

Saudi Electricity Company



الشركة السعودية للكهرباء

SEC DISTRIBUTION CONSTRUCTION STANDARD

30-SDMS-02

DATE: 28-09-2005G

30-SDMS-02

SPECIFICATIONS

FOR

**DISCONNECT AND BYPASS-DISCONNECT
SWITCHES**

**This specification is property of SEC and
subject to change or modification without any notice**

**TABLE OF CONTENTS**

1.0	SCOPE	3
2.0	CROSS REFERENCES	3
3.0	APPLICABLE CODES AND STANDARDS	3
4.0	SERVICE CONDITIONS	4
5.0	SYSTEM PARAMETERS	4
6.0	DESIGN AND CONSTRUCTION REQUIREMENTS	4
7.0	MARKING	7
8.0	TESTING AND INSPECTION	7
9.0	PACKING AND SHIPPING	9
10.0	GUARANTEE	10
11.0	TECHNICAL DATA SCHEDULE	11
12.0	DRAWINGS	13



1.0 SCOPE:

This SEC Distribution Material specification describes the minimum technical requirements for design, engineering, manufacturing, testing, inspection, delivery and performance requirement for air type Bypass/Disconnect switches and Disconnect switches for 13.8 kV and 33 kV, Automatic Voltage Regulators and Auto reclosers intended to be used in the overhead distribution system of the Saudi Electricity Company (SEC).

2.0 CROSS REFERENCES:

- 2.1 This material standard specification shall be read in conjunction with the SEC general specification No. 01-SDMS-01 (latest revision) for general requirements for all equipment/materials as an integral part of this SDMS.
- 2.2 This SDMS shall also be read in conjunction with SEC purchase order requirements or contract schedules.

3.0 APPLICABLE CODES AND STANDARDS:

The latest revision of the following codes and standards shall be applicable for the equipment/materials covered in this specification. In case of any deviation, the vendor/manufacturer may propose equipment/material conforming to an alternate code or standard. However, the provision of SEC standards shall supersede the provisions of these alternate standards in case of any difference.

- | | | |
|-----|----------------|---|
| 3.1 | IEC 60060 -1 | High Voltage Test Techniques. |
| 3.2 | IEC 60129 | Alternating Current Disconnect and Earthing Switches. |
| 3.3 | IEC 60137 | Bushings for alternating voltages above 1 kV |
| 3.4 | IEC 60168 | Test on Indoor and Outdoor Post Insulators of Ceramic Material or Glass for System With Nominal Voltages Greater Than 1000 V. |
| 3.5 | IEC 60437 | Radio Interference Test on High Voltage Insulators. |
| 3.6 | IEC 60507 | Artificial Pollution Test on High Voltage Insulators to be Used on A.C System. |
| 3.7 | IEC 60694:1996 | Common Specifications For High Voltage Switchgear And Controlgear Standards. |
| 3.8 | ANSI C 37.41 | Design Tests for High Voltages Fuses, Distribution Including Air Switches, Fuse Disconnecting Switches and Accessories. |
| 3.9 | BS 729 | Galvanizing |



In case of any deviation from the listed standards, it should be indicated in the list of deviations submitted by the supplier.

4.0 SERVICE CONDITIONS:

- 4.1 The Disconnect/Bypass-Disconnect switch shall be suitable for operation under the service conditions as per SEC latest revision of general Specification No. 01-SDMS-01.
- 4.2 The Disconnect/Bypass-Disconnect switch and fittings shall withstand the effect of direct solar radiation at their installed locations. The temperature of exposed surfaces shall be regarded as 75°C plus the effect of internal heating.

5.0 SYSTEM PARAMETERS:

The Disconnect Bypass switch shall be suitable for installation in a system as given in the latest revisions of the SEC general specification No. 01-SDMS-01.

6.0 DESIGN AND CONSTRUCTION REQUIREMENTS:

6.1 General

- 6.1.1 The Bypass/Disconnect switch for voltage regulator shall be capable of switching load current with full recovery system voltage across the switch and interrupting the magnetizing current and overhead line charging current. They shall permit all switching to be done on-load such as bypassing, disconnecting and connecting the line current. Bypass/Disconnect switch for voltage regulator shall be fitted with interrupting devices and shall be capable of closing on faults.
- 6.1.2 The Bypass/Disconnect switch for autorecloser shall be capable of switching load current with full recovery system voltage across the switch and shall permit all switching to be done live such as bypassing, disconnecting and connecting the full line current and shall be fitted with interrupting device and shall be capable of closing on fault.
- 6.1.3 Disconnect switch for voltage regulator shall be capable of switching load current with full recovery voltage across the switch and shall permit all switching to be done live such as disconnecting and connecting.



6.2 Current Rating:

This specification covers the standard ratings for Disconnect switches and Disconnect/Bypass switches, with rated current of 400A and 600A for both 13.8 kV and 33 kV system voltages.

6.3 Basic insulation level (BIL)

The BIL for 13.8 kV and 33 kV systems shall be as per SEC latest revision of general Specification No. 01-SDMS-01.

6.4 Rated Short Time Withstand Current:

The rated r.m.s short time current for one second shall be: 21 kA and 25 kA for 13.8 kV and 33 kV switches, respectively.

6.5 Radio influence:

The maximum value shall be as follows:

13.8kV: 250 μ V at 1 MHZ
33kV: 650 μ V at 1 MHZ

6.6 Creepage distances:

Creepage distances are based on nominal line-to-line voltage.

Creepage/Leakage distance shall be 25/40 mm/kV minimum as per SEC general specification No. 01-SDMS-01.

6.7 Main assembly:

6.7.1 Bypass disconnect switch for automatic voltage regulators.

6.7.1.1 Bypass/Disconnect switches shall be single-pole type with built in features of mechanical interlocking, sequencing and synchronizing. It shall be suitable for vertical mounting on a fabricated galvanized steel base and capable to be operated by hot stick through built in hook.

6.7.1.2 The switch shall be capable to bypass the source current, disconnect the source and load terminals and interrupt the



magnetizing current in a sequence such as to avoid any damage to the voltage regulator.

6.7.1.3 Arc interrupting devices shall be fitted on the fixed contacts to provide protection to the main contacts from erosion.

6.7.2 Autorecloser bypass/Disconnect switch shall be single pole type, suitable for vertical mounting capable to bypass the source current without damage to the autorecloser.

6.7.3 Disconnect switches for voltage regulators shall be of single pole type and suitable for vertical Installation.

6.8 Insulators:

The insulators shall be the solid glazed porcelain, epoxy or polymer type and shall be bird Proof (they will be shaped so as to stop small birds from nesting). Color shall be preferably brown. However, grey color shall be acceptable. The insulators shall be rigidly connected to the base so that deflection of the insulators under short circuit conditions is kept to a minimum and there is no tendency for them to work loose from base.

6.9 Contacts and blades

All contacts shall be designed to operate on continuous rated current. Silver to silver / nickel to nickel contacts shall be utilized through out the switch. The contacts shall be capable to prevent weld burn or pit on over currents. The disconnect, interrupter and bypass blades shall have double member hard drawn copper construction clad with extra thick, high density low porosity silver/nickel. The surface of stationary contacts shall be such that to prevent sticking galling or seizing and shall be resistive to weld, burn or pit on over currents. The bypass blade must be capable to latch positively, to operate at full load when closed after it remains open for a long period and prevent opening under high momentary current conditions it must be capable to retain complete alignment through out its life time for its disconnecting and bypass components.

6.10 Interrupter:

The interrupter blade should be capable for proper arc quenching for interrupting the shunt winding magnetizing current.



6.11 Connections:

The switch terminals for connection of line conductors must not be loose due to vibration.

The terminals shall be suitable for copper, ACSR/AW, Aluminum and aluminum alloy conductors without risk of corrosion.

The terminals shall be designed for use with compression lugs, for fixing the lug and shall be suitable for the SEC standard sizes of conductors.

6.12 Galvanizing:

All iron components shall be coated with zinc or a material having equivalent protection against atmospheric corrosion. If coated by the hot dip galvanizing method, coating shall be made in accordance with BS 729.

The supplier shall state weight/thickness of zinc coating on the attached schedule.

7.0 MARKING:

Each switch shall be provided with a weather proof and corrosion proof name plate and shall give the following information in English and/or Arabic.

- 7.1 Purchase Order/Tender No.
- 7.2 Manufacturer name.
- 7.3 Year of manufacturing.
- 7.4 Type of switches.
- 7.5 Rated current.
- 7.6 Rated short time withstand current.
- 7.7 Rated voltage.
- 7.8 Short circuit current.

8.0 TESTING AND INSPECTION:

8.1 General:

All switches shall be tested in accordance with the latest standards and as specified herein. The supplier shall provide acceptable type test and routine test certificates for his offered switches. SEC at his discretion may wish to have



additional or to repeat type test being carried out. Two certified copies of the test reports shall be submitted to the SEC for approval.

No switch shall be shipped until approval of the test reports has been given by SEC. Routine and/or sample tests shall be carried at the supplier/manufacturer factory. Type tests shall be carried out at independent testing laboratory and be witnessed by a representative of an independent testing laboratory or other representative acceptable to SEC. Schedule/plan of type test shall be submitted in advance.

8.2 Type Test:

All load break switches shall be type tested in accordance with the latest standards in this specification given below.

8.2.1 Dielectric tests to IEC 60129 clause 6.1.

8.2.2 Power frequency withstand (1 minute dry & wet).

8.2.3 Impulse withstand (1.2 x 50 μ sec).

8.2.4 Temperature rise test to IEC 60129 clause 6.3.

8.2.5 Resistance tests to IEC 60129 clause 6.4.

8.2.6 Short time withstand current and peak current withstand tests to IEC 60129 clause 6.5.

8.2.7 Test to prove satisfactory operation under ice conditions (only on special request by SEC) to IEC 60129 clause 6.103.

8.2.8 Operating and mechanical endurance tests to IEC 60129 clause 6.104

8.2.9 Test for measuring Radio interference levels to IEC 60437.

8.2.10 Pollution tests to IEC 60507.

8.3 Routine Tests:

All the switches offered shall meet the routine test requirements of the standards given below:



- 8.3.1 Power frequency voltage withstand test (dry) to IEC60129 clause 7.1
- 8.3.2 Voltage tests on control and auxiliary circuits to IEC 60129 clause 7.2
- 8.3.3 Measurement of the resistance of main circuit to IEC 60129 clause 7.3
- 8.3.4 Mechanical operating tests to IEC 60129 clause 7.101

8.4 Inspection:

The SEC may wish to witness tests or visit the factory during manufacture of any or all items covered by this specification. Accordingly the supplier shall give the purchaser adequate notice of manufacturing program and test to be witnessed. SEC may require certificates and data from the manufacturer /supplier on all pertinent aspects of the manufacturing process. However for detailed inspection conditions refer to the latest revision of the SEC general specification No 01-SDMS-01, clause 7. Schedule/plan of type test shall be submitted in advance.

9.0 PACKING AND SHIPPING:

- 9.1 Each switch shall be packed individually in a strong non returnable wooden crate in such manner to prevent damage components during transportation and handling up to installation site.
- 9.2 Packing shall be designed to prevent entry of dust, ingress of moisture and other foreign materials.
- 9.3 Packing shall be marked with the following:
 - 9.3.1 Manufacture's name
 - 9.3.2 Country of origin.
 - 9.3.3 SEC Item number.
 - 9.3.4 SEC purchase order number.
 - 9.3.5 Weight in kilogram.
 - 9.3.6 Handling instruction.
 - 9.3.7 Voltage and current rating.
- 9.4 Supplier shall contact material department for additional packing, handling and shipment instructions as applicable.



9.5 Packing note in Arabic and English shall be included in each case giving description of goods packed.

9.6 Switches shall not be packed in any organic material.

10.0 GUARANTEE:

10.1 Vendor shall guarantee the switches against all the defects arising out of faulty design, workmanship or defective material for a period of one year from the date of installation or two years from the date of delivery, unless and otherwise specified in tender documents. SEC certification for the date of installation shall be accepted by the vendor.

10.2 If no exception/deviations are taken to this specification and no list of deviations is submitted, it shall be deemed that, in every respect, the offered switches and their accessories conform to this specification. A reference list of the present users of the offered load break switch with the relevant address and fax No. shall be included.

11.0 TECHNICAL DATA SCHEDULE:

11.1 The vendor shall complete and return one copy of the attached technical data schedule with quotation. In addition to data schedule, submittal for clauses from 11.2 to 11.4 shall be provided with quotations.

11.2 Detailed dimensional drawing of the Load break switch showing mounting arrangements.

11.3 The supplier shall provide literature describing field experience under similar service conditions to those given in SEC Ref No.4. A reference sale list shall be included. This shall detail the quantities sold, name and address of users, the number of years in service in each case. The literature shall show at least 10 years service in each environment.

11.4 Type test certificates.

11.5 Submittals required following award of contract are given below:

- Manufacturing schedule, progress report and test schedule.
- Test reports



SEC DISTRIBUTION MATERIALS SPECIFICATION

30-SDMS-02

DATE: 28-09-2005G

12.0 TECHNICAL DATA SCHEDULE
(Sheet 1 Of 2)

Type of switch: Bypass-Disconnect / Disconnect Switch for Voltage Regulator, Bypass-Disconnect for Autorecloser

SEC Inquiry No. _____

Item No. _____

S/N	DESCRIPTION	UNIT	SEC SPECIFIED VALUES		VENDOR PROPOSED VALUES
1	System Voltage	kV	13.8	33	
2	Rated Voltage	kV	15.2	36	
3	Continuous current capacity	A	400/600	600	
4	Breaking current capacity	A	400/600	600	
5	Short time withstand current (1sec)	kA	21	25	
6	Creepage distance	mm/kV	25/40	25/40	
7	Dry flash over voltage	kV	70/110	125/175	
8	Wet flash over voltage	kV	50/80	100/150	
9	Max radio interference voltage	μV	250	650	
10	Ambient temperature during temperature rise tests	°C	40	40	
11	Temperature rise of contacts	°C	65	65	
12	Temperature rise of terminals	°C	65	65	
13	Material of support insulators and color.	-	Porcelain/ Epoxy/Polymer glazed brown/gray		
14	Bird proof arrangement	-	Preferred		
15	Minimum clearance between phase and earth	mm			
16	Method of attachment of insulator to insulator base.	-			
17	Minimum clearance between source and load blades	mm			
18	Main contacts material	-			
19	Main contacts plating material.	-	Silver/ Nickel	Silver/ Nickel	
20	All ferrous components galvanized.	-	Yes		
21	Short circuit levels	kA	21	25	
22	Fitting of permanent load break device	-	Required		
23	Fault closing capability	-	Required		



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12.0 TECHNICAL DATA SCHEDULE
(Sheet 2 of 2)

SEC Inquiry No. _____ Item No. _____

Type of switch: Bypass-Disconnect / Disconnect Switch for Voltage Regulator, Bypass-Disconnect for Autorecloser

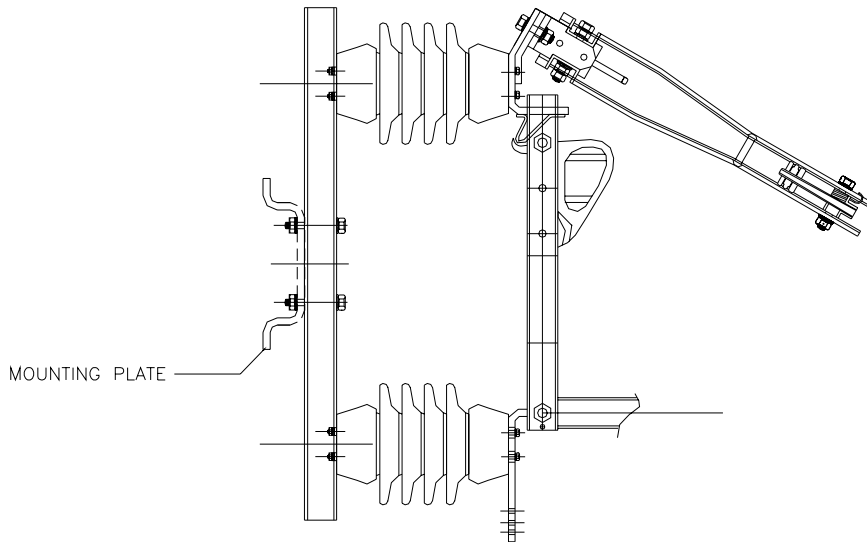
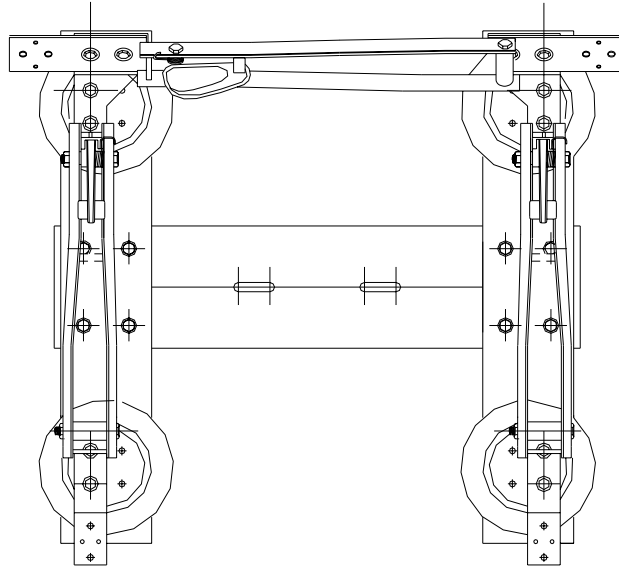
A. ADDITIONAL TECHNICAL INFORMATION OR FEATURES SPECIFIED BY SEC

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 EXCEPTION IS TAKEN BY THE BIDDER/VENDOR/SUPPLIER: (USE SEPARATE SHEET IF NECESSARY):

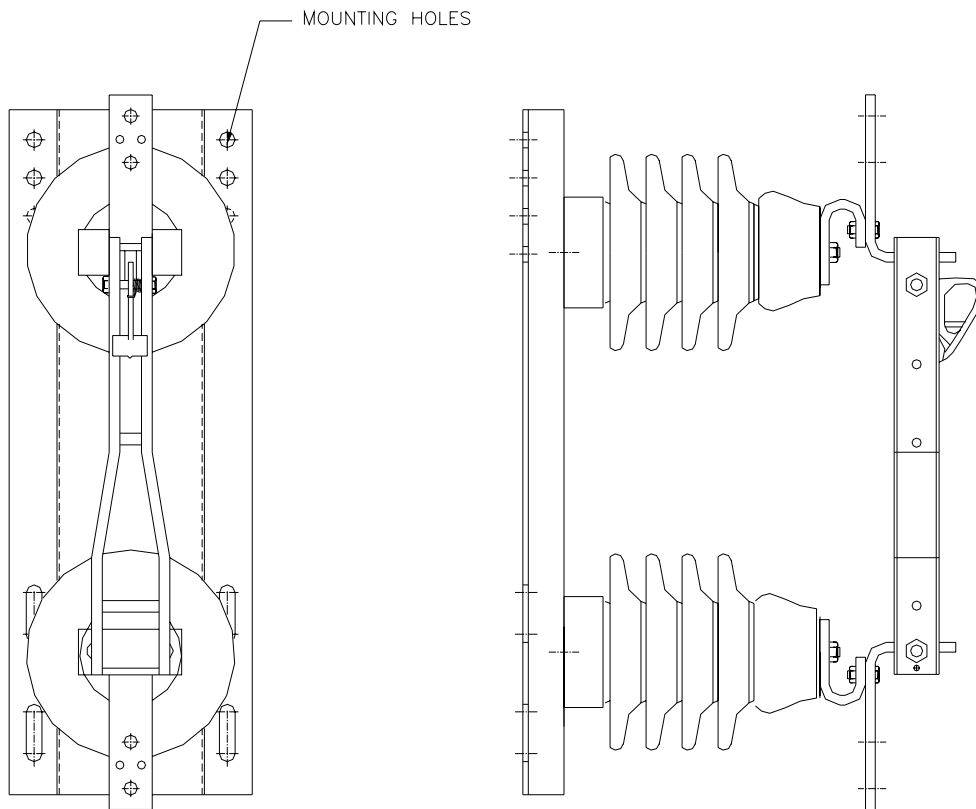
	MANUFACTURER OF MATERIALS/EQUIPMENT	VENDOR/SUPPLIER
Name of Company		
Location and Office Address		
Name and Signature of Authorized Representative and Date		
Official Seal/Stamp		



NOTE:

THIS DRAWING IS CONCEPTUAL PURPOSE ONLY.

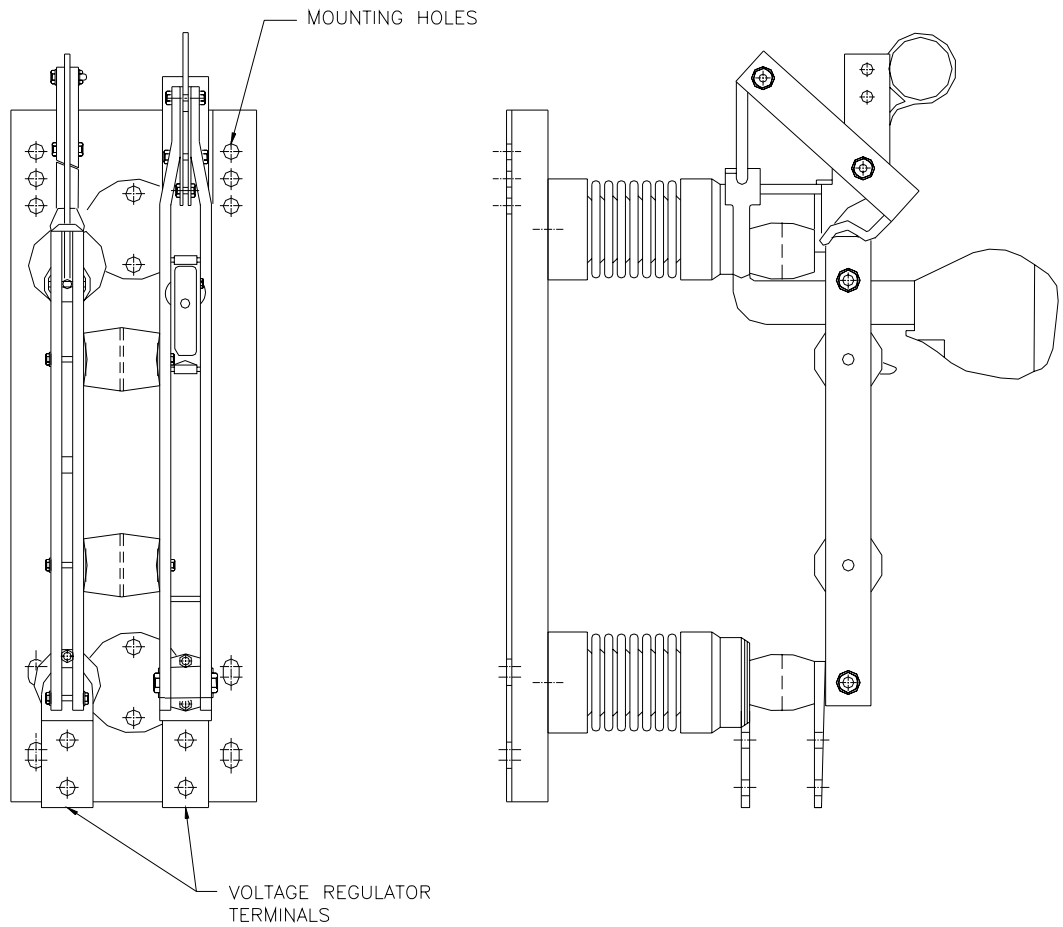
AUTO RECLOSER BYPASS SWITCH



NOTE:

THIS DRAWING IS CONCEPTUAL PURPOSE ONLY.

DISCONNECT SWITCH FOR VOLTAGE REGULATOR



NOTE:

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VOLTAGE REGULATOR BYPASS SWITCH