

Saudi Electricity Company



الشركة السعودية للكهرباء

SEC DISTRIBUTION MATERIALS SPECIFICATION

11-SDMS-02

DATE: January -2002G

11-SDMS-02

SPECIFICATIONS

FOR

**LV OVERHEAD LINE CONDUCTOR
TYPE QUADRUPLEX**

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



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1.0 SCOPE

This SEC Distribution Materials Specification (11-SDMS-02) covers the minimum technical requirement for design, materials, manufacturing, inspection, testing, performance and supply of LV overhead, XLPE insulated Quadruplex conductor, rated 1000V, intended to be used in the low voltage overhead line system of Saudi Electricity Company (SEC), Saudi Arabia.

2.0 CROSS REFERENCES

This specification shall always be read in conjunction with 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.

This SDMS shall also be read in conjunction with SEC Purchase Order or Contract Schedules and the Scope of Work and Technical Specifications for project, as applicable.

3.0 APPLICABLE CODES AND STANDARDS

The latest revision of the following Codes and Standards 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 Codes and Standards quoted hereunder without jeopardizing the requirements of this SDMS

- | | | |
|-----|---------------|--|
| 3.1 | IEC 60228 | Conductors of insulated cables. |
| 3.2 | IEC 60502 | Power cables with extruded insulation and their accessories. |
| 3.3 | ICEA S-66-524 | Cross-linked thermosetting polyethylene insulated wire and cable for the transmission and distribution of electrical energy. |
| 3.4 | ASTM B549 | Specification for Concentric Lay Stranded Aluminium Conductors, Aluminium-Clad Steel Reinforced (ACSR/AW) |



4.0 DESIGN AND CONSTRUCTION REQUIREMENTS

4.1 General

- 4.1.1 The quadruplex LV overhead conductor shall meet or exceed the requirements of this specification in all respects.
- 4.1.2 Manufacturer's drawings as required by 01-SDMS-01 shall show the outline cross-section of the overhead conductor together with all pertinent dimensions. Any variations in these dimensions due to manufacturing tolerances shall be indicated.

4.2 Design Criteria

- 4.2.1 Unless otherwise specified, the conductor shall be manufactured and tested in accordance with the relevant standards mentioned in clause 3
- 4.2.2 The LV overhead conductor shall be designed for service conditions specified in 01-SDMS-01
- 4.2.3 The size and continuous current carrying capacity of the conductor shall be based on a maximum permissible continuous temperature of 90°C taking into account the solar radiation effect.
- 4.2.4 The rating and dimensions shall be as indicated in the Data Schedule.

4.3 Materials

4.3.1 Phase Conductor

Insulated hard drawn concentric-lay stranded aluminium conductor, round, compacted, with a smooth surface.

4.2.5 Neutral Conductor

Bare aluminium conductor steel reinforced (ACSR/AW)



4.2.6 Insulation

Phase conductor shall be insulated with an extruded layer of cross-linked polyethylene (XLPE) rated 90°C for continuous operation, with carbon black for protection against the ultra violet radiation of the sun rays as per ICEA S-66-524. Neutral conductor shall be bare.

4.2.7 Cross-section

Two sizes are intended to be used in SEC overhead line LV network, 3(1x120) + 1x120 mm² as a main feeder and 3(1x50) + 1x50 mm² as service drop.

4.4 Construction

The LV overhead line conductor shall be a quadruplex cable. The three insulated phase conductors and the bare neutral shall be twisted together to form what is called a quadruplex conductor consisting of three XLPE insulated aluminium conductors laid up around one bare ACSR/AW as per attached drawing (figure 1). The neutral shall act as a messenger for L.V spans up to 50m for main feeder and 30m for service drop.

4.5 Phase identification

Phase identification shall be made over the XLPE insulation by embossing stripes as follows:

- Phase 1: No stripes
- Phase 2: One line stripe
- Phase 3: Two lines stripes

5.0 TESTS:

5.1 General

- 5.1.1 All conductors shall be tested in accordance with the latest standards and as specified herein. Supplier shall provide all test results for review and acceptance by SEC.
- 5.1.2 The full range of routine, special and type tests specified in the relevant standard shall be carried out as applicable.



5.1.3 Routine and/or special tests shall be carried out in the supplier's factory. Type test report/certificate from an independent testing laboratory shall be submitted to SEC.

6.0 PACKING AND SHIPPING

In addition to the applicable items per 01-SDMS-01, packing and shipping of the conductor shall conform to the following:

- 6.1 Each of the insulated conductor cores shall be sealed with a water proof, heat shrinkable plastic or elastomeric end cap with adhesive type sealing compound. Conductor ends shall be properly secured to the reel.
- 6.2 The conductor shall be delivered on standard sized wooden or steel reels of sturdy construction properly packed and lagged externally to prevent possible damage to the cable during transportation. Wood lagging shall also be secured with steel straps to provide physical protection for the conductors during transit and during customary storage and handling operations.
- 6.3 The minimum diameter of the drum of the shipping reel shall not be less than the minimum bending diameter of the conductor.
- 6.4 Conductor shall be supplied in lengths as specified in purchase orders. The allowable tolerance on the specified length shall be $\pm 5\%$
- 6.5 Reel Markings
 - 6.5.1 Conductor reels/drums shall be marked in legible and indelible letters giving the following particulars:
 - a. Conductor voltage and material
 - b. Type of conductor
 - c. Length and weight of conductor on reel
 - d. Cross-section of conductor
 - e. Gross weight
 - f. Size of reel
 - g. Manufacturer's name and country of origin.
 - h. Year of manufacture
 - i. SEC address and purchase order number
 - j. Serial number of reel



- k. Direction of rolling of reel
- l. Spec number 11-SDMS-02
- m. SEC stock number in 10 cm high bold numerals.

6.5.2 All markings shall appear on both sides of the reel.

6.5.3 Conductor reel identification shall include any additional information as required by SEC shipping instructions.

7.0 GUARANTEE

The supplier shall guarantee the conductor against all defects arising out of faulty design or workmanship, or of defective material for a period of two years from date of delivery.

8.0 SUBMITTALS

8.1 Submittals required with tender:

8.1.1 The supplier shall complete and return one copy of the attached Data Schedule for each size of conductor offered.

8.1.2 Guaranteed Ex-Works delivery date

8.1.3 Type test certificates.

8.1.4 Dimensional cross-sectional drawings of conductor and conductor drum along with technical data and catalogues shall be submitted by supplier to facilitate evaluation of the offer.

8.2 Submittals required following award of contract:

8.2.1 Details of manufacturing and test programs.

8.2.2 Factory test reports.

8.2.3 Derating factors for ambient temperature up to 55°C.

8.2.4 Erection Sag-Tension tables for main cable (35 to 50m span) and service drop cable (20 to 30m span) and temperature range 20°C to 40°C in 5°C steps.



9.0 TECHNICAL DATA SCHEDULE

QUADRUPLEX CABLE 3(1x120) + 1x120mm² / 3(1x50) + 1x50 mm²
(Sheet 1/3)

SEC Inquiry No: _____

Item No: _____

REF. SEC	DESCRIPTION	UNIT	SEC SPECIFIED VALUES*	VENDOR PROPOSED VALUES**
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4.0 DESIGN AND CONSTRUCTION REQUIREMENTS

1	The standard to which the conductor is manufactured		As per clause 3.0	
2	Type of conductor		Quadruplex	
3	Rated voltage		1000 V	
Phase conductor				
4	Number and diameter of individual wire	No./mm		
5	Overall diameter of bare conductor (apprx.)	mm		
6	Cross-sectional area of conductor (calculated)	mm ²		
7	Ultimate breaking load of phase conductor	kg		
8	Type of insulation		XLPE	
9	Thickness of insulation over bare conductor (nominal thickness)	mm		
Neutral messenger				
10	No. & diameter of individual aluminium wire	No./mm		
11	Overall diameter (apprx.)	mm		
12	Ultimate breaking load of neutral conductor	kg		
13	Weight of quadruplex conductor per km (apprx)	Kg/km		
14	Resistance of each conductor per km at reference temperature 75°C	Ohm/km		
15	Reactance per km of completed 3 phase circuit at 60Hz.	Ohm/km		
16	Max. continuous current carrying capacity of conductor at ambient temperature 45°C	Amps		
17	Conductor temperature for condition at item 16	° C		
18	The short time overload current capacity of conductor at ambient 45°C - 1 hour duration - 3 hour duration	Amps Amps		
19	Conductor temperature for condition at item 18	° C		
20	Short circuit withstand capability time-current of cable & wire for 1 second. Final temperature of conductor after short circuit	KA ° C		



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9.0 TECHNICAL DATA SCHEDULE

QUADRUPLEX CABLE 3(1x120) + 1x120mm² / 3(1x50) + 1x50 mm²
(Sheet 2/3)

SEC Inquiry No: _____

Item No: _____

6.0	PACKING AND SHIPPING
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1	Drum type		
2	Length of conductor (M)		
3	Dimensions (M)		
4	Gross weight (kg)		
5	Net weight (kg)		
6	Marking as per the specification		

8.0	SUBMITTALS
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1	All submitted as per the specification		
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- (*) - Values to be provided / proposed by the vendor.
(**) - Please provide explanations for deviations if any.



9.0 TECHNICAL DATA SCHEDULE

QUADRUPLEX CABLE 3(1x120) + 1x120mm² / 3(1x50) + 1x50 mm²
(Sheet 3/3)

SEC Inquiry No: _____

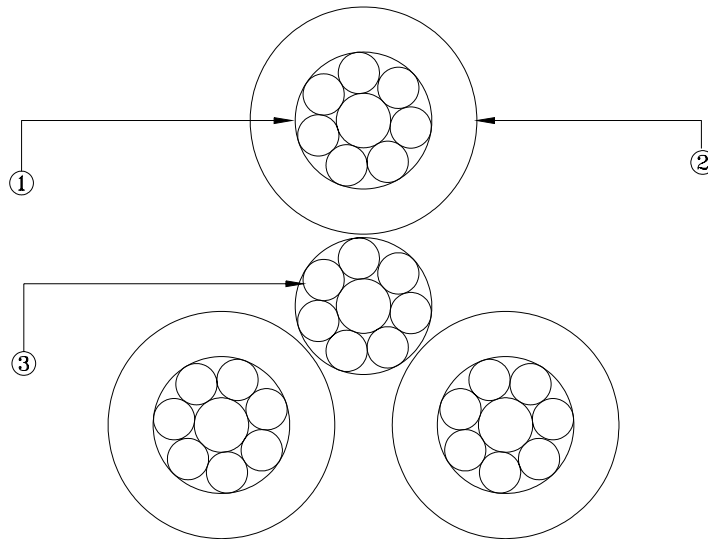
Item No: _____

- C. 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 Country		
Location and Office Address		
Name & Signature of Authorized Representative and Date		
Official Seal / Stamp		



Cross Section Of Overhead Line Conductor, XLPE Insulated Quadruplex
Cable With One Bare ACSR/AW Neutral (Messenger) Conductor



- 1:- ALUMINUM CONDUCTOR
- 2:- XLPE INSULATION
- 3:- MESSENGER (ACSR/AW)

FIGURE - 1 -

XLPE INSULATED QUADRUPLE