

CITY OF AUSTIN ELECTRIC UTILITY DEPARTMENT

PURCHASE SPECIFICATION

FOR

CABLE, NETWORK, 600V, ETHYLENE PROPOYLENE RUBBER (EPR),

INSULATED CHLORINATED POLYETHYLENE (CPE) JACKETED

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL PROCESS SUPV. / MATERIALS SUPV.
11/12/87	Robin Kittel	Revision	/ Richard C. Dreiss
09/24/2013	Dennis Patrick	Revision	Troy Vessel
11/12/2019	Dennis Patrick	Revision	

REASON FOR REVISION	AFFECTED PARAGRAPHS
Change Jacket from CSPE to CPE removing the Led. Added "low smoke and Zero halogen".	6.1 General

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein.
Retain for future reference.

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1.0 SCOPE AND CLASSIFICATION

1.1 Scope

1.1.1 This specification covers single conductor, 600 volt, ethylene propylene, CPE jacketed secondary network cable. This cable shall be capable of meeting Underwriters Laboratories' types RHH and RHW-USE and VW-1.

1.1.2 No deviation from this specification will be permitted.

1.1.3 Only manufacturers products approved by the City of Austin Electric Utility Material Standards will be acceptable.

1.2 Classification

1.2.1 Rated voltage shall be 600 volts.

1.2.2 Conductor sizes shall be #2 AWG through 500 MCM.

2.0 APPLICABLE SPECIFICATIONS

2.1 Unless otherwise stated in these specifications, cable shall be manufactured, tested, and made ready for shipment in accordance with the latest revisions of ASTM, NEMA, UL, and ICEA National Standards.

3.0 FUNCTIONAL REQUIREMENTS

3.1 Cable furnished under these specifications shall be designed for installation in underground conduit.

4.0 PHYSICAL REQUIREMENTS

4.1 Cable shall be single conductor, #2 AWG through 500 MCM inclusive, coated copper, insulated with heat and moisture resistant ethylene propylene rubber compound covered with an overall black CPE jacket.

5.0 WIRE

5.1 Wires, before stranding, shall be soft or annealed copper, coated meeting the requirements of either ASTM B33 "Tinned Soft or Annealed Copper Wire for Electrical Purposes". Test frequencies shall be in accordance with manufacturers practice.

5.2 Stranding - Conductors shall be Class B stranded meeting the requirements of ASTM B8 "Specification for Concentric Lay Stranded Copper Conductors, Hard, Medium - Hard or Soft." Test frequencies shall be in accordance with the manufacturers practice.

6.0 INSULATION

6.1 General

Insulation shall be heat and moisture resisting ethylene propylene rubber compound. This insulation shall be homogenous in character, tough and elastic applied concentrically and tightly around the conductor. The insulation shall be guaranteed for use at conductor temperatures not exceeding 90 degrees Celsius (194 degrees F). The Insulation and Jacket shall emit only low smoke and Zero halogen at any time.

6.2 Thickness - The average thickness shall be not less than that specified in Table I. The minimum thickness at any point shall be not less than 90 percent of the specified thickness.

6.3 Insulation Tests - The insulation shall be capable of meeting the requirements of ICEA S-95-658, latest revision, in addition to the following:

6.3.1 Initial Requirements:

Tensile Strength, minimum PSI.....	700
Elongation at rupture, minimum.....	250

6.3.2 Physical requirements after accelerated aging:

Air Oven test (168 hrs. @ 121 degrees C):

Tensile strength, minimum % of original.....	75
Elongation at rupture, minimum, % of original.....	75

6.3.3 Moisture Absorption Test

6.3.3.1 Electrical Method (immersed @ 75 degrees C; tested at an average stress of 80 volts per mil, 60 hertz)

(a) Dielectric constant after 24 hours immersion, maximum.....	6.0
(b) Increase in capacitance, 7 to 14 days, maximum.....	5.0
(c) Increase in capacitance, 7 to 14 days, maximum.....	3.0
(d) Stability Factor after 14 days, max.....	1.0
(e) Alternate to Stability Factor, 1 to 14 days, maximum.....	0.5

6.3.3.2 Gravimetric Method (immersion for 7 days @ 70 degrees C.

(a) Moisture absorption, max., milligrams per square inch.....	5.0
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7.0 JACKET

- 7.1 General - The jacket shall be black, heavy-duty CPE.
- 7.2 Thickness - The average thickness shall not be less than that shown in Table I. The minimum thickness at any point shall be not less than 80% of the specified thickness.
- 7.3 Jacket Tests - The jacket shall be capable of meeting the requirements of ICEA S-95-658, latest revision in addition to the following:
- 7.3.1 Initial Requirements:
- | | |
|---------------------------------------|------|
| Tensile strength, minimum PSI..... | 1500 |
| Elongation at rupture, minimum %..... | 300 |
- 7.3.2 Physical Properties after Accelerated Aging via:
- (a) Air-Oven Test (168 hours @ 100 degrees C)
- | | |
|---|----|
| Tensile strength, minimum, percentage
of original..... | 85 |
| Elongation, minimum, percentage of
original..... | 50 |
- 7.3.3 Moisture - Absorption Tests:
- 7.3.3.1 Electrical Method (immersion at 75 degrees C, tested at an average stress of 80 volts per mil, 60 hertz.
- | | |
|---|-----|
| (a) Increase in capacitance, 1 to
14 days, maximum %..... | 6.0 |
| (b) Increase in capacitance, 7 to
14 days, maximum, %..... | 2.5 |
| (c) Stability factor after 14 days,
maximum..... | 1.0 |
| (d) Alternate: Stability factor difference,
1 to 14 days, maximum..... | 0.5 |

- 7.3.3.2 Gravimetric Method (Immersed for 7 days @ 82 degrees C):
 - (a) Moisture Absorption, maximum, milligram per square inch.....20

7.4 Cable Identifiers and Cutting Lengths

- 7.4.1 Single leg cable shall be unmarked.
- 7.4.2 Two (2) leg cable shall be paralleled and

Three equal lengths of cable shall be paralleled on each reel. Coding shall be as follows: One cable shall be either unmarked or one ridge, one cable shall have two ridges, and one cable shall have three ridges. Cutting lengths shall be specified on order.

- 7.5 Adhesion: The jacket and insulation shall adhere to such a degree that upon separation of the two, there shall be a perceptible deformation of the insulation or jacket at the point of separation.

8.0 ELECTRICAL TESTS

- 8.1 High Voltage AC - Each length of completed cable shall withstand for five minutes the alternating - current voltage as specified in Table II.
- 8.2 Insulation Resistance - Each length of completed cable, following the 5 minute voltage test, shall show an insulation resistance corrected to 15.6 degrees Celsius (60 degrees F), of not less than the Value R as calculated from the formula given below. Temperature coefficients for correcting readings taken at other than 15.6 degrees Celsius (60 degrees F) to equivalent values at 15.6 degrees Celsius 60 degrees F) are given in Table III.

$$R = k \log_{10} D/d$$

Where R = insulation resistance in megohms/1,000 ft.

$$K = 12,000$$

D = diameter over insulation

d = diameter under insulation

9.0 IDENTIFICATION

- 9.1 All cables shall carry, throughout their length, markers thread either between the jacket and insulation or insulation and conductors identifying manufacturer by color of thread.
- 9.2 Surface Legend - All cable jackets shall have surface print with manufacturers name, cable type, cable size, and manufacturing location.

10.0 TEST REPORTS

Manufacturer shall furnish, to the City of Austin Electric Utility Material Standards section, three copies certified test reports on each size cable manufactured under these specifications.

TABLE I**THICKNESS OF INSULATION ON 600-VOLT TYPE RHH AND RHW WIRES**

SIZE OF CONDUCTOR	MINIMUM ACCEPTABLE AVERAGE THICKNESS IN MILS	
	<u>EP</u>	<u>CPE</u>
14-9 AWG	30	15
8, 7	45	15
6-2	45	30
1-4/0	55	45
213-500 MCM	65	65
501-1000	80	65

TABLE II

RATED CIRCUIT VOLTAGE	CONDUCTOR SIZE	AC TEST VOLTAGE (KV)
0-600	18-16	1.0
	14-9	3.0
	8-2	3.5
	1-4/0	4.0
	225-500	5.0
	525-1000	6.0
	over 1000	7.0

TABLE III

FACTORS FOR CORRECTING INSULATION RESISTANCE TO 60 DEGREES F (15.6 DEGREES C)

<u>TEMPERATURE</u>		<u>CORRECTION FACTOR F</u>
DEGREES F	DEGREES C	
50	10.0	0.73
51	10.6	0.76
52	11.1	0.78
53	11.7	0.80
54	12.2	0.83
55	12.8	0.86
56	13.3	0.88
57	13.9	0.91
58	14.4	0.94
59	15.0	0.97
60	15.6	1.00
61	16.1	1.03
62	16.7	1.07
63	17.2	1.10
64	17.8	1.13
65	18.3	1.17
66	18.9	1.20
67	19.4	1.24
68	20.0	1.28
69	20.6	1.32
70	21.1	1.36
71	21.7	1.40
72	22.2	1.45
73	22.8	1.50
74	23.3	1.55
75	23.9	1.59
76	24.4	1.64
77	25.0	1.69
78	25.6	1.75
79	26.1	1.80
80	26.7	1.86