offered?		
15.	4.2.10.5	Switch disconnector to incorporate integral type circuit test facility.	Required.	
16.	4.2.10.6	Description of test plugs?		
	4.3	**Circuit-breaker**		
	4.3.1.1.1	CB's current rating.	400A	
17.	4.3.1.1.4	Circuit-breaker interrupting medium offered?		
18.	4.3.1.5.1	Is main circuit earthing offered?	state	
19.	4.3.1.5.2	For main circuit earthing: facilities either integral to the panel or circuit-breaker?		
20.		Provide details of the earthing offered?		
21.	4.3.1.6.1	Local electrical operation i) Item 1-14: Remote control panel:		

		Manufacture? Catalogue number? Functionality?		

Annexure A

SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements

SCHEDULE B: Particulars of equipment supplied

22.	4.3.1.7.3	Electrical charging required	yes	
23.	4.3.1.8.2	Motorized tracking devices to be provided	yes	
24.	4.3.1.9.1	Type of closing operating mechanism required with each CB.	i) Stored energy and ii) electrical charging.	
25.	4.3.1.9.1	Operating voltage of motorized racking motor.	230V AC	
26.	4.3.1.9.5	Second opening release.	required.	
27.	4.3.1.10.3	Number of spare contacts required for:		
		a) SF6 alarm b) Lock-out SF6 c) Circuit-breaker auxiliary 'a' d) Circuit-breaker auxiliary 'b' e) Spring limit f) Circuit breaker earthed. g) Rack-in and Rack-out H Upper and lower limit switch	1 1 1 1 1 1	
28.	4.3.1.10.4	The number of spare contacts offered for:		
		a) SF6 alarm b) Lock-out SF6 c) Circuit-breaker auxiliary 'a' d) Circuit-breaker auxiliary 'b' e) Spring limit f) Circuit-breaker earthed. g) Rack-in and Rack-out g) H Upper and lower limit switch		
29.	4.3.1.10.6	Circuit-breaker auxiliary contacts to be wired to:	Terminal junction box	
	4.3.2	**Withdrawable type circuit-breaker**		
30.	4.3.2.3.2	What type of earthing switch is offered?		
31.	4.3.2.6.2	Type of circuit-breaker transporting device required.	Integral	
32.	4.3.2.1.2	Circuit-breaker details:		
		a) Manufacturer? b) Country of origin? c) Model/type designation? d) Total mass (cart included)? kg e) Rating nameplate position? f) Interrupting medium?		
33.	4.3.2.2.1	Isolation displacement of circuit breaker?	Vertical/ Horizontal.	
	4.4	**Switch-disconnector panel (Single**		

		BB)		
34.	4.4.1.2	Integral three-pole earthing switch.	required.	
35.	4.4.1.5	Type of switch-disconnector offered?		

Annexure A

SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements.

SCHEDULE B: Particulars of equipment supplied.

	4.5	**Auxiliary components**		
	4.5.1.1.1	ECTs required on protection CCTS.	CB	
	4.5.1.1.3	Electronic current and voltage sensors (installed in the CT or VT secondary circuit): a) number of sensors; b) rated primary current; c) rated primary voltage; d) output current; e) class and accuracy.	 one 5A 110V 0-5mA 0.5	
36.	4.5.1.1.4	Electronic current sensors ECT: a) Type offered? b) Encapsulation material? c) Rated primary current? d) Class? e) Accuracy, and f) Output voltage of current sensor?		
37.	4.5.1.2.2	Number of current transformer cores for: a) Over-current and earth-fault; b) Differential protection; c) Metering.	 Three. Three Two.	
38.	4.5.1.2.3	Requirements for CT application:		
	4.5.1.2.3	Requirements**: protection** CTs		
39.		a) Class. b) Secondary rating: c) Tap ratio: SBB : Item 1 (F11); SBB : Item 2 (F12M); SBB : Item 8 (bus-section)(B12); SBB/DBB: Item 4 (F12); item 5 F13M); Item 6 (F13); item 7(F13VT); item 10 (F22) ; item 11(F23M); item 12(F23); item 13 (F23VT). DBB : Item 14 (C22-bus coupler) ; DBB : Item 15-16 (multifunction relay).	5P15,5P20. 5A. 50/25/5A. 200/100/5A. 800/5. 400/300/5A. 400/300/5A. 1200/5. 400/300/1or5A.	
40.	4.5.1.2.4	Offered: protection CT's:		
41.		a) Type offered? b) Encapsulation material? c) Class? d) 1 or 5A secondary? e) Burden? VA		

		f) Tap ratios: SBB : Item 1 (F11); SBB : Item 2 (F12M); SBB : Item 8 (bus-section)(B12); SBB/DBB: Item 4 (F12); item 5 F13M); Item 6 (F13); item 7(F13VT); item 10 (F22) ; item 11(F23M); item 12(F23); item 13 (F23VT). DBB : Item 14 (C22-bus coupler) ; DBB : Item 15-16 (multifunction relay). g) Knee point voltage? V h) Secondary resistance? Ohm r) Excitation I at knee-point voltage? mA		

Annexure A

SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements.

SCHEDULE B: Particulars of equipment to be supplied.

42.	4.5.1.2.3	Requirements: Pilot wire protection CT's:		
43.		a) Class b) Secondary: c) Tap ratio : d) SBB: Item 5 (F13M), item 6 (F13), and item 7 (F13VT); e) DBB: item 10 (F22); item 11 (F23M); item 12 (F23M); item 13 (F23VT); f) DBB : Item 15 and 16 (Multifunction relay).	Class X 5A 400/300/5A 400/300/5A 400/300/5A 400/300/5A 400/300/5A	
44.	4.5.1.2.4	Offered: Pilot wire CT's:		
45.				
46.	4.5.1.2.3	Requirements: **metering** CT's:		
47.		a) Class b) Tap ratio: c) SBB: (i) Item 2 (F12M); item 5 (F13M); d) DBB: (ii) Item 11(F23M); (iii) Item 12/14 : (Multifunctionrelay).	0.5 200/100/5 200/100/5. 400/200/5 None	400/200/5 More than 4MVA
48.	4.5.1.2.4	Offered: Metering current transformers:		
49.		a)Type offered? b) Encapsulation material? c) Class? d) 5A secondary? e) Burden? VA f) Tap ratios? SBB: Item 2 (F12M); item 5 (F13M); DBB: Item 11(F23M); Item 14/15 : (Multifunctionrelay). g)Knee point voltage? V h)Secondary resistance? Ohm i)Excitation I at knee-point voltage? mA		
50.	4.5.1.2.9	Required short time current rating required	20kA for 3 seconds.	

51.	4.5.1.2.9	STC offered?		
52.	4.5.2.1	Are heaters required to be installed?	yes	
53.	4.5.2.2	Type of heater offered?		
54.	4.5.3.1	Are surge arrestors to be installed?	No	
55.	4.5.4.2.2	On which panels are voltage transformers and voltage transducers required?	**Panel F12M, F13M;F23M, F13VT;F23+ VT.**	
56.	4.5.4.2.3	Requirements of voltage transformers and voltage transducers:		
57.		a) Type; b) Number of phases required; c) Fused on the primary side; d) Ratio; a) Class; d) Burden; VA e) Voltage factor; f) Location of test block; g) number VT limbs; h) Primary connection at busbar or circuit side. k) Voltage transducers mA	withdrawable three Required. 11000/110 0.5 100 1.9 Instr-panel 3. Circuit side 0-5	
58.	4.5.2.4	Offered: voltage transformers and voltage transducers:		
59.		a) Manufacturer? b) Withdrawable or non-withdrawable? c) Ratio? d) Class? e) Burden? VA f) Voltage factor? g) Location of fuses? h) Location of test blocks? i) 3-limb? j) Primary connection at busbar or circuit side? k) Voltage transducer?		
60.	4.5.4.2.6	Voltage transformer a) LSC category? b) Secondary earthing c) Location of VT?	yes	
61.	4.5.5	Protection relays		
62.	4.5.5.2	Requirements of protection relays required: **Single busbar:** (i) Item 1/2 (F11; F12M). (ii) Item 4 (F12). (iii) Item 5/6/7, (F12; F13; F13VT). (iv) Item 8 (B12);	 OC-EF; OC-EF; SEF, Differential. OC-EF; BB and	

		Double busbar: (i) Item 10; (F22) ; (ii) Item 11to13 . Note : Overcurrentearthfault OC-EF; Differential= Translay; BB=Busbarblocking protection; CMU (SEF) =Sensitive earthfault.protection.	Master lockout. OC-EF; BB, OC-EF; SEF, Differential; Master lockout.	

Annexure A

SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements

SCHEDULE B: Particulars of equipment to be supplied

63.	4.5.5.4	Detail of protection relays offered: Single busbar: Item 1. a) Manufacturer? b) Type? c) Rating? Single busbar: Items 2/4/5/6/7 and 8. d) Manufacturer? e) Type? f) Rating? Double busbar: Item 10/11/12,13 & 14. g) Manufacturer? h) Type? i) Rating? Double busbar: items 15 and 16 (Multifunction relay). j) Manufacturer? k) Type? l) Rating?		
64.	4.5.6.1.1	Instruments and transducers for indication and metering.		
65.		Detail of instruments required: Ammeter on panels: Voltmeter on panels: Detail of sensors/transducers required: Detail of metering circuitry required.	 All panels. F12M; F13M;F13VT;F23M; F23VT: multifunction panels All panels. F12M; F23M.	

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ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

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66.	4.5.6.2.4	Are ammeters with thermal maximum demand indicators required	Yes.	
67.	4.5.6.2.7	Accuracy of the ammeter offered?		
68.	4.5.6.2.8	Scale plate required on the ammeter.	0-480A	
69.	4.5.6.3.2	Voltmeters with a range 70-120% are required.	Yes	
70.	4.5.7.3	Luminous indicators: Detail of indicator required.	Voltage detection system (VDS)	
71.	4.5.7.3	Detail of VDS indicators offered?		
72.	4.5.7.2.1	Panels on which VDS are required.	Panels without VTs.	
73.	4.5.7.2.2	VPI: Detail of bushing and voltage divider?		
74.	4.5.7.3	Detail of VDS offered?		
75.	4.5.7.4	Signal indicators required on: Circuit breakers and; Remote control panels.	 Open/ closed; Bus-zone.	
76.	4.5.9	Supervisory (signal indicators and trip indications) and control function indications required on 1) the panels as indicated below and 2) wired and numbered as shown to the auxiliary cable termination box (4.5.9.6) of all panels.		
77.	4.5.9.1	**All panels**	**Terminal/** **Ferrule no** +VE Common	
78.	4.5.9.1	Panel trip CCT supply fail Panel closing CCT supply fail	x356 x355 x358 x357	

Annexure A

SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements

SCHEDULE B: Particulars of equipment to be supplied

ITEM	SUB-CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
79.	4.5.9.1	**11kV Main feeder 11kV Ring feeders Bus-zone panel**		
80.	4.5.9.1	Indications: VCB open. VCB closed. VCB racked in top/FBB. VCB racked in bottom/RBB. VCB racked out. VCB earthed. Control: VCB trip: VCB close:	 1x 86 1x85; 1x 87 1x85; 1x 88 1x90; 1x 89 1x90; 1x 92 1x94; 1x 550 1 x300; 1xW101 1xW100; 1xW102; 1xW100.	
81.	4.5.9.1	O/C protection operated. E/F protection operated. Differential protection operated (Solkor/Translay). Local/remote selected. Trip CCT supervision. Relay fail: Motor MCB healthy: B-zone operated TBB: B-zone operated BBB: Frame leakage: White phase current: White phase voltage:	1x135 1x134 1x136 1x134 1x137 1x139 1x150 1x300 1x536 1x300 1x526 1x300 1x671 1x300 1x103A 1x300 1x103B 1x300 1x104 1x300 1x121 1x122 1x123 1x124	

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SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements

SCHEDULE B: Particulars of equipment to be supplied

ITEM	SUB-CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
82.	4.5.7.4.2	Trip indications required. a) b) c) d) e) f) g)	 O/C protection E/F protection Differential. Breaker fail Relay fail Busbar Blocking SEF	
83.	4.5.8	Alarm circuit is required. a) b) c) d) e) f) g) h)	 O/C protection E/F protection Differential Breaker fail Relay fail Busbar Blocking Trip coil faulty SEF	
84.	4.5.9.2.2	Alternative wiring: Refer to the wire numbering schedule included (79-81):	refer 4.5.9.1	
85.	4.5.9.2.2	Is approval required for any alternative wiring?	Yes	
86.	4.5.9.3.1	D.C. circuits protection.	MCCB's	
87.	4.5.9.4.2	Location of ammeter selector switches.	Not required	
88.	4.5.9.4.5	Location of voltmeter selector switches	Instrument panel	
89.	4.5.9.4.6	What detail of the voltmeter selection switch is offered?		
90.	4.5.9.6.5	Position of external termination box.	Rear of panel	
91.	4.5.9.8.1	Details of terminal blocks offered?		
	4.6	Accessories		
92.	4.6.7	Detail of test packs required for each switchboard, containing C.2 a) and/or b).	C.1+C.3 a) & b)	
93.	4.6.9	Quantities of each type of pack to be supplied. P, J and S packs:	Equal to the number of panels to be	

		T packs:	joined. One per switchboard.	
94.	4.6.11	Mounting of accessories cabinet required.	required	
95.	4.6.12	Is a circuit-breaker maintenance trolley required?	Refer 4.3.2.6.2 Integral transport device	
	4.7	Labels		
96.	4.7.1.1	Method used to attach rating plates? Method used to attach labels?		
97.	4.7.2.4	Requirements for main circuit designation labels.	To be provided at order stage.	

Annexure A

SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements

SCHEDULE B: Particulars of equipment to be supplied

98.	5	Tests		
99.	5.1.3	Statement that the test certificates of SA manufactured products to overseas design and tested products are valid in South Africa?		
100.	5.1.3	Number of RSA-manufactured overseas products produced and installed in RSA?		
101.	6.1	Service continuity of switchgear		
102.	6.1.3	LSC category required	LSC2B	
103.	5.2	Type Tests.		
104.	5.2.1	Insulation level?		
105.	5.2.1	Temperature rise test?		
106.	5.2.1	Impulse and power frequency voltage test?		
107.	5.2.1	Making and breaking type test of the included switching devices?		
108.	5.2.1	Tests to the satisfactory operation of the included switching devices and removable parts?		
109.	5.2.1	Test to prove the capability of the main and earthing circuits to be subjected to the rated peak and rated short-time withstand currents?		
110.	5.2.1	Current transformer type test?		
111.	5.2.1	Strength of gas filled compartment?		
112.	5.2.1	Gas tightness test of gas filled compartment?		
113.	5.2.1	Test to verify the protection of persons against dangerous electrical defects: Arcing test due to internal fault? Classification IAC: AFLR; 13kA, 200mS.		
114.	5.2.1	Insulation test and Partial discharge test?		
115.	5.2.1	Degree of protection of persons against access to hazardous parts and protection of equipment against solid foreign objects tests?		
116.	5.2.1	Electromagnetic compatibility test (EMC)?		

Annexure A

SCHEDULE A AND B

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements

SCHEDULE B: Particulars of equipment to be supplied

ITEM	SUB-CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
117.	6.1	Service continuity of switchgear		
118.	6.1.3	LSC category required	LSC2B	
119.	8.1	Is installation and on-site operational testing to be carried out by the supplier	Yes	
120.	8.4	Is construction power supply available	No	
121.	9	Documentation		
122.	9.1b)	Switch room layout drawing	A-1061	

ITEM 1-8 and 10 to 14: SINGLE AND DOUBLE BUSBAR SWITCHGEAR

SCHEDULE A: Purchaser's specific requirements

SCHEDULE B: Particulars of equipment to be supplied

ITEM	SUB-CLAUSE	DESCRIPTION	SCHEDULE A	SCHEDULE B
1.	4.5.7.4	11kV Main feeder		
2.	4.5.7.4.1	Indications : CB open. CB closed. VCB racked in top/FBB. VCB racked in bottom/RBB. VCB racked out. VCB earthed. VCB Fail Control : VCB Trip. VCB Close	 1X86 1X85 **1**X87 1X85 1 meaning Feeder 1,indication 86, common85 1X88 1X90 1X89 1X90 1X92 1X94 1X 550 1X300 1X662 1X300 1W101 1W100 1W102 1W100	
3.	4.5.7.4.2	O/C protection operated. E/F protection operated. Translay/Solkor protection operated. Local/remote selected. Trip Circuit Supervision. Relay Fail. Motor MCB Healthy. B-Zone Operated TBB B-Zone Operated BBB Frame Leakage White phase Current. White phase voltage	1X135 1X134 1X136 1X134 1X136 1x134 1X150 1X300 1X536 1X300 1x526 1X300 1X671 1X300 1x103A 1X300 1X103B 1X300 1X104 1X300 1X121 1X122 1X123 1X124	
4.	4.5.7.4	11kV Ring feeders		

ANNEX B

Deviation schedule

Any deviations offered to this specification shall be listed below with reasons for deviation.		
ITEM		**PROPOSED DEVIATION**

Signature of tenderer:……

C3.7HEALTH AND SAFETY SPECIFICATION

MINIMUM OCCUPATIONAL HEALTH & SAFETY REQUIREMENTS

I ..... in my capacity as ..... representing ..... (contractor) hereby agree in terms of Section 37(2) of the Occupational Health and Safety Act 1993 (Act 85 of 1993) that I am an employer in own right and hereby take upon myself the duty to ensure that myself and my employees will adhere to the requirements as set out below and all other requirements as set out in the Occupational Health and Safety Act 1993 and its regulations.

1. INTRODUCTION

1.1. The Municipality requires a high standard of safe work performance from all employees and expects that the standard be maintained by the contractor within the Municipality's jurisdictional area or on its premises.

1.2. Irrespective of human considerations, the maintaining of these health and safety rules shall be the execution of the prescribed legal requirements. These rules are not to hinder the contractor in rendering services or indemnify the contractor from any legal responsibility to ensure healthy and safe work circumstances.

1.3. The Municipality shall assist the contractor in any practical considerations to accommodate the healthy and safe execution of work and therefore require co-operation in the execution of these safety rules

2. LOCK OUT PROCEDURE

2.1. When power or air driven machines or equipment, electrical apparatus or pipe lines are examined, repaired, adjusted, cleaned, lubricated or serviced in any other way than normal servicing, then all isolating switches, -levers, valves or appliances must be put in the "off" or "closed" position and locked.

2.2. Should more than one team work on a machine, then each person in control of a team, must put a separate lock on the switch, lever, valve or appliance.

3. CRANES, VEHICLES AND HOISTING

3.1. For each crane or hoisting equipment used, the contractor must submit a valid and recent test certificate or other form of the last examination of the machine or equipment, to the Municipality.

3.2. Only trained personnel with written permission and where determined by Law, with a valid driver's license, may be allowed to operate any electrical diesel or petrol driver overhead crane, hydraulic or electrical hoisting equipment, self driven forklift, tractor or any other crane

or vehicle. No employee of the contractor may perform any overhead work or work on an overhead crane or hoisting equipment or work near cranes or crane rail, before:

- An agreement was concluded with the Municipality.
- Approval has been obtained from the Municipality to perform the work.
- All applicable danger – and warning symbolic signs are put into position, or exemption, if applied for, is in operation

4. MACHINE VALANCES, PROTECTION AND FENCING

4.1. No machine valances, protection or fencing may be removed from machines, manholes, etc without the written permission of Municipality if applicable exemption procedures were not appropriated.

5. SCAFFOLD, LADDERS, TOOLS AND EQUIPMENT

5.1. No equipment or appliance belonging to Municipality may be used without written permission from the Municipality.

5.2. Unless prior arranged, contractors must bring sufficient tools and equipment to the site to finish the contract, including offices and storerooms. The mentioned equipment remains the responsibility of the contractor with respect to loss, damage and theft.

6. EXCAVATIONS

6.1 Before any excavations commence, the contractor must obtain information with regard to all existing services. The Municipality does not guarantee the accurateness of the information supplied.

6.2 All excavations and obstructions in floor, tar and dirt surfaces must be fenced effectively and safeguarded between sundown and sunup with a sufficient amount of red/yellow warning lights and symbolic signs.

6.3 The surrounding area must be kept clean, safe and tidy during excavation. Excess material may not obstruct unnecessarily

6.4 If any property is in danger during excavation, it must be supported and the proposed support work must be submitted to the Department of Labour (OHS) and Municipality for approval.

6.5 Written permission must be obtained from Municipality to grant admittance to restricted areas as well as areas where dangerous or poisonous gases are present

6.6 That all excavations be done in accordance with the stipulations of the Occupational Health and Safety Act

7. FIRST AID

7.1 The contractor must provide and maintain a first aid box equipped according to legal requirement where more than (5) five persons are employed. The first aid box must be in the care of a person with a competency certificate from one of the following organizations

- SA Red Cross Association
- St John's Ambulance
- SA First Aid League; or
- A person or organization approved by the Chief inspector for this purpose

7.2 A visible notice must be put up on any work premises with the name of the person responsible for first aid. In an emergency the Municipality's Ambulance / Fire Department or emergency services may be contacted at (012) 310 6200.

8. FLAMMABLE LIQUIDS

8.1. The contractor shall be held responsible for the necessary precautionary fire prevention measures. No smoking signs must be put up where applicable. The contractor's employees must be informed of Municipality's fire prevention measures and evacuation procedures.

9. INCIDENT REPORTING

9.1. All incidents referred to in Section 24 of the Occupational Health and Safety Act and or other incidents shall be reported, by the contractor, to the Department of Labour, as well as to the Municipality and should such an incident take place outside normal working hours, on a Saturday, Sunday or Public holiday to Capital Park Power Management at tell no. 012-324 3495 or 012-339 9027 and Piet Delport Centre at 012-427 7111. The Municipality shall further be provided with a written report relating to any incident.

9.2. The Municipality will obtain an interest in the issue of any formal inquiry conducted in terms of the Occupational Health and Safety Act in any incident involving the contractor and/or his employees and/or his subcontractors.

9.3. The contractor undertakes to report to the Municipality anything deemed to be unhealthy and/or unsafe and that he undertakes to verse his employees and/or subcontractors in this regard

9.4. The contractor undertakes to immediately report all injuries on duty sustained by the employees of the contractor to the Municipal Contract manager.

10. LIAISON AND SUPERVISION

10.1. The contractor hereby undertakes to report on a regular basis, not exceeding a period of one (I) week in the instances of long term contracts, to the Municipal Contract Manager regarding any hazards or incidents that may be identified or encountered during the performance of the principal contract.

11. SERVICE INTERRUPTION

11.1 Should any work done by the contractor cause a possible interruption, written permission must be obtained from the Municipality, before such work commences. The contractor may not switch on or off any service without written permission from the Municipality.

12. LIQUOR, DRUGS, DANGEROUS WEAPONS AND FIREARMS

12.1. The contractor shall ensure that he and his employees comply with the official policy of the Municipality at all times. It is the responsibility of the contractor to request a copy of this document from CoT.

13. GENERAL CONDITION

13.1. Notwithstanding anything to the contrary in this agreement, it is hereby specifically determined that the Contractor shall have acquainted himself and be conversant with the contents of all statutory provisions applicable to the health and safety of workers and other persons on the site including the execution of the work, and in particular the conditions contained in the Occupational Health and Safety Act, 1993 (Act 85/1993), and the regulations promulgated in terms thereof, and shall comply therewith meticulously and in all aspects and/or take care that it is complied with

14. CONTRACTOR IDENTIFICATION BOARD

14.1 The contractor shall provide on any work premises a temporary identification board at all worksites containing the following information:

- Company name
- On behalf of which division/department the work is being done
- The contact number and name of the person representing the contractor
- The contact number and name of the person representing Municipality

14.2 The specifications of the identification board shall be as follows:

- Size: 900mm x 900mm
- Material: The board must be constructed of aluminium or similar strength material.
- Letter size: Letters must be at least 70mm in height.

14.3 The identification board must be displayed in a conspicuous manner at the worksite of the contractor for the duration of the work performed

The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.

Person Authorized to sign Tender:

FULL NAME (BLOCK LETTERS): .....

SIGNATURE: .....

DATE: .....