Transmission & Distribution
Material & Installation Specification

Underground Cable

I. Quantity

The base bid shall include the indicated quantity of underground cable furnished and installed as hereinafter specified.

II. Material

A. Underground cable - Shall be single conductor, TRXLPE insulated, copper tape shield cable with a PVC jacket. Cable shall be designed for use on a 60 Hz, 15kV, AC line-to-line system and to be installed in ground ducts by or by direct burial. The cable shall be operating continuously at a conductor temperature of 90 degree C for normal operation, 140 degree C under emergency conditions and 250 degree C under short circuit conditions.

B. Product description - Class B compressed copper conductor with strand filling, extruded semi-conducting thermosetting conductor shield, tree-retardant cross-linked polyethylene (TRXLPE) insulation, extruded semi-conducting thermosetting insulation shield, helically applied soft drawn bare copper tape shield, black insulating polyvinyl chloride (PVC) jacket.

C. Industry standard - The cable in this specification shall meet and/or exceed all requirements of the latest editions of the standards listed below. Where this specification differs from the requirements of the below standards, this specification shall take precedence. The cable shall further meet and/or exceed those applicable standards not stated herein but referenced by the below standards.

AEIC CS8-00	Specification for extruded dielectric, shielded power cables Rated 5 through 46KV (1st edition)
ICEA S-97-682	Utility shielded power cables rated 5,000 - 46,000 volts
ICEA S-93-639,	5 - 46KV shielded power cable for use in the transmission and
NEMA WC 74	Distribution of electric energy
ICEA T-25-425	Guide for establishing stability of resistively for conducting polymeric components of power cables
ASTM B-3	Copper wire, soft or annealed
ASTM B-8	Copper conductors, concentric-lay-stranded, hard, medium-hard or soft
ICEA T-31-610	Guide for conducting a longitudinal water penetration resistance test for sealed conductor
ICEA T-32-645	Guide for establishing compatibility of sealed conductor filler compound with conducting stress control materials

D. Conductor - The conductor shall be Class B stranded, compressed copper in accordance with the appropriate standards listed in item C, and sized per the below table:

Part ID #	Conductor Size	No. of Phases	Jacket Marking	Max Cable Outside Diameter
19946	#1 AWG	3	“A” “B” “C”	1.10”
50396	#1 AWG / #2 AWG 600V neutral	3/1	“A” “B” “C”	1.10”
19947	#1 AWG	1	“A”	1.10”
19948	#1 AWG	1	“B”	1.10”
19949	#1 AWG	1	“C”	1.10”
19955	2/0 AWG	3	“A” “B” “C”	1.22”
50397	2/0 AWG / #2 AWG 600V neutral	3/1	“A” “B” “C”	1.22”
19968	350 kcm	3	“A” “B” “C”	1.50”
19970	500 kcm	3	“A” “B” “C”	1.63”
19971	500 kcm / 350 kcm 600V neutral	3/1	“A” “B” “C”	1.63”
19972	500 kcm	1	“A”	1.63”
19973	500 kcm	1	“B”	1.63”

19974	500 kcm	1	“C”	1.63”
19978	750 kcm	1	“A”	1.88”
19979	750 kcm	1	“B”	1.88”
19980	750 kcm	1	“C”	1.88”
19983	1000 kcm	1	NO PHASE MARKING	2.04”

The interstices of the stranded conductor shall be filled with a sealant to impede longitudinal water penetration; however, the outer surface of the conductor shall be free from the sealant compound. The sealant must be compatible with the conductor shield in accordance with the latest edition of ICEA T-32-645. Further, longitudinal water penetration shall be tested in accordance with the latest edition of ICEA T-31-610 but shall meet a minimum requirement of 5 psig for 1 hour for qualification testing and 5 psig for 15 minutes for production testing.

E. Conductor shield - The conductor shield shall be black, thermosetting, semi-conducting material extruded over the conductor and shall be compatible with both the conductor and the overlying insulation. The conductor shield thickness shall be in accordance with the latest editions of ICEA S-93-639. The conductor shield shall be easily removed from the conductor and securely bonded to the overlying insulation. The conductor shield shall meet the requirements of the ICEA S-93-639, ICEA S-97-682.

F. Insulation - The insulation shall be a premium quality, heat, moisture, ozone, and corona resistant tree-retardant cross-linked polyethylene. The insulation shall be compatible with both the conductor shield and the insulation shield. The thickness shall be at the 133% level in accordance with the latest edition of ICEA S-93-639, ICEA S-97-682. The diameters over the insulation shall be in accordance with ICEA S-97-682.

G. Insulation shield - The insulation shield shall be black, thermosetting, semi-conducting material extruded. The insulation shield shall be black, thermosetting, semi-conducting material extruded over the insulation and shall be compatible with the underlying insulation as well as the overlying metallic shield. The thickness shall comply with the requirements of the latest edition of ICEA S-93-639. The insulation shield shall be free stripping from the insulation, leaving the insulation free from any significant residue or semi-conducting material. The tension necessary to remove the extruded insulation shield shall not exceed 24 pounds when tested in accordance with ICEA S-93-639. The insulation shield shall be marked per the requirements of ICEA S-93-639 and ICEA S-97-682 standard. The diameters over the insulation shield shall be in accordance with ICEA S-97-682.over the insulation and shall be compatible with the underlying insulation as well as the overlying metallic shield. The thickness shall comply with the requirements of the latest edition of ICEA S-93-639. The insulation shield shall be free stripping from the insulation, leaving the insulation free from any significant residue or semi-conducting material. The tension necessary to remove the extruded insulation shield shall not exceed 24 pounds when tested in accordance with ICEA S-93-639. The insulation shield shall be marked per the requirements of ICEA S-93-639 and ICEA S-97-682 standard.

H. Metallic shield - The metallic shield structure shall consist of one annealed, bare copper tape helically applied or two annealed, bare copper tapes intercalated and helically applied over the insulation shield. The tape(s) shall have a minimum thickness of 4 mils with a minimum overlap of 25%. The shield shall meet the applicable requirements of ICEA S-93-639.

I. Jacket - The jacket shall be black, non-conducting polyvinyl chloride (PVC). The thickness shall be in accordance with ICEA S-93-639. It shall be tightly extruded over the metallic shield and be free stripping. The jacket shall meet the requirements of the ICEA S-93-639. The jacket shall be marked in accordance with the ICEA S-93-639.

In addition to these markings, the cable shall have a sequential footage marking at 2-foot intervals as well as phase identification per the table above.

J. Production tests - All cable shall be subjected to and pass all production tests as required by ICEA S-93-639 and ICEA S-97-682. The purchaser reserves the right to witness any or all tests.

Certificates of Compliance shall be supplied and indicate the cables have successfully passed all tests in accordance with AEIC and applicable ICEA standards. Certificates shall be included with the packing slips for each reel.

K. Packaging - Watertight seals shall be applied to all cable ends to prevent the entrance of moisture during transit, outdoor storage, or installation. An additional three (3) sets of watertight seals shall be provided with each reel and the bag containing the seals shall be stapled to the inside of the reel.

L. Reel size - The maximum reel size for the above listed cable shall be 54” wide (outside bolt to bolt) x 96” high (diameter).

CITY OF COLUMBUS
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III. Method of measurement

Shall be a straight line from center line of stake to stake, point to point, pole to pad, pad to pad, ground mount structure to structure, man hole to man hole, vault to vault.
In addition to the lineal point to point measurement, a 50lf adder shall be allowed for each riser pole and a 15lf adder for each ground or pad mounted equipment.
Cable shall be considered a single conductor cable or a multi-conductor cable assembly (bi-plex, tri-plex or quad-plex), but not both. No additional will be paid for “multi-cable put-ups”, (more than 1 conductor on a reel) for the convenience of rigging or pulling.
Unit price shall be per 1000lf of cable or cable assembly and shall include all labor, materials, spacers, supports, ties, terminations, splices, separable connectors and accessories, lubricants, tools, equipment, and supervision required for a complete and operational conductor segment.

IV. Basis of payment

Items	Unit	Description
TDMIS-1510	Per 1000 Linear Feet	__ underground conductor cable

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