



CITY OF LODI

COUNCIL COMMUNICATION

AGENDA TITLE: Approve specifications and authorize advertisement for bids for various sizes and lengths of 15kV underground cable (EUD)

MEETING DATE: May 7, 2003

PREPARED BY: Electric Utility Director

RECOMMENDED ACTION: That the City Council approve the specifications and authorize the advertisement for bids for sizes and lengths of medium-voltage concentric neutral underground electrical cable, as described below.

BACKGROUND INFORMATION: This request for bids is intended to serve two purposes. First, electrical cable is needed for later phases of service installation in new subdivisions this year. Second, electric utility department staff believe opportunities exist with a new type of cable insulation, ethylene-propylene rubber (EPR), which has a longer life and, while slightly more expensive, is expected to yield efficiencies in installation and a lower overall cost of ownership. An evaluation using actual bid data will be helpful in determining whether a change to EPR is warranted at this time.

Staff is recommending that bids be obtained for both crosslinked polyethylene (TR-XLP)-insulated cable, and for EPR-insulated cable. After evaluation, a recommendation will be made to Council for award.

The following sizes and lengths of cable are included in this bid:

TR-XLP	
Cable Size	Length
#1000 kcmil (2,200 ft per reel)	13,000 ft
#750 kcmil (2,500 ft per reel)	22,500 ft*
#2/0 AWG (2,500 ft per reel)	25,000 ft*
#2 AWG (3,000 ft per reel)	21,000 ft*

EPR	
Cable Size	Length
#1100 kcmil, per PG&E Specs	13,000 ft
#750 kcmil (2,500 ft per reel)	22,500 ft*
#4/0 AWG	10,000 ft*
#1/0 AWG (replaces #2 and #2/0)	46,000 ft*

The items marked with an asterisk will be needed for subdivisions. The other items are included for evaluation purposes only, and will not be recommended for award.

FUNDING: Electric Utility Department Line Extensions
2001-2003 Financial Plan and Budget, Page E-29
Estimated cost \$141,000

BID OPENING: May 28, 2003

Alan N. Vallow, Electric Utility Director

Prepared by Joel Harris, Purchasing Officer
cc: Manager, EUD Engineering and Operations

APPROVED: _____

H. Dixon Flynn -- City Manager

City of Lodi

15 kV, EPR and TR-XLP INSULATED CONCENTRIC NEUTRAL CABLE

1.0 GENERAL

Cable furnished under these specifications shall be limited to 15 kV single conductor URD cable, stranded aluminum conductor, filled strand, triple extruded insulating system consisting of a semi-conducting conductor shield, insulation, semi-conducting insulation shield, bare copper concentric neutral and encapsulating jacket. The cable shall be designed for installation in conduits or for direct burial in earth, in wet or dry locations as well as outdoor locations exposed to weather and sunlight. Cable furnished shall meet the requirements of the applicable NEMA, ICEA, AEIC and ASTM Standards, latest edition thereof, unless otherwise noted in this specification. The insulation shall be tree-retardant crosslinked polyethylene (TR-XLP) suitable for operation at 90 degree C continuous and 130 degree C emergency or ethylene-propylene rubber (EPR) suitable for operation at 105 degree C continuous and 140 degree C emergency, as specified.

2.0 CONDUCTOR

The insulated conductor shall be Class B, stranded or compressed strand 1350 aluminum alloy, three-quarter hard meeting the requirements of ASTM B231/B231M, B609/B609M. Conductor size will be listed on the proposal forms (bid sheets).

3.0 STRAND FILLING COMPOUND

In order to prevent water propagation through the insulated conductor and to alleviate water (electrochemical) treeing of the insulation, a strand filling compound shall completely fill the voids between the conductor's inner strand layer(s). The compound used shall be flexible and stable under the operating conditions imposed on the cable and as specified herein, and compatible with the conductor, strand shield and insulation. The outer surface of the conductor shall be free from the filling compound such that splices and terminations can be readily applied using standard compression-type connectors and utilizing the same techniques as for unfilled conductors.

4.0 CONDUCTOR SHIELD

The conductor (strand) shielding shall meet the requirements of AEIC CS8. The material shall be compatible with the conductor metal and free stripping from the stranded conductor. The outer surface of the conductor shield shall be cylindrical and shall be firmly bonded to the overlaying insulation.

5.0 INSULATION

The insulation thickness shall be nominal 220 mils (133%) and meet the requirements of ICEA S-94-649

A:

TR-XLP insulation shall be unfilled, semi-transparent, tree-retardant, cross-linked thermosetting polyethylene extruded directly over the conductor shield. The insulation compound shall meet AEIC CS8 part D.1

B:

EPR insulation shall be a red colored flexible thermosetting dielectric based on an ethylene propylene elastomer. The ethylene content of the elastomer used in the insulation compound shall not exceed 72% by weight nor shall the insulation compound contain any polyethylene.

6.0 INSULATION SHIELD

The insulation shielding shall be an extruded semi-conducting material compatible with the insulation and the overlying metallic shield. The insulation shield compound and thickness shall be in conformance with ICEA S-94-649

No cleaning shall be required upon stripping the semi-conducting layer if splicing or terminating immediately follows the stripping process.

7.0 CONSTRUCTION METHOD

Conductor shield, insulation and insulation shield shall be installed on the conductor using the "True-Triple" extruding, dry cure method for TR-XLP and using the triple tandem extrusion method for EPR.

8.0 CONCENTRIC NEUTRAL

The concentric neutral conductor shall be a number of round, annealed, bare copper wires helically wrapped around the cable. The wires shall be spaced equidistant from each other around the circumference of the cable with a length of lay to be not less than 6 or more than 10 times the cable diameter.

The size of the neutral wires shall be in the range of #14 to #10 AWG.

The number of neutral wires shall be sufficient to yield "FULL NEUTRAL" and "1/3 NEUTRAL" as specified on the proposal sheet, except for the 1100 kcmil, 25 kV cable per PG&E specifications.

9.0 ENCAPSULATING JACKET

An extruded insulating layer of thermoplastic material shall be applied over the concentric neutral wires in accordance with ICEA S-94-649. The jacket shall be compatible with the overall cable system.

The jacket shall encapsulate all neutral wires.

10.0 MARKINGS

The encapsulating jacket shall be marked by means of surface or indent print with the following information at regular intervals with no more than 6 inches of unmarked space between cable identification, with the following information:

1. Manufacturer's identification or trade name.
2. Size of conductor
3. Conductor material.
4. Type of insulation.
5. Voltage rating.
6. Nominal insulation thickness
7. Year of manufacture.
8. National Electric Safety Code "Lightning Bolt" symbol.
9. Footage markings in two foot increments.
(Beginning and ending footage numbers shall be indicated on a durable label attached to a flange of the reel).

11.0 TESTING AND GUARANTEE

Testing of cable shall be performed according to procedures set forth by ICEA, AEIC CS-8 and ASTM Standards. Certified copies of pass/fail test results shall be supplied. Any cable found defective either upon inspection, testing or installation will be returned at the manufacturer's expense.

12.0 SPECIFIC REQUIREMENTS

Any conditional bid such as "subject to availability in stock" will be considered non responsive and will be rejected. Cable shall be furnished according to Table 1 and/or 2 below:

TR-XLP Insulation

Table 1

Conductor Size AWG or kcmil (No. of Strands)	Conc. Neutral Size	Material Phase (Neutral)	Insulation Thickness (mils) Nominal	Reel Dimensions (Dia. Trav. Drum)
#2 (7)	Full Neut.	Alum. (Cu.)	220	58-32-28
#2/0 (19)	1/3 Neut.	Alum. (Cu.)	220	58-32-28
750 (61)	1/3 Neut.	Alum. (Cu.)	220	78-48-42
1000 (61)	1/3 Neut.	Alum. (Cu.)	220	78-48-42

NOTE: Refer to proposal forms (bid sheets) for specific sizes and quantities.

EPR Insulation

Table 2

Conductor Size AWG or kcmil (No. of Strands)	Conc. Neutral Size	Material Phase (Neutral)	Insulation Thickness (mils) Nominal	Reel Dimensions (Dia. Trav. Drum)
#1/0(19)	Full Neut.	Alum. (Cu.)	220	58-32-28
#4/0 (19)	1/3 Neut.	Alum. (Cu.)	220	58-32-28
750 (61)	1/3 Neut.	Alum. (Cu.)	220	78-48-42
1100 (61)*	1/6± Neut.	Alum. (Cu.)	260	78-48-42

* Per PG&E Specification for 1100 kcmil 25 kV cable (Okonote ref. PC #160-23-9768)

NOTE: Refer to proposal forms (bid sheets) for specific sizes and quantities.

13.0 REELS

1. Reels

Shall be "Heavy Duty Reuseable Wood Reels - Class 2" meeting NEMA Standards Publication No. WC 26-2000 and EEMAC Standards Publication 201-2000, or latest revision thereof. See Table 3 below:

Table 3
Heavy Duty Reuseable Wood Reels – Class 2

Reel Dimensions (Dia. Trav. Drum)(")	58 - 32 - 28	78 - 48 - 42
Min. Flange Thickness (")	2.125	3.00
Max. Overall Width (")	39.50	56.00
Arbor Hole Diameter (")	3.06	3.06
Min. Stave Thickness (")	1.250	1.375
Drive Pin Qty	2	2
Dia. (")	1.50	3.00
Radius (")	10.0	11.5
Test Hole (")	3.0	4.5
Bushing or Plate	see note "d"	Yes
Tie Rods (No. & Size)	6 x 3/8"	8 x 5/8"
Assembly Washers (")	2.5	3.0
Min. # Of Nail Rings	5	6

Notes

- a. Washers are required on all bolts. Cup washers are permitted where gross weight is not in excess of 6000 pounds. Flat washers to be a minimum diameter of 3" with a minimum thickness of .125".
- b. Tapered cable test holes are required.
- c. Headed nails are to be used, spaced 3 inches apart with a minimum countersink of 1/16" on the cable side and a 1/8" clinch on the opposite side.
- d. Metal bushings are required when gross weight is in excess of 2500 lbs.

2. Makeup and length:

Reels shall be shipped with cable to their full maximum cable capacity.

#2, #1/0, #2/0 and #4/0 AWG shall be shipped on 58-32-38 reels.

750, 1000, 1100 kcmil shall be shipped on 78-48-42 reels.

Alternate reel sizes may be considered. However, a proposal with reels exceeding the maximum flange diameters of 78" or 58" and traverse width of 48" and 32", respectively, will be considered non responsive and will be rejected.

3. Packaging:

Reels containing 750, 1000 and 1100 kcmil cable shall have adequate protective covering across the flanges. Such covering shall consist of wood members from flange to flange covering the entire perimeter of the reel (lagging). The lagging shall be nailed to the flange perimeter and shall be further secured with at least two steel bands around the reel.

Reels containing #2, #1/0, #2/0 and #4/0 AWG cable shall be paper wrapped only, i.e. lagging is not required.

Each end of the cable shall be firmly secured to the reel.

4. Marking:

Each reel shall be marked with two durable labels securely attached to each flange of the reel and plainly marked and stating:

- a. Destination.
- b. Purchaser's purchase order number.
- c. Shipping length of cable on reel.
- d. Weight of reel (tare weight).
- e. Weight of cable on reel.
- f. Type and size of conductor.
- g. Insulation type and thickness.
- h. Voltage rating.
- i. Manufacturer's identification number
- j. Beginning and ending footage numbers of cable on the reel.

14.0 SHIPPING

Cable ends shall be adequately sealed with a water seal type material and heat shrinkable end caps to prevent the ingress of moisture into the cable ends. Reels shall be shipped upright. All shipments shall be prepaid, F.O.B. Lodi, California.

15.0 MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheets, for specific cable components which are considered hazardous, shall accompany each order. Three (3) copies shall be supplied at time of delivery.

16.0 MANUFACTURER'S CERTIFICATION

The Bidder/Supplier must provide manufacturer's certification indicating:

1. The cable meets the specifications.
2. The cable is of recent manufacture (less than 3 months).

17.0 EPR CABLE REQUIREMENTS

The successful bidder for EPR cable shall provide, meet and show proof of the following with the proposal:

1. Reference a minimum of five United States electric utilities with at least 100,000 feet of cable with the exact same insulating material in service for a minimum of 20 years. Include contact persons and phone numbers.
2. The successful cable manufacturer shall have a minimum of 25 years proven and successful experience with the manufacture of EPR insulated cable.
3. The EPR cable shall carry a forty-year warranty, by the manufacturer, after receipt in Lodi.