

Saudi Electricity Company



الشركة السعودية للكهرباء

SEC DISTRIBUTION MATERIALS SPECIFICATION

56-SDMS-08 Rev. 00

DATE: APRIL 2017G

56-SDMS-08

REV. 00

SPECIFICATIONS

FOR

MV /LV MOBILE SUBSTATION

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1.0 SCOPE

This SEC Distribution Material Specification (SDMS) specifies the minimum technical requirements of design, engineering, manufacturing, inspection; testing and performance of Mobile substation with medium voltage rated 13.8 kV or 33 kV and low voltage 400/231V-231/133V for Temporary / stand by supply in 13.8 kV or 33 kV system of the Saudi Electricity Company (SEC), Saudi Arabia.

MV/LV Mobile substation shall consist of an RMU and unit substation (rated as required) conforming to relevant SDMS combined with a trailer in a single transportable unit

2.0 CROSS REFERENCES

This SEC material standard specification shall always be read in conjunction with SEC specification No. 01-SDMS-01, titled “General Requirements for All Equipment/Materials”, which shall be considered as an integral part of this SDMS. These standard specifications shall also be read in conjunction with SEC Purchase Order (PO) requirements.

3.0 APPLICABLE CODES AND STANDARDS

The latest revisions of the codes and standards listed in the SEC specifications as given below shall be applicable for the equipment / material covered in this SDMS. In case of conflict, the vendor / manufacturer may propose equipment / material conforming to one group of industry codes and standards quoted hereunder without jeopardizing the requirements of this SDMS.

3.1	56-SDMS-07	Unit Substations up to 36 kV
3.2	51-SDMS-04	Distribution Transformer Up to 36 kV 400/230/133V with Aluminum Windings for dual secondary.
3.3	51-SDMS-05	Distribution Transformers up to 36 kV
3.3	31-SDMS-07	Low Voltage Distribution Panel with Aluminum bus bars
3.4	37-SDMS-02	Molded Case Circuit Breakers for LV panels
3.5	11-SDMS-01	Low Voltage Power and Control Cables
3.5	11-SDMS-03	XLPE Insulated Power Cables for rated voltages 15 kV up to 36 kV



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3.6	12-SDMS-01	Cable Joints and Terminations
3.7	12-SDMS-02	Lugs and Connectors for MV/LV Distribution System
3.6	IEC-62271-100	High-voltage Alternating Current Circuit Breakers
3.7	IEC- 622271-200	AC metal-enclosed switchgear and control gear for rated voltage above 1 kV and up to and including 52 kV.
3.8	IEC- 60529	Classification of degree of protection provided by Enclosures
3.9	32-SDMS-01	Non Extensible SF6 Insulated Ring main Units,17.5 kV
3.10	32-SDMS-07	Non Extensible SF6 Insulated Ring main Units,36 kV
3.11	32-SDMS-11	Ring Main Units

4.0 TERMS AND CONDITIONS

4.1 General

- 4.1.1 The mobile substation along with trailer shall conform to requirements of Saudi Arabian Standards Organization (SASO) and to any other Saudi Arabian Government (SAG) regulation enforced at the time of delivery including road traffic laws.
- 4.1.2 Three (3) sets of detailed drawings shall be supplied within 30 days of purchase order (P.O) issuance date for SEC approval prior to the production.
- 4.1.3 Recommended spare parts list with prices for 5 years of operation in Saudi Arabia shall be supplied with units during delivery. Vendors may specify validity date for prices.
- 4.1.4 The mobile substation including its components shall be suitable for continuous operation under dusty atmosphere, high ambient temperatures (55° C), uneven roads and at high altitudes for long periods.
- 4.1.5 The units must be designed to give optimum weight distribution to front /rear axles and a good center of gravity, and suitable dimensions.
- 4.1.6 Welding work shall be through certified welders.
- 4.1.7 The mobile substation must be suitable for reasonably long journeys with safe towing speed of 50 kPH.
- 4.1.8 It shall be vendors responsibility to obtain all necessary certificates of conformity and/or other documentation required to register or import of any units/parts.
- 4.1.9 The mobile substation delivered shall be complete with fire extinguishers, safety triangle, manuals, catalogs, SAG documents, safety jack and lug wrench.
- 4.1.10 Vendor shall contact SEC respective office five (5) working days before the delivery for necessary arrangements for delivery/receipt.
- 4.1.11 Warranty period shall be five (5) years from the date of final acceptance.



- 4.1.12 Vendor shall submit the locations of service centers and spare parts stores including phone number of contact person.
- 4.1.13 Vendor shall be fully responsible for the quality of whole unit including trailer as well as accessories.
- 4.1.14. Vendor shall be fully responsible to ensure the conformance of all equipment to SEC specifications.

4.2 Inspection and monitoring of fabrication process.

- 4.2.1 In case of first time supply of mobile substations to SEC by manufacturers, SEC or its designated representative reserves the right to carry out a Quality and Manufacturing Plant Survey and assessment of manufacturing facilities before approval to start production. SEC further reserves the right to send SEC Inspection Team for the prototype/ first unit produced of same category.
- 4.2.2 Manufacturer shall be responsible to perform and qualify operation stability tests of the mobile substations.
- 4.2.3 The mobile substations shall undergo suppliers mandatory pre-delivery inspection. Prior to delivery the respective inspection documents shall be submitted to SEC for approval.
- 4.2.4 In order to enable SEC to monitor the fabrication process effectively, the vendor/manufacturer shall submit the following to SEC.
- A. Production and Delivery mile stone schedule within (4) weeks of P.O. issuances date indicating activities such as :
- Drawing submittal/approval date
 - Chassis order delivery date
 - Allied equipment production start/ completion date
 - Inspection and test dates.
 - Shipment date after issuance of Release for shipment Certificate by SEC.
 - Arrival date at port if applicable.
 - Pre- delivery Inspection date
 - Delivery date to SEC.
- B. Pictorial reports shall be submitted after completion of production. All pictures shall be colored preferably with date imprint with the following views.
- street side
 - curb side
 - Front and rear elevations.
 - Birds eye view from the top of allied equipment
 - Close up of major components and control lay outs.
- 4.2.5 Vendor shall be responsible to submit all related test certificates documents on time to SEC
- 4.2.6 SEC shall not issue any receipt until all test / inspection documents have been reviewed and approved by SEC.



5.0 DESIGN AND FABRICATION REQUIREMENTS

5.1 System Characteristics

5.1.1 The mobile substation shall be suitable for installation under system parameters as given in SEC specification 01-SDMS-01 and including the following:

MV Neutral arrangement	Solidly or low resistance grounded.
LV Neutral Grounding	Solidly grounded.

5.1.2 All insulating material shall be non-hygroscopic and resistant to tracking.

5.1.3 All bolted electrical joints shall be secured by means of corrosion proof steel nuts and bolts.

5.1.4 All nuts, bolts and washers shall be plated to type II of ASTM B633.

5.2 Mobile Substation Components /Compartments Specifications

5.2.1 Unit Substation

5.2.1.1 Unit substation shall contain transformer with medium voltage termination box and detachable low voltage compartment in a single transportable unit on common skid and ready for operation on being placed in position and connected to the system network.

5.2.1.2 The medium voltage termination box and low voltage compartment shall be weatherproof and robust construction and shall be provided with watershed top. It shall be manufactured from galvanized sheet steel of 3 mm thickness or Alu-zinc thickness 2 mm respectively.

5.2.1.3 Adequate ventilation for the medium voltage termination box as well as ventilation in the back side of low voltage compartment shall be provided to permit natural air circulation. The ventilation apertures shall be screened with galvanized double steel mesh to prevent entry of vermin and other foreign bodies.

5.2.1.4 All parts of equal size and shape shall be interchangeable. The general design shall be made with minimum number of joints.

5.2.1.5 Except for the transformer, all nuts and bolts shall not be accessible from outside of the unit substation.

5.2.1.6 Unit substation shall conform specification 56-SDMS-01, 56-SDMS-03 and 56-SDMS-07

5.2.2 Transformer for Unit Substation

5.2.2.1 Transformer shall be suitable for mobile substation, outdoor pad-mounted type and generally shall comply with all applicable clauses of SEC specification **51-SDMS-04 and 51-SDMS-05** as per scope of work and including the following requirements.



5.2.2.2 MV Bushings shall be located horizontally on the right hand side of the transformer (facing unit substation from the front) in a cable termination box. Bushing shall be type C-interface suitable for M16 bolt to be fitted in the bushing. The respective bolt outer size shall be M12. It shall be suitable for pre molded termination with separable elbow connectors. The bushing termination shall be fitted through the above mentioned stud size of M12, for single hole flat pad lug for 50-70 mm² medium voltage cable as given in SEC specification 11- SDMS-03.

5.2.2.3 MV and LV bushings shall be identified, labeled and printed with black paint as follows:

- MV bushings: **U V W**
- LV bushings : **u v w n**

5.2.2.4 Oil level & temperature indicators and off-load tap changer operating knob shall easily be accessible / readable and operate-able from LV compartment with adequate safety. Oil temperature indicator shall be equipped with tripping contact if requested and specified in the tender / data schedule.

5.2.2.5 Oil drainage / sample and pressure relief valves shall be on the transformer and easily accessible.

5.2.2.6 Transformer must be suitable to be placed on a trailer for mobilizing the equipment ON and OFF the road.

5.2.3 Low Voltage Panel for Unit Substation

5.2.3.1 Low voltage compartment shall comply with SEC specification 31-SDMS-01. In case of any conflict between this specification and 31-SDMS-01, this specification shall apply.

5.2.3.2 LV Panel shall have provision to feed bulk customer or regular customers as required at site and shall be equipped with main LV circuit breaker as well as outgoing MCCBs. Suitable links shall be provided to connect the respective cables.

5.2.3.3 For the details of the following items, refer to SEC specification 31-SDMS-07:

- i. Ratings of transformer LV phase links
- ii. Main / Incomer CT rating
- iii. Transformer connection with LV panel
- iv. Number of out going circuits
- v. Clearances between outgoing circuits
- vi. Bus-bar sizes / ratings
- vii. Indicating instruments



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- viii. Fault level
- ix. Provision for installing CT for metering of partial panel
- x. Degree of protection
- xi. Out going MCCB clearance
- xii. Details of access doors and its following associated items:
 1. Door locks
 2. Door stopper and its locking
 3. Installation of hinges and its material
 4. Door bonding with framework (enclosure)
 5. Door gaskets

5.2.4 RMU

- 5.2.4.1 RMU shall be outdoor type and shall generally comply with SEC specifications 32-SDMS-01,32-SDMS-07 and 32-SDMS-11. It shall be mounted on the trailer through suitable skid.
- 5.2.4.2 SEC approved Earth Fault Indicators (EFI) shall be provided and installed at suitable location.
- 5.2.4.3 RMU shall be suitable to be placed on trailer for mobilizing along ON and OFF the road.

5.2.5 Dimensions

The dimensions of Unit Substation and RMU shall conform to respective SDMS. Vendor shall mention the overall dimensions of the trailer in the offer with maximum limits as under:

Overall Length 5000 mm
 Overall width 2500 mm
 Overall height (Including USS)

5.2.6 Mobile Substation Finish

- 5.2.6.1 Mobile substation shall be adequately protected against corrosion and painted as given in SEC specification 01-SDMS-01

5.2.7 TRAILER.

- 5.2.7.1 Smaller dimensions shall be preferred
- 5.2.7.2 Trailer shall be accurately balanced with low centre of gravity.
- 5.2.7.3 Lockable spare tire, and complete tool box shall be provided.
- 5.2.7.4 Proper floor drainage should be provided.
- 5.2.7.5 Finish color shall be Omaha Orange RAL 2004 conforming to ASTM D1535
- 5.2.7.6 Running and operating beacon lights shall be provided.
- 5.2.7.7 Removable cable entry plates shall be provided in the trailer floor for HV incoming cables



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and LV outgoing cables.

- 5.2.7.8 MV flexible power cables (on proper reel in the Mobile Substation) , 25M long/ size 3x185 mm² to connect mobile substation with MV Distribution network conforming to 11- SDMS-03 shall be supplied.
- 5.2.7.9 Premold cable terminations with separable elbow connectors for MV cable conforming to 12-SDMS-01 shall be supplied.
- 5.2.7.10 Proper safety barriers shall be provided on all sides of trailer floor.

5.2.8 GROUNDING.

Flexible grounding cable,120 mm sq. size and 25 meter length, terminated at two points on the body of trailer for connection to ground rod or system at site equipped with copper lugs with tin plated surface.

5.2.9 Name Plates

Aluminum name plates for the RMU, transformer and the low voltage compartment with the information required in respective SEC specifications, item identification number and PO number for the Mobile Substation shall be fixed.

5.2.10 Danger Plate and SEC Monogram

Danger plate and SEC monogram as per SEC drawings No. SEC - 01- 01 and SEC - 01- 02 respectively shall be provided and installed on the front / SEC approved location of the unit substation 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 door / front cover.
SEC shall approve location and samples of danger & monogram plates prior to installation.

6.0 TESTING

The RMU and unit substation shall be tested in accordance with the specifications listed under Clause 3 above. Tests shall also cover and verify the degree of protection IP-54 for LV compartment.

7.0 SUBMITTALS

- 7.1 The vendor shall complete and submit filled-in the Data Schedule and clause by clause compliance of this specification as well as the following applicable specifications with the quotations:



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31-SDMS-01
 31-SDMS-06
 32-SDMS-01
 32-SDMS-07
 32-SDMS- 11
 37-SDMS-02
 37-SDMS-04
 51-SDMS-03
 51-SDMS-04
 51-SDMS-05

- 7.2 The following dimensional drawings shall be provided with the quotation for each unit substation rating:
- 7.2.1 Outline of Unit Substation showing position of fittings, attachments and mountings
- 7.2.2 Single line diagram of unit substation with all electrical components
- 7.2.3 Detailed drawings of transformer medium voltage termination box,
- 7.2.4 Detailed drawings of low voltage compartments.
- 7.2.5 Detailed drawings of trailer and the equipment arrangement on it.
- 7.2.5 Details of all fittings and attachments including catalogs
- 7.2.6 Details of hardwood cable clamps.
- 7.2.7 Name plates information
- 7.2.8 Mounting and installation details of unit substation.
- 7.2.9 Comprehensive list of manufacturer's recommended spare parts with complete details including drawing, catalog number / part number, manufacturing / supplier name of each items shall be submitted.
- 7.2.10 Copy of type test report
- 7.2.11 List of clients in case of new manufacture / vendor
- 7.2.12 Vendor shall provide the details of manufacturing and testing schedules and routine test reports after signing the purchase order.
- 7.2.13 Warranty certificate for wear and tear occurring during the warranty period as mentioned in the specification 01-SDMS-01 latest revision.



8.0 DATA SCHEDULE

MV /LV MOBILE SUB STATION

(Sheet 1 of 4)

SEC Inquiry No. _____ Item No. _____

REF. SEC.	DESCRIPTION	SEC SPECIFIED VALUE	VENDOR PROPOSED VALUES
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5.0 DESIGN AND CONSTRUCTION REQUIREMENTS

1. Nominal UNIT S/S KVA rating	1500 kVA	
2. Medium Voltage rating	33 or 13.8 kV	
3. Secondary Voltage Rating	400/230-230/133-dual	
4. Main Breaker Rating	As per Transformer	
5. Branch Breaker Rating	400 amp.	

5.2 UNIT SUBSTATION COMPONENTS /COMPARTMENTS

1. Length, mm		
2. Width, mm		
3. Height, mm		
4. Length of MV termination		
5. Center to center distance between MV bushings, mm		
6. Horizontal clearance between the outer MV bushing(s) and the wall of the MV termination box, mm		
7. Center to center distance between MCCBs, mm	150	
8. Space between MCCBs, mm	10	
9. Phase bus-bar current rating,		
10. Phase bus-bar size, mm		
11. Neutral bus-bar current		
12. Neutral bus-bar size, mm		
13. Oil temp. indicator with trip	Yes/ No	



8.0 DATA SCHEDULE

MV/LV MOBILE STATION

(Sheet 2 of 4)

SEC Inquiry No. _____ Item No. _____

5.2.8	RING MAIN UNIT		
	RMU 3way/4 way	3 way	
	Specification 32-SDMS-01/32-SDMS-07/32-SDMS-11		
	Voltage Rating 13.8 or 33 kV		
	Current Rating	630 Amp./400 Amp/	

5.2.9	FINISH OF ENCLOSURE		
	Finish method		
	Finish color	Light Gray RAL 7035	
5.2.10	TRAILER		
a	Standard	KSA	
b	Ground clearance mm	350	
c	Anti vibration pads	Required	
d	Break System	Air	
e	Make/Type		
f	Loading Capacity, Tons		
g	Chassis , Length (mm)		
h	Chassis , Width (mm)		
i	Chassis , Height (mm)		
j	Chassis Frame (mm)		



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8.0 DATA SCHEDULE

MV/LV MOBILE STATION

(Sheet 3 of 4)

SEC Inquiry No. _____ Item No. _____

5.2.10	TRAILER		
k	Coupling		
l	Suspension		
m	Axles		

n	Tires		
o	Mud flaps		
p	Landing Gear		
q	Electrical System		
r	Finish Color of trailer	Omaha Orange RAL 2004	



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8.0 DATA SCHEDULE**MV/LV MOBILE STATION**

(Sheet 4 of 4)

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/EQUIPMENT	VENDOR / SUPPLIER
Name of Company		
Location and Office Address		
Name and Signature of Authorize Representative		
Official Seal / Stamp		

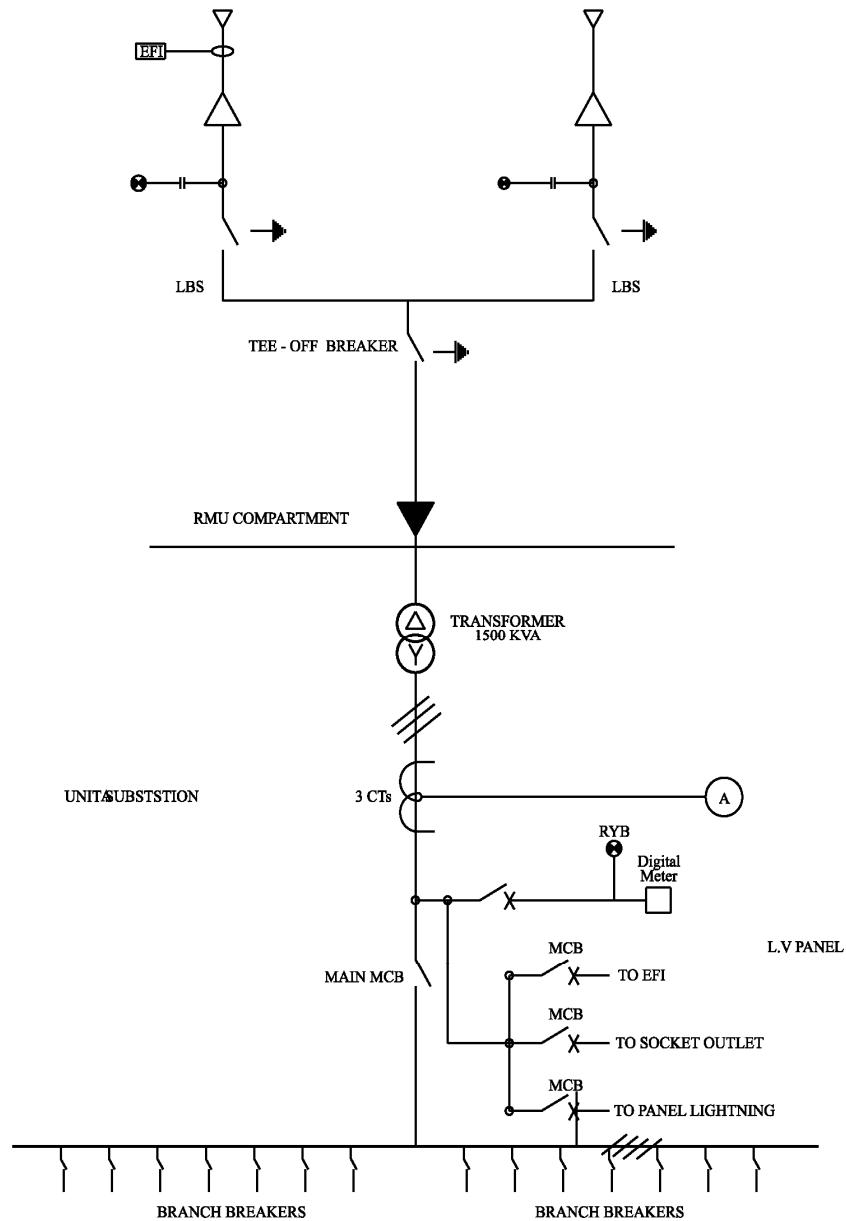


Figure :1 KEY DIAGRAM