Saudi Electricity Company	الشركة السعودية للكهرباء

SEC DISTRIBUTION MATERIALS SPECIFICATION	32-SDMS-03
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32-SDMS-03

SPECIFICATIONS

FOR

EXTENSIBLE SF6 INSULATED RING MAIN UNIT, 17.5 KV

CONTENTS

1.0 SCOPE

This SEC Distribution Material Standard (SDMS) specification specifies the minimum technical requirements for design; engineering, manufacturing, inspection, testing and performance of indoor SF6 insulated, extensible ring main unit (EXT-RMU) intended to be used in 13.8 kV medium voltage system of the Saudi Electricity Company (SEC) in Saudi Arabia.

2.0 CROSS REFERENCES

This material standard specification shall be read in conjunction with SEC specification No. 01-SDMS-01 (latest revision) for General Requirement For All Equipment / Materials, which shall be considered as an integral part of this SDMS. This SDMS shall also be read in conjunction with SEC Purchase Order (PO) requirements.

3.0 APPLICABLE CODES AND STANDARDS

The latest revision / amendments of the following codes and standards shall be applicable for the equipment / materials covered in this SDMS. In case of conflict, the vendor / manufacturer may propose equipment / materials conforming to one group of industry codes and standards quoted hereunder without jeopardizing the requirements of this SDMS.

3.1	IEC 62271-100	High-voltage alternating-current circuit breakers.
3.2	IEC 62271-102	Alternating current disconnectors (isolators) and earthing switch.
3.3	IEC 60044-1	Current Transformers
3.4	IEC 60044-2	Inductive Voltage Transformers
3.5	IEC 60255	Electric Relays.
3.6	IEC 60265	High-voltage switches.
3.7	IEC 60282	High-voltage fuses.
3.8	IEC 62271-200	AC metal-enclosed switchgear and controlgear for rated voltage above 1 kV and up to and including 52 kV.
3.9	IEC 60337	Control switches (low-voltage switching devices for control

and auxiliary circuits, including contactor relays).

3.10	IEC 60376	Specification and acceptance of new sulpher hexafluoride.
3.11	IEC 62271-105	High-voltage switchgear and controlgear alternating current switch-fuse combination
3.12	IEC 60529	Classification of degree of protection provided by enclosures.
3.13	IEC 60694	Common specifications for HV switchgear and controlgear standards.
3.14	ISO 2063	Metallic coatings – protection of iron and steel against corrosion – metal spraying of Zinc and Aluminum.
3.15	DIN 43625	High voltage fuses; rated voltages 3.6 kV to 36 kV; fuse-link.
3.16	11-SDMS-03	XLPE Insulated Power Cables For Rated Voltages From 15 KV Up TO 36 KV (Um).
3.17	38-SDMS-01	Fault Indicators.

4.0 DESIGN AND CONSTRUCTION REQUIREMENTS

4.1 General

The extensible ring main unit shall be indoor, ground / skid mounted and SF6 insulated type. It shall be constructed for operation in service conditions and the degree of protection as given in SEC specification 01-SDMS-01 latest revision. Additionally, it shall be provided with adequate protection for entry of dust to the operating mechanism.

Extensible ring main unit complete with all fittings and attachments shall be capable of withstanding the effects of direct solar radiation in case of outdoor storage. The temperature of metal surfaces exposed to direct solar radiation shall be regarded as 75 ^{0}C.

The extensible ring main unit shall consist of number of cubicles / modules which can be extended on either side, except the basic two LBS cubicle / module which is extensible on the right side only. SEC tender documents will specify the number and type of each cubicle / module. The cubicles / modules shall be as follows:

- Two (2) ring switches (Load Break Switch) for through feed as a basic cubicle / module, supplied as one unit.

- One (1) single ring switch (Load Break Switch) for through feed cubicle / module.

- One (1) single fuse switch or circuit breaker cubicle / module for tee-off.

- One (1) single cubicle / module for revenue metering.

The terminals of each cubicle / module shall be suitable for installation of cable sizes as given in SEC specification 11-SDMS-03 latest revision.

All live parts of Load Break Switch, Fused-switch, and Circuit Breaker cubicle / module and/or busbars assembly shall be SF6 gas insulated in a gas-tight stainless steel chamber, and sealed for life.

4.2 **System Characteristics**

The extensible ring main unit shall be suitable to operate under system parameters given in SEC specification 01- SDMS-01 latest revision.

Electrical and mechanical strength of extensible ring main unit shall be designed to operate in a system to withstand a short circuit current of 21 kA for 1 second or more at 13.8 kV nominal voltage.

4.3 **Current Rating**

The continuous current rating of the extensible unit at an ambient temperature given in SEC specification 01-SDMS-01 latest revision shall be:

Ring switches and metering unit	400 A
Fuse switch / Circuit Breaker	200 A

4.4 **Ring switch** (Load Break Switch)

Ring switch shall be load breaking and fault-making type. Ring switches shall be designed for interrupting full rated current as stated in clause 4.3 above, small inductive or capacitive currents involved in disconnecting of unloaded transformers and cables or overhead lines. It shall be suitable for full fault-making current.

Ring switch shall consist of a moving contact assembly with three positions; 'ON', 'OFF', and 'Earth'. Two independent manual operating mechanisms for ring and earth switches are also acceptable. The design shall prevent simultaneous closing of the main switch contacts and the earth switch contacts. The earth switch contacts shall be designed to close into a fault and shall have the same short circuit capacity as the main contacts.

The switching operation shall be manual by means of an operating handle and independent fast acting operating mechanism. Closing and opening speeds of the switch shall be independent of the speed with which the operating handle is moved. Ring switch operating mechanism shall have provision for on-site installation (retrofitting) of geared motor mechanism and associated closing and opening coils with necessary contactors for remote and future tele-control operations in the distribution network.

4.5 **Tee-Off Circuit Protection**

Tee-off circuit protection shall be either by fuse switch or circuit breaker.

4.5.1 Fuse Switch

Fuse switch shall be designed for interrupting full rated current as stated in clause 4.3, by blowing of a fuse(s) or by actuating a push button, which shall cause simultaneous tripping of all phases.

The switch shall be manually closed by means of an operating handle and independent fast acting operating mechanism. Closing movement charges the opening mechanism, for opening by 'trip' push button operation. Closing speed of the switch shall be independent of the speed with which the operating handle is moved.

Tee-off switch shall consist of a moving contact assembly with three positions; 'ON', 'OFF', and 'Earth'. Two independent manual operating mechanisms for tee-off switch and earth switch are also acceptable**.** Design shall prevent simultaneous closing of the main switch contacts and the earth switch contacts. The earth switch contacts shall be designed to close into a fault and shall have the same short circuit capacity as the main contacts. Closing of earth switch shall earth both ends of the fuse. Tee-off switch shall also be suitable to equip with shunt trip coil, rated for 220 V AC, 60 Hz and shall be provided if specified in the tender / data schedule.

Tee-off switch operating mechanism shall have provision for on-site installation (retrofitting) of geared motor mechanism and associated closing and opening coils with necessary contactors for remote and future tele-control operations in the distribution network.

4.5.2 Fuses

The fuse switch cubicle / module shall be suitable to accommodate three HRC fuses, in individually sealed chambers. Fuses shall be with striker pin and fuse link length of 442 mm. as per SEC specification 34-SDMS-02 latest revision, Following Fuse standard ratings shall be used in the SEC distribution system:

Rated Voltage: 17.5 kV
Interrupting Capacity: 40 kA (minimum) for 1 sec.

Fuse ratings (A)	31.5	50	80	125
Transformer (KVA)	300	500	1000	1500

The fuse switch cubicle / module shall be supplied without fuses.

4.5.3 Circuit Breaker

The Circuit breaker shall be of fixed type and designed for interrupting full rated fault current (21 kA for 1 second), and full fault making current. The insulation medium shall be SF6 gas and the interruption medium can be either SF6 or vacuum. Opening of the circuit breaker shall be by local manual trip button, by protective relay circuit and by remote tripping signal. Closing movement charges the opening mechanism, of the circuit breaker. Earthing of tee-off circuit shall be by an off load isolator switch having the same fault make capacity as the Ring switches. Operating mechanism shall be trip free, fast acting and independent of the operator action and shall provide three positions; circuit breaker 'ON', circuit breaker and isolator 'OFF' and earthing switch 'Earth'

Circuit breaker operating mechanism shall have provision for on-site installation (retrofitting) of geared motor mechanism and associated closing and opening coils with necessary contactors for remote and future tele-control operations in the distribution network.

4.5.4 Protective Relay

Self-powered protective relay with over-current and earth fault protection shall be used on tee-off circuits. General requirements of protective relay are listed in the appendix at the end of this specification.

4.6 Operations

All operating positions shall be on the front of the unit, position of each of the switches shall be displayed on a mimic diagram. Clear indicators showing 'ON', OFF' and 'Earth' positions shall be provided on polycarbonate or metal painted labels not less than 15 mm in height and 1.5 mm thick (sticker type labels are not acceptable). Indicator windows shall not be less than 15 mm in diameter and shall be covered with transparent UV resistant material with adequate mechanical strength.

Indicator	Letters	Background
ON	White	Red
OFF	White	Green
Earth	Black	Yellow

The mechanisms for operating the switches shall be accessible by removing the front plate. The operating handle shall have anti-reflex action and shall be stored at the front of the unit. Common operating handle shall be used for all operations of both ring and tee-off switches. Operating handle inserts shall have marking as appropriate to avoid inserting the wrong end during switching operations. Physical effort required for operating any mechanism shall not exceed 400 N.

In order to prevent un-authorized access for the operation of the extensible ring main unit, operating handle entries for ring & tee-off switches and trip push button shall have padlocking provision. It shall be suitable for padlocks having 6 mm shackle with 24 mm clearance. The padlocking provision material shall be adequately strong and compatible with the life of the extensible ring main unit.

4.7 Cable Testing Facility

Ring switch (Load Break Switch) cubicles / modules shall have a separate test bushings or test plug/probe insertion facility to carry out high voltage tests and current injection tests for the cables terminated on them. Disconnection of cables for testing purposes is not acceptable, any other test facility on cable bushings or terminations shall not be accepted.

4.8 **Interlocks**

Interlocks shall be provided to make the following operations impossible:

a) The operation of a ring switch or fuse switch / circuit breaker directly from 'ON' to 'Earth' or from 'Earth' to 'ON'.

The following additional requirements apply if the unit offered has two independent manual operating mechanisms for ring and earth switches:

- Operation of the 'Earth ON / Earth OFF' mechanism of earth switch unless the 'ON/OFF' mechanism of ring switch is in the 'OFF' position.
- Operation of the 'ON/OFF' mechanism of ring switch unless the 'Earth ON / Earth OFF' mechanism of earth switch is in the 'Earth OFF' position.

b) Opening of the cable test cover without the associated ring switch or fuse switch / circuit breaker being in the 'Earth' position.

c) Closing ring switch (Load Break Switch) to 'ON' with the test plug / probe inserted and /or the test cover open.

d) Insertion or withdrawal of the test plugs / probes with the associated switch in any position other than 'Earth' position.

e) Fuse changing or accessing the fuse chamber in any position other than 'Earth' position.

f) Closing fuse switch to 'ON' when:
- The fuse access cover not properly closed.
- Fuse switch in 'Earth' position.
- Fuse holder not correctly in position.
- Any fuse blown.

g) Opening cable termination box without the associated ring switch / tee off in the 'Earth' position.

h) Switching the ring switch / tee off to ON position without the associated cable termination box cover is properly closed.

4.9 **Terminations / Cable Boxes**

a) Termination in the Ring switches shall be dry-type inside cable boxes suitable for accepting three core Aluminum or Copper; XLPE insulated cables of outside diameter of 70-110 mm. Each cable box shall have a bottom plate and cable clamp. Bottom plate shall be in two halves with cable entry hole of 110 mm diameter. Cable clamp shall be detachable semi-circular halves suitable to hold the cable inside the cable box without cable glands.

b) Termination in the fuse switch / circuit breaker shall be dry-type inside cable box suitable for accepting three core or three single core Copper / Aluminum, XLPE insulated cables of outside diameter of 30-80 mm. The cable box shall have a bottom plate and cable clamp. Bottom plate shall be in two halves with three cable entry holes with rubber bushings.

Center entry hole shall be of 80 mm diameter for three core cable. Other two holes (right & left) shall be 30 mm diameter for single core cables. Cable clamps shall be detachable semi-circular halves suitable to hold the cables inside the cable box without cable glands.

c) Cable shall be terminated using single hole cable lugs suitable for bolt size of M16 for ring switch cubicles / modules and M12 for tee-off cubicles / modules, all necessary bolts, nuts and washers for fixing the cable on the bushings shall be provided with each unit**.**

d) Bushings for ring and tee-off switches shall be suitable for cable termination by means of bolted type connection with heat/cold shrinkable or screened pre-molded separable right angle/straight boots.

e) The clearances in the ring and tee-off cable boxes shall be sufficient for cable termination by heat shrink application.

f) Vertical distance from the top of cable clamp to the centerline of cable bushings shall be suitable for all type of terminations mentioned above.

g) The design of the cable boxes shall be such that the cable box shall allow full access during cable termination. Removal and installation of cable box cover shall be with minimum number of bolts.

4.10 **Metering Unit**

4.10.1 Two single phase voltage transformers according to IEC-60044-2 shall be fitted at the main busbar for metering purpose. They shall be dry type, epoxy encapsulated rated as follows:

- Voltage: 13.8 kV / 110 V
- Frequency: 60 Hz
- Burden: 20 VA
- Accuracy class: 1

4.10.2 Two double-ratio primary current transformers for metering according to IEC-60044-1 and SEC specification 50-SDMS-01 latest revision shall be fitted in the metering panel rated as follows:

- Current ratio: 400/200/5 A
- Burden: 10 VA
- Accuracy class: 0.5

4.11 **Terminal block**

Terminal blocks for remotely installed three phase three-wire revenue KWH meter shall be provided in the metering cubicle / module, identified and clearly marked. These terminal blocks shall have CT shorting and voltage disconnection facility without disturbing the wiring connections.

Terminal blocks for current injection test facility for protective relay shall be provided in the tee- off circuit breaker cubicles / modules, identified and clearly marked.

4.12 **Enclosure**

All cubicles / modules shall have a tamperproof and weatherproof steel enclosure, with lifting hooks. The degree of protection shall be IP4X or better as per specification no. 01-SDMS-01 latest revision. All panel bolts of enclosure shall be accessible from outside. All nuts, bolts and washers shall be stainless steel or hot dip galvanized.

The enclosure shall be adequately protected against corrosion and painted as per relevant clauses of SEC specification 01-SDMS-01 latest revision. Finish color shall be Cement Gray RAL 7033 as per ASTM D1535.

SEC may consider alternative methods of protection against corrosion. Vendor / manufacturer shall submit details with quotation.

4.13 **Dimensions**

Overall maximum size of each unit shall be:

Type	Ring switch	Tee-off fuse	Tee-off breaker	Metering unit
Usage				
Height (H)	1600 mm	1600 mm	1600 mm	1600 mm
Width (W)	550mm	650mm	650mm	1120mm
Depth (D)	850 mm	850 mm	850 mm	900mm
Operating mechanism height (maximum)	1300 mm	1300 mm	1300 mm	-

The above mentioned dimensions include any extensions needed for busbar couplings

4.14 **Earthing**

A ground bar of not less than 25 x 5 mm copper strip shall be provided bolted to the frame. It shall be located and arranged so as to facilitate earthing of cable sheaths and earthing devices. In addition, a terminal having M12 stud and nut shall be provided in the back of the panel with clear grounding mark. Extending facility of the earthing bus should be provided for bonding all units together.

4.15 **Voltage Indicator Lamps / Phase Comparators**

Built-in or Push-button type neon voltage indicators shall be provided together with low voltage hot phasing facility on ring switches. The lamps shall be powered by bushing type capacitive dividers.

Internal wiring in cable boxes shall be protected with heat resistant tape/tube, against flame temperatures of gas torch during the cable termination.

4.16 **Fault Indicator (FI)**

Fault indicator (SEC approved type) with automatic resetting, single-phase AC supply, split core type sensor as per SEC specification 38-SDMS-01 latest revision shall be supplied with the two LBS basic cubicle / module.

Fault indicator shall be protected inside separate sunshield cover with a mesh front (drawn from the same metal sheet).

FI shall be installed on the left hand side line-feeder. Three-pin plug for testing of FI by primary current injection shall be provided in separate compartment with screwed cover, below the FI housing.
SEC may require to supply the FI loose in an outdoor box with 10 meters of control cable for installation on masonry wall.

4.17 **SF6 Gas Pressure Indicator & Refilling Provision**

Temperature independent gas pressure gauge marked with green (safe) and red (not safe) zones shall be provided for each ring and tee-off switch cubicle/module. The safe operating zone shall correspond to a temperature range of $-10\ ^0C$ to $50\ ^0C$.

The unit shall continue to work safely even if the gas pressure inside the tank goes down to the atmospheric pressure.

Refilling/re-pressurizing inlet valve if provided shall be easily accessible for field refilling.

4.18 **Over-pressure Release**

In order to ensure maximum personal safety, Extensible Ring Main Unit shall be designed to withstand any overpressure due to an internal fault by rupture of a gas escape membrane located at the rear or bottom of the enclosure. The gas shall be led out through a flap in the rear panel to the bottom of the enclosure.

4.19 **Nameplate**

Each module / cubicle shall be provided with Aluminum /Stainless steel / Brass nameplate showing the following information indelibly marked in Arabic and English:

- Manufacturer's Name
- Country of Origin
- Type/Model
- Vendor's Name
- Reference of SEC specification
- Manufacturer's Serial Number
- SEC Purchase Order Number
- SEC Item Number

- Year of Manufacture
- Voltage Rating kV
- Current Rating Amps
- BIL kV
- Short Circuit Rating / Duration kA / Sec
- Rated Frequency 60Hz
- Rated Making Current kA
- Rated Breaking Current kA
- Gross Weight kg

4.20 **Circuit Labels**

Ring and T-off switches shall be provided with circuit number plates of dimension 150 x 50 mm. without inscription. Plate shall be made of three-layer traffolyte material (white/black/white) of 3 mm thickness as per SEC drawing No. SEC-01-03.

4.21 **Monograms and Danger Plates**

Danger plate and SEC monogram as per SEC drawings No. SEC - 01- 01 and SEC - 01-02 respectively shall be provided and installed at the front (on SEC approved location) of each cubicle / module using M5 hot dipped galvanized /stainless steel / brass fasteners (oval head rounded neck bolts with nuts and external tooth lock washers) not removable / accessible from the front i.e. without opening the front cover.

SEC shall approve location and samples of danger & monogram plates prior to installation.

5.0 TESTING AND INSPECTION

5.1 All equipment shall be type tested at an independent laboratory in accordance with the latest standards and as specified herein and test report shall be submitted for SEC review and approval.

5.2 The switchgear offered shall meet the type test requirements of the standards listed below:

5.2.1 Fuse-switch combination per IEC 60420

a) Dielectric Tests

b) Temperature Rise Tests
c) Making and Breaking Tests
d) Tests of the Operating Mechanism

5.2.2 High-voltage switches per IEC 60265
a) Dielectric Tests
b) Temperature Rise Tests
c) Making and Breaking Tests
d) Peak and Short Circuit Withstand Current Tests
e) Operation and Mechanical Endurance Tests
f) Internal arc test certificate

5.2.3 Circuit- breaker per IEC 62271-100
a) Dielectric Tests
b) Temperature Rise Tests
c) Measurement of the resistance of the main circuit
d) Short-time and Peak Withstand Current Tests
e) Mechanical and Environmental Tests
f) Making and Breaking Tests
g) Short-circuit Tests

5.2.4 Metering Unit as per relevant IEC standards

5.2.5 Degree of protection as per IEC 60529 and SEC specification no. 01-SDMS-01 latest revision

5.3 The switchgear offered shall meet the routine test requirements of the standards listed below:

5.3.1 Fuse-switch combination per IEC 60420
a) Mechanical Operating Tests
b) Power Frequency Dry Tests

5.3.2 High-voltage switches per IEC 60265
a) Power Frequency Voltage Tests
b) Voltage Tests on Auxiliary Circuits
c) Measurement of Resistance of Main Circuit
d) Operation Tests
e) Operation and Mechanical Endurance Tests

5.3.3 Circuit breaker per IEC 62271-100
- a) Power Frequency Voltage Tests
- b) Voltage Withstand Tests on Control and Auxiliary Circuits
- c) Measurement of Resistance of Main Circuit
- d) Mechanical Operating Tests

5.3.4 Metering Unit:
- a) Power Frequency Withstand Voltage Tests

5.4 SEC reserve the right to visit the factory during manufacture of any or all items covered by this specification, for inspection of material or witness of tests. Accordingly, the manufacturer shall give SEC adequate notice of manufacturing and testing schedule.

6.0 PACKING AND SHIPMENT

All units have to be supplied from same manufacturer for each tender ordered by SEC to achieve full installation compatibility.

6.1 Each unit shall be delivered ready for installation.

6.2 Each unit shall be individually packed in non-returnable cases as per packing /shipping requirements in relevant clauses of 01-SDMS-01.

6.3 For container shipment, each unit bolted on wood pallet is acceptable.

6.4 Tee-off fuse switch shall be delivered without fuses.

6.5 Units shall be delivered with handles, fixing bolts, earthing nuts, leaflet pocket with installation & operating manuals, test plugs and bill of materials for all loose items.

7.0 GUARANTEE

7.1 The vendor shall guarantee the extensible ring main unit against all defects arising out of faulty design or workmanship or defective material for a period of two years from the date of delivery.

7.2 Warranty period for gas tightness shall conform clause 5.15.3 of IEC 60694. Vendor / manufacturer shall assume full responsibility for no gas leakage during the service life.

In case of gas leak during the service life, all expenses for repairs and replacements shall be borne by vendor / manufacturer.

7.3 If no exception to this specification and no list of deviations are submitted, it shall be deemed that, in every respect, ring main unit offered shall conform to this specification. SEC interpretation of this specification shall be accepted.

8.0 SUBMITTALS

8.1 Vendor shall complete and return one copy of the attached Technical Data Schedule.

8.2 Vendor shall provide the following with the Quotation:

- Clause by clause compliance with this specification.
- Drawing showing the full constructional detail with dimensions of extensible ring main unit and all associated accessories.
- Drawings of cable boxes.
- Installation and maintenance instructions of the extensible ring main unit.
- Comprehensive list of manufacturer's recommended spare parts. The quantities offered should be adequate for the initial 5 years of operation. Firm price and delivery period shall be quoted for each item.
- Copy of type test report.
- A certificate from the termination manufacturers that the cable box size in all respect (technical, cable handling and making termination) is suitable for heat & cold shrink and pre-mold terminations.
- Descriptive leaflet and literature of extensible ring main unit offered.
- Checklist of quotation request.
- List of customers in case of new manufacturer / vendor.

8.3 Vendor shall provide the following after signing of purchase order:

- Details of manufacturing and testing schedules.
- Routine test reports.

9.0 DATA SCHEDULE
EXTENSIBLE RING MAIN UNIT, SF6, 17.5 kV

(Sheet 1 of 3)

SEC Inquiry No. _____ Item No. _____

REF. SEC.	DESCRIPTION	SEC SPECIFIED VALUE	VENDOR PROPOSED VALUES
4.0	**DESIGN AND CONSTRUCTION REQUIREMENTS**		
4.1	**GENERAL**		
	1. EXT-RMU Type	Indoor	
	2. Ring Switch	LBS	
	3. Tee-off	Fuse / Breaker	
	4. Fuse-switch with shunt coil	Yes / No	
	5. Term. fastener for Ring switch	M16	
	6. Term. fastener for Tee-Off	M12	
4.2~4.4	**GENERAL**		
	1. Service Voltage	13.8 kV	
	2. Maximum Operating Voltage	17.5 kV	
	3. Rated Frequency	60 Hz	
	4. Rated Current of Load Break (As per clause 4.3)	400 A	
	5. Rated Current of Fuse Switches (As per clause 4.3)	200 A	
	6. Short circuit withstand current Ring switches (1 sec.)	21 kA	
	7. Rated Making Current of Ring switches (peak)	50 kA	
	8. Rated Making Current of Earthing Switches (peak)	50 kA	
	9. Rated Making Current of Fuse Switch (peak)	50 kA	
	10. Impulse Withstand Voltage	As per (01-SDMS-01)	
	11. Power Frequency Withstand Voltage (1 min.)	As given in (01-SDMS-01)	
	12. Internal Arc fault withstand for 1 second	20 kA	

9.0 DATA SCHEDULE
RING MAIN UNIT, SF6, 17.5 kV
(Sheet 2 of 3)

SEC Inquiry No. _____ Item No. _____

4.5.3	CIRCUIT BREAKER TYPE

1. Service Voltage	13.8 kV	
2. Maximum Operating Voltage	17.5 kV	
3. Rated Frequency	60 Hz	
4. Rated Current of CB	200 A	
5. Rated Short circuit level (1 s)	21 kA	
6. Rated Making Current	50 kA	
7. Re-striking Voltage Ratio	1.4	
8. Duty Cycle	O-t_1-CO- t_2-CO	
9. Making time	ms	
10.Opening time	ms	
11. Arc Duration	ms	
12. Total Breaking Time	ms	
13. Operating Mechanism	Spring Charged	

4.5.2	DIMENSIONS OF FUSE

1. Overall Length of Fuse	442 mm	
2. Overall Diameter	As per spec 34-SDMS-02	

4.9	TERMINATION / CABLE BOX		
	Cable box size		
	Vertical distance (bushing to clamp)		

4.10	ENCLOSURE

1. Overall Dimensions	Width x Depth x Height (mm x mm x mm)	
2. Degree of Protection	IP4X	
3. Finish Method		
4. Finish Color	RAL 7033	

9.0 DATA SCHEDULE

RING MAIN UNIT, SF6, 17.5 kV
(Sheet 3 of 3)

SEC Inquiry No. _____ Item No. _____

A. ADDITIONAL TECHNICAL INFORMATION OR FEATURES SPECIFIED BY SEC:

B. ADDITIONAL SUPPLEMENTARY DATA OR FEATURES PROPOSED BY BIDDER/VENDOR/SUPPLIER:

C. OTHER PARTICULARS TO BE FILLED UP BY BIDDER/VENDOR/ SUPPLIER:

D. LIST OF DEVIATIONS & CLAUSES TO WHICH EXCEPTIONS ARE TAKEN BY THE BIDDER/VENDOR/SUPPLIER: (USE SEPARATE SHEET IF NECESSARY)

	MANUFACTURER OF MATERIALS/EQUIPMEN	VENDOR / SUPPLIER
Name of Company		
Location and Office Address		
Name and Signature of Authorize Representative		
Official Seal / Stamp		

APPENDIX

Specifications of Phase and Ground Over current Protective Relays with Low set (Time Delay) and High-set (Instantaneous) Elements (50/51,50N/51N) for RMUs

1.0 General

1.1 The relay shall be of electronic/microprocessor type.

1.2 All the components, hardware, input/output devices of the relay shall comply with relevant IEC or equivalent standards.

1.3 The relay shall use thoroughly tested hardware as per IEC or equivalent standards. Relay should have acquired at least two (2) years of field experience in a major electricity utility.

1.4 All the input/output units of the relay shall be capable of making/breaking currents (with any transients) and withstand voltages (normally intended/harmonic over voltages).

1.5 The relay shall be immune to all types of electrical and mechanical interference in accordance with relevant IEC standard or equivalent.

1.6 The relay shall be powered through CTS in normal condition while it shall also be capable to work through its own source of supply as well in power off condition.

1.7 The degree of protection of the relay enclosure shall be suitable for indoor applications. in extreme heat and dusty conditions without affecting its normal performance.

2.0 Application

2.1 The relay shall meet the following criteria:

2.1.1 Naturally be quicker than the MV protection device immediately upstream.

2.1.2 Naturally selective with the LV protection device.

2.1.3 To have inrush current restraint features.

2.1.4 Local/Remote CB tripped fault indication preferably.

2.1.5 Will be able to guarantee monitoring of the transformer overload zone, or the zone immediately above the overload threshold.

2.2 The relay shall be suitable for 5A or 1A CT secondary current.

2.3 Phase fault over current protection shall have IDMT features so as to coordinate with upstream IDMT and definite time delay relay. The selectable minimum pickup setting shall be 0.1 In.

2.4 Ground fault protection shall have definite time characteristics features and shall have:

2.4.1 Selectable pickup setting.

2.4.2 Time setting range of 0.1 to 1.0s.

2.5 The relay shall be:

2.5.1 Suitable for operating on 60 Hz.

2.5.2 Suitable for solidly / low resistance grounded system.

2.5.3 Provided with local / remote trigger indicator for the CB tripped with fault indication preferably.

2.6 The relay AC circuits shall withstand continuous current of 3xIn (where In is the relay rated current), a current of 20xIn for 10 sec. and a current of 70xIn for 1 sec.

2.7 The relay shall have high dropout to pickup ratio and transient overreaching for instantaneous Protection as per IEC. The relay shall impose low burden on CTs.

2.8 The relay and CTs should be compatible with each other and supplied as one integrated package.

2.9 The relay shall have instantaneous over current protection and earth fault protection.

3.0 Testing

3.1 The relays shall be tested in accordance with the requirements of IEC or equivalent ANSI, BS, etc.

3.2 The relays shall be capable of being functionally tested completely, with adequate safety without the risk of spurious tripping, per standard test connections, using secondary injection test sets.

3.3 The relay shall have external testing facilities. The design of the test terminals/plugs shall be such that external test equipment can be connected at a conveniently located connector on the relay panel.

4.0 Instruction and Maintenance Manual

4.1 Original manufacturer's instruction manuals and documentation shall be provided.

4.2 The information in the manuals and documentation for the relay shall include but not limited to the following:

4.2.1 Specification, characteristics and available functions.

4.2.2 Relay limitations.

4.2.3 External connections.

4.2.4 Any special device for testing/calibrating the relay should be mentioned.

4.2.5 Description, drawings of the construction and the principles of operation.

4.2.6 All setting calculation procedures and instructions.

4.2.7 Installation requirements and instructions.

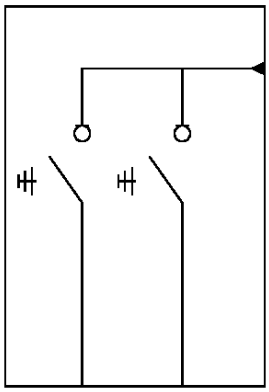
4.2.8 Routine maintenance requirements and instructions.

4.2.9 Repair and re-calibration instructions.

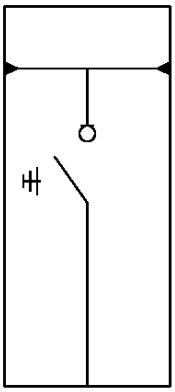
4.2.10 Parts list.

4.2.11 Certified test reports.

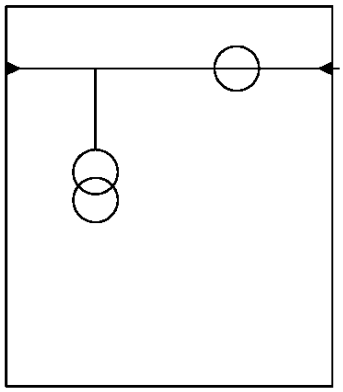
2-LBS



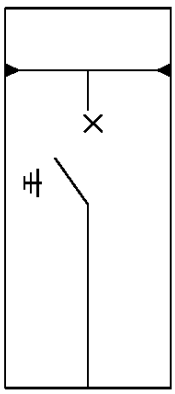
LBS



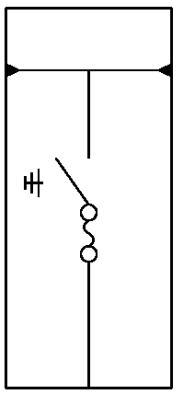
Metering Panel

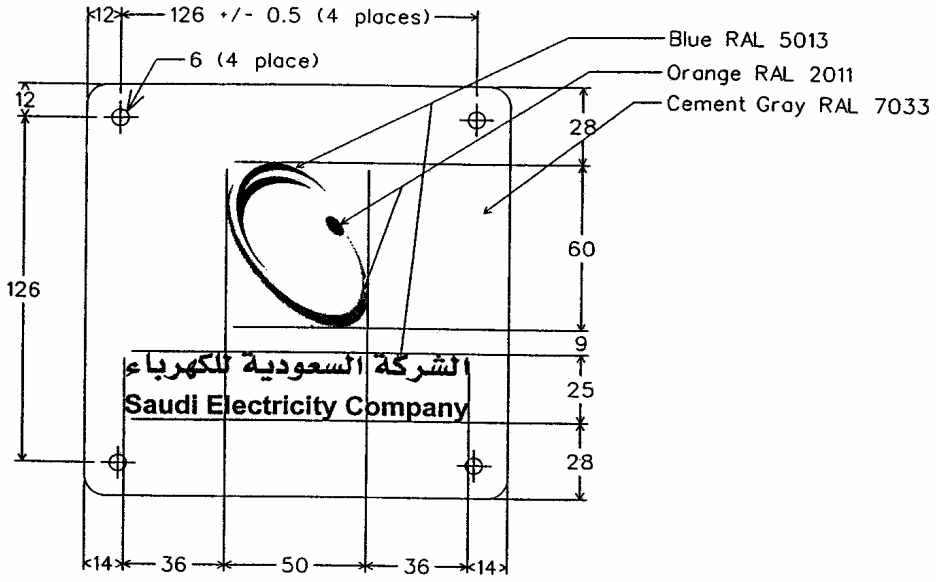


CB



Fuse Switch

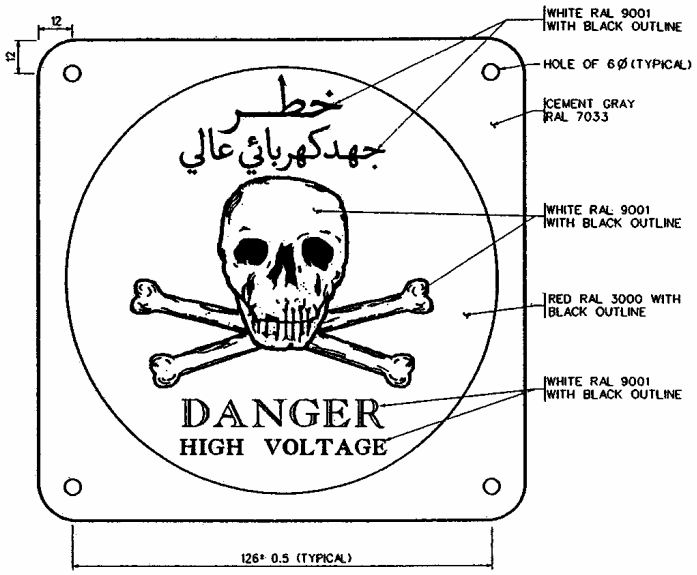




Note:
1) All Dimention are in millimeters.
2) 150 X150 X 1.5 thick, aluminum plate with three (3) color monogram
3) Sepcimen for color shades shall be obtained from SEC.
4) Size of symbols and lettering shall be propotional to the overall dimensions of the monogram.

MONOGRAM FOR EQUIPMENT MOUNTING

Drawing No.
SEC-01-01

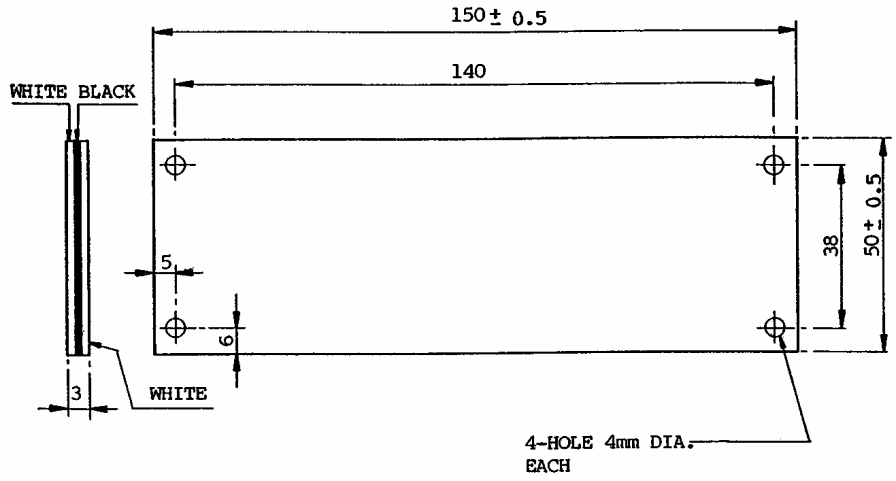


NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. 150 x 150 x 1.5 THICK, ALUMINUM PLATE FOR EQUIPMENT MOUNTING.
3. SPECIMEN FOR COLOR SHADES SHALL BE OBTAINED FROM SCECO-EAST.
4. HIGH GLOSS ENAMEL PAINT REQUIREMENTS SHALL CONFORM TO SCECO-EAST MATERIAL SPECIFICATIONS 78-SMSS-2, 78-SMSS-4 AND ENGINEERING STANDARD SES-H-001
5. SIZE OF SYMBOL AND LETTERING SHALL BE PROPORTIONAL TO THE OVERALL DIMENSIONS OF THE SIGN.
6. FOR THE INSTALLATION OF THIS SIGN ON THE PERIMETER FENCE AND GATE OF THE TRANSMISSION SUBSTATION, THE SIZE OF THE SIGN SHALL BE 510 x 510 AND 255 x 255 RESPECTIVELY, WHEREIN THE HOLE CENTERS WILL BE 25 & 15 & HOLE DIAMETERS WILL BE 10 & 6 RESPECTIVELY
7. THE SIGN PLATE SHALL HAVE ROUNDED CORNERS AND NO SHARP OR ROUGH EDGES

DANGER SIGN FOR EQUIPMENT

Drawing No.
SEC-01-02



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. MATERIAL TRAFFOLYTE WHITE - BLACK - WHITE THICKNESS 3mm.
3. THIS PLATE WILL BE USED TO ENGRAVE LETTERS AND NUMBERS BY USING ENGRAVING MACHINE.

CIRCUIT LABEL PLATE

Drawing No.
SEC-01-03