34-SDMS-01

REV. 01

SPECIFICATION

FOR

MV DROPOUT FUSE CUT OUTS

Revision History

#	Date	Revision No.	Major Revision Description
1	November 2020	1	Insulators type changed for using polymer insulators instead of porcelain insulators.
2	November 2020	1	Guarantee period changed to be according to SEC new rules (5 years from the date of delivery).

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1 Scope

This SEC distribution material specification (SDMS) describes the minimum technical requirements for design, materials, manufacturing, testing, inspection and performance for 13.8 kV and 33 kV dropout fuse cutouts, intended to be used for the protection of the overhead distribution system of the Saudi Electricity Company (SEC).

2 Cross References

2.1 This specification shall always be read in conjunction with the SEC general specification No. 01-SDMS-01, latest revision titled "General requirements for all equipment/ materials," which shall be considered as an integral part of this SDMS.

2.2 This specification shall always be read in conjunction with SEC purchase order or contract schedules and the scope of work and technical specification for project as applicable.

2.3 This specification shall always be read in conjunction with SEC specification for polymeric insulators No. 15-SDMS-02, latest revision.

3 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.

IEC	International Electro-technical Commission
IEC 60060	High Voltage Test Techniques.
IEC 62217	Polymeric HV Insulators for Indoor and Outdoor Use – General Definitions, Test Methods and Acceptance Criteria
IEC 60282-2	High voltage fuses part2: Expulsion and similar insulators.
IEC 60437	Radio interference test on high voltage insulators.
IEC 60507	Artificial pollution test on high voltage insulators to be used on A.C system.
IEC 60270	High-Voltage Test Techniques – Partial Discharge Measurements

Table 1: Applicable Codes and standards (IEC)

ANSI	American National Standard Institute
ANSI C 37.41	Design tests for high voltages fuses, distribution including air switches, fuse disconnecting switches and accessories.
ANSI C 37.42	Specification for distribution cut outs and fuse links.

Table 2: Applicable Codes and standards (ANSI)

NEMA	National Electrical Manufacturers Association.
NEMA S.G 2	High voltage fuses

Table 3: Applicable Codes and standards (NEMA)

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

4 SERVICE CONDITIONS:

4.1 The dropout fuse cutouts shall be suitable for operation under the service conditions as per SEC latest revision of general specification No.01- SDMS- 01.

4.2 The dropout fuse cutouts and its fittings shall withstand the effect of direct solar radiation at their installed locations. The temperature of exposed surface shall be 75 °C excluding internal heating.

5 SYSTEM CONDITIONS:

The drop out fuse cut outs for 13.8 kV and 33 kV shall be suitable to operate under typical system parameters, specified in latest revision of SEC specification No.01-SDMS-01.

6 DESIGN AND CONSTRUCTION REQUIREMENTS:

6.1 CURRENT RATING:

SYSTEM VOLTAGE	CURRENT RATING
13.8 KV	100 & 200 A
33 KV	100 A

Table 4: Current rating.

6.2 INTERRUPTING CAPACITY:

SYSTEM VOLTAGE	CURRENT RATING
13.8 KV	8 kA Symmetrical r.m.s. minimum.
33 KV	8 kA Symmetrical r.m.s. minimum.

Table 5: Interrupting capacity.

6.3 Minimum Dielectric withstand values:

13.8 /33 kV	Power frequency withstand 1min Dry and Wet.
To earth and between poles.	38/70 kV
Across the isolating distances.	45/80 kV
Impulse (1.2x 50 µ sec)	
To earth and between poles.	95/170 kV
Across the isolating Distances	110/200 kV

Table 6: Dielectric withstand values..

6.4 Radio interference voltage:

The maximum value shall be as follows:

SYSTEM VOLTAGE	Radio interference voltage
13.8 KV	250 µV at 1 MHZ
33 KV	650 µV at 1 MHZ

Table 7: Radio interference voltage.

6.5 Fuse link:

The drop out fuse cutouts shall be suitable in all respects for fuse links within the range as defined in IEC 60282-2 and NEMA SG 2.It should be K- type with removable button head and with the length of 787.4 mm (31 inches).

6.6 Basic insulation level:

The basic insulation level for 13.8 kV and 33 kV fuse cutouts shall be referred to the latest revision of the SEC general specification No.01-SDMS-01

6.7 Interchangeability.

The fuse holder and tube of a dropout fuse cutout shall be dimensionally compatible with a universal type IEC and NEMA fuse links of corresponding rating. The cutout and fuse links shall meet the interchangeability requirements of ANSI C 37.42 as also contained in NEMA SG 2.

6.8 Creepage distances:

Three levels of creepage distances shall be maintained as per requirement for fuse cutouts, they are:-

a) 660 mm creepage distance with single insulator

b) 825 mm creepage distance with standoff insulator.

c) 1320 mm creepage distance with standoff insulator.

6.9 Fuse tube:

Fuse tube shall be bone fiber lined epoxy fiberglass with exterior ultra violet (U.V) protected, solid cap and single vented with arc shortening rod. Solid link shall also be used in place of as and when required.

6.10 Main assembly construction:

The main assembly shall be mounted on a single insulator of 660 mm creepage distance in the case of 13.8 kV fuse cutouts and single insulator along with standoff insulator arrangement of total creepage of 825 mm or 1320 mm for 33 KV fuse cutouts.

6.11 Mounting arrangement:

The dropout fuse cutouts shall be suitable for vertical mounting. NEMA brackets shall be provided for both type of dropout fuse cutouts. The brackets including bolts, nuts, lock washers etc. shall be in accordance with ANSI C 37.42 to prevent swiveling. The upper, lower fuse unit and fitting shall be reusable. The fuse holder shall be easy to operate with hot stick.

6.12 Contacts.

All contacts shall be designed to give continuous rated current carrying capacity after exposure to marine and desert climates for the service life. Contacts shall be silver clad on each side. Embossed surfaces with wiping action are preferred. Top and bottom contacts, sub-assemblies and mounting fitting shall be potted into the polymeric insulators. The upper fixed contacts assembly shall not be corroded when exposed to atmosphere. Upper contacts shall positively latch in the closed position. The lower contacts shall be with stainless steel backup springs to prevent arcing that may occur as the fuse tube rises slightly in the hinge during operation.

6.13 Terminals:

The terminals shall be made in such a way that ACSR/AW conductors can be connected without any risk of corrosion. The material used shall be copper and plated with suitable alloy. The terminals shall be of parallel groove type and shall be suitable for the standard sizes of conductors used by SEC.

6.14 Insulators:

The insulators shall be polymer with grey color single-piece housing and sheds that are designed to minimize trapping of contamination of dust, sands, etc. Housing shall be made of UV-resistant high-temperature vulcanized silicon rubber with hydrophobic surface and is manufactured using a direct molding method according to SEC specification for polymeric insulators No. 15-SDMS-02, latest revision. There shall be no steel bands around the insulator. In case of standoff insulator, the insulators shall be rigidly connected to the channel, base where provided 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.

6.15 Load break hook:

The dropout fuse cutouts shall be provided with load break hooks to facilitate the use of portable load break tools. The attachment hooks shall be made of galvanized steel, not less than 9.54 mm (3/8” in) diameter. They shall be resistance welded to the upper contacts assembly. Spot welding, which can produce localized rust and weaken the hooks, shall not be acceptable.

6.16 Galvanizing:

All iron components shall be galvanized in accordance with SEC general specification 01-SDMS-01.The supplier /vendor shall state weight / thickness of zinc coating on the attached technical data schedule.

6.17 Fuse tube assembly:

- The assembly shall be designed in such a way that the fuse tube can be pushed-in into the slot even without taking due care even when the closing force is applied from angle.
- The angle of the fuse tube relative to the vertical shall be given on the attached data schedule.

- The toggle mechanism shall provide locking action to protect the fuse link from shock. A spring-assisted flipper shall assist arc interruption by the withdrawal of the fuse tail.
- The fuse tube cap shall preferably be of the non-expandable type.
- A lifting eye shall be provided on the fuse tube and designed for use with a hot stick.

7 MARKING:

Each fuse tube shall be permanently marked with the following information as minimum, in English and /or Arabic.

7.1 Rated voltage.

7.2 Maximum continuous current rating.

7.3 Rated interrupting current symmetrical.

7.4 Basic insulation level.

7.5 Manufacturers' name or trademark.

7.6 Year of manufacture.

7.7 Country of origin.

Note: For the insulator marking, refer to SEC specification 15- SDMS-01.

8 TESTING AND INSPECTION:

8.1 General:

All dropout fuse cutouts shall be tested in accordance with the latest standards and as specified herein. The supplier/vendor shall provide acceptable type test certificates for his fuse cutouts. Two certified copies of the test reports shall be submitted to the SEC for approval. No equipment shall be shipped until approval of the test reports has been given by SEC.

8.1.1 **Type tests**. The dropout fuse cutouts offered shall meet the type test requirements of the standards given below.

8.1.1.1 Dielectric tests to IEC 60282-2 (clause11).

- Power frequency withstand (1minute dry and wet).
- Impulse with stand (1.2 x50 µ sec).

8.1.1.2 Interrupting capacity to IEC 60282-2, clause 13.

8.1.1.3 Radio interference test to IEC 60437.

8.1.1.4 Temperature rise tests to IEC 60282-2, clause12.

8.1.1.5 Pollution performance test as per IEC 60507.

- Salt spray corrosion performance tests for 1000 hours.
- Solid layer pollution test.

8.1.1.6 Expendable caps shall be subject to a static relief pressure test to ANSI C 37.42, clause 2.2.7.

8.1.1.7 Load break tests to ANSI C 37, 41, clause 7.

Tests shall be made with the manufacturers recommended portable load break device.

8.1.2 **Routine tests:**

Supplier shall provide detail of the routine tests, which will be performed on the dropout fuse cutouts with the minimum requirements listed as follows.

8.1.2.1 Insulator tests.

8.1.2.2 Power frequency reference or low current.

8.2 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 SEC adequate notice of manufacturing and test schedules. 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.

9 PACKING AND SHIPMENT:

Each dropout fuse cutout shall be packed individually in a strong non-returnable wooden crate/ cardboard box in such manner to prevent damage to components during transportation and handling up to installation site. Packing shall be designed to prevent entry of dust, ingress of moisture and other foreign materials. The mounting bracket, where required, shall be packed separately. Each container shall have the following information stenciled on it in English and /or Arabic.

- Manufacture's name.
- Country of origin.
- SEC item number.
- SEC purchase order number.
- Weight in kilogram.
- Handling instruction.
- Voltage and current rating.

9.1 Supplier shall contact material department for additional packing, handling and shipment instructions as applicable.

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

9.3 Dropout fuse cutouts shall not be packed in any organic material.

10 GUARANTEE:

10.1 Vendor shall guarantee the dropout fuse cutouts against all the defects arising out of faulty design, workmanship or defective material for a period of five (5) years from the date of delivery.

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 dropout fuse cutouts and their accessories conform to this specification.

11 TECHNICAL DATA SCHEDULE:

11.1 The vendor shall complete and return one copy of the attached data Schedule with quotation. In addition to data Schedule, clause-by-clause compliance to this specification shall be confirmed/ submitted.

11.2 Detail dimensional drawing of the dropout fuse cutout and mounting arrangements shall be submitted.

11.3 The supplier shall provide literature describing field experience under similar service conditions to those given in SEC general specification No 01- SDMS01.

11.4 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.

11.5 Type test certificates.

11.6 Submittal required following award of contract, are given below.

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

TECHNICAL DATA SCHEDULE

13.8KV DROPOUT FUSE CUTOUT

(Sheet 1 of 4)

SEC Inquiry No. _____ *Item No.* _____

S.No.	DESCRIPTION	UNIT	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
1	System Voltage	kV	13.8	
2	Max design voltage.	kV	15.2	
3	Continuous current capacity.	A	100 or 200 *	
4	Interrupting current (symmetrical).	kA	8	
5	BIL at altitude ≤ 1000 m	kV	95	
6	BIL at altitude > 1000 m	kV	110	
7	Total minimum creepage distance.	mm	660 *	
8	Power frequency with stand 1 min dry and wet: To earth and between poles. Across the isolating distances.	kV	38 45	
9	Impulse (1.2 µ sec). To earth and between poles. Across the isolating distances.	kV	95 110	
10	Max radio interference voltage.	µV	250	
11	Ambient temperature during temperature rise tests.	ºC	*	
12	Temperature rise of contacts.	ºC	*	
13	Temperature rise of terminals.	ºC	*	
14	Material of support insulators.		Polymer	
15	Color of the insulator.		Grey color	
16	Manufacturer of insulator a) Main insulator b) Standoff insulator			
17	Type of main contacts material.		Copper	

Table 8: Technical Data Schedule 1.

***** To be specified in tender documents.

TECHNICAL DATA SCHEDULE

33KV DROPOUT FUSE CUTOUT

(Sheet 2 of 4)

SEC Inquiry No._____ Item No._____

S.No.	DESCRIPTION	UNIT	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
1	System Voltage	kV	33	
2	Max design voltage.	kV	36	
3	Continuous current capacity.	A	100 *	
4	Interrupting current (symmetrical).	kA	8	
5	BIL at altitude ≤ 1000 m	kV	170	
6	BIL at altitude > 1000 m	kV	200	
7	Total minimum creepage distance.	mm	825, 1320 *	
8	Power frequency with stand 1 min dry and wet: To earth and between poles. Across the isolating distances.	kV	70 80	
9	Impulse (1.2 µ sec). To earth and between poles. Across the isolating distances.	kV	170 200	
10	Max radio interference voltage.	µV	650	
11	Ambient temperature during temperature rise tests.	ºC	*	
12	Temperature rise of contacts.	ºC	*	
13	Temperature rise of terminals.	ºC	*	
14	Material of support insulators.		Polymer	
15	Color of the insulator.		Grey color	
16	Manufacturer of insulator a) Main insulator b) Standoff insulator			
17	Type of main contacts material.		Copper	

Table 9: Technical Data Schedule 2.

***** To be specified in tender documents.

TECHNICAL DATA SCHEDULE

13.8/33KV DROPOUT FUSE CUTOUT

(Sheet 3 of 4)

SEC Inquiry No._____ Item No._____

S.No.	DESCRIPTION	UNIT	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
18	Fuse cutout with single or standoff insulator NEMA brackets.		Required	
19	Cutout suitable for removable button head fuse link		Yes/ no	
20	All assemblies potted into the porcelain.		Required	
21	Angle of the fuse insulator to the vertical.		15˚- 20˚	
22	Shed to be incorporated into upper contact assembly.		Required.	
23	All current carrying parts of copper or copper alloy.		Required.	
24	Conductors terminals tin plated		Required.	
25	Contacts silver clad		Required.	
26	All ferrous components galvanized		Required.	
27	Load break hooks fitting.		Required.	
28	Arc interruption assisted by a spring operated flipper		Required.	
29	The protection of fuse link from mechanical shock by latching of toggle mechanism		Required.	
30	Non expendable type fuse cap		Required.	
31	The fuse tube marked with manufacturer, model continuous and interrupting current rating,, rated voltage and date of manufacture.		Required.	
32	Routine tests carried out on 100% of the offered items		Required.	
33	Type test certificates included in the tender along with complete descriptive literature.		Required.	

Table 9: Technical Data Schedule 3.

TECHNICAL DATA SCHEDULE

DROPOUT FUSE CUTOUT

(Sheet 4 of 4)

SEC Inquiry No._____ Item No._____

- Additional Technical Information or Features Specified by SEC
- Additional Supplementary Data or Features Proposed by Bidder/Vendor/Supplier.
- Other Particulars to be filled-up by the Bidder/Vendor/Supplier.
- List of Deviations and Clauses to which exception is taken by the Bidder/Vendor/Supplier. (Use separate sheet, if necessary).

Description	Manufacturer of Material/Equipment	Vendor/Supplier
Name of Company		
Location and Office Address		
Name and Signature of Authorized Representative with Date		
Official Seal / Stamp		

Table 10: Technical Data Schedule 4.