

CHICAGO TRANSIT AUTHORITY**DETAIL SPECIFICATION
FOR
CABLE: ELECTRIC, 150 DEGREES C, COPPER,
ETFE (TEFZEL®) INSULATED, 1000V****SPECIFICATION NO. CTA 3789-06****1. SCOPE**

- 1.1 This specification covers the requirements for 150 degrees C ETFE (TEFZEL®) insulated cable, in various colored insulation and American Wire Gauge (AWG), used for Automatic Train Control (ATC) and signal wiring on CTA rail cars and track signals.

2. GENERAL REQUIREMENTS

- 2.1 Cable furnished shall be single conductor, flexible in nature, self-extinguishing and have good resistance properties to abrasion, cut through, notch propagation, impact, voltage, moisture, heat, and chemicals.
- 2.2 Because of its insulation thickness, the cable to be furnished is not standard, and is considered of special design.

3. DETAILED REQUIREMENTS

- 3.1. Conductor - The cable conductor shall meet the following requirements

3.1.1 The conductor shall be soft annealed copper as per ASTM B3-01

3.1.2 The conductor shall be tin coated per ASTM B33-04

3.1.3 The stranding shall be in accordance with ASTM B286-02 and as called for in Table 1, located in Section 9 of this specification.

3.2. Insulation - The cable insulation shall be extruded ethylene tetrafluoroethylene fluoropolymer (ETFE). An example of an insulation that meets the following requirements is DuPont's TEFZEL®.

3.2.1 Insulation shall strip cleanly from the conductor.

3.2.2 The insulation thickness shall be not less than called for in Table 1, located in Section 9 of this specification.

CTA 3789-06

3. DETAILED REQUIREMENTS (Cont.)3.2 Insulation (Cont.)

3.2.3 The cable insulation be inert and be rated for 1000 VDC continuous operation at 150 degrees C.

3.2.4 The cable insulation resistance measured on same lengths of each size shall not be less than 1.000 megohms per thousand feet.

3.2.5 The insulation shall have the following minimum physical properties when tested in accordance with ASTM D638-03:

Tensile Strength:	5,500 PSI
Elongation	100%

3.2.6 The insulation shall be colored throughout, and the colors shall be durable and shall have no deleterious effect on the finished products.

3.2.7 The ETFE material shall comply with ASTM D3159-06: ETFE-Fluoroplastic Molding and Extrusion Materials.

4. TESTING

4.1 The manufacturer, if requested, shall furnish certified evidence that the cable proposed has passed the following test requirements.

4.2 The insulated wire shall be subjected to ninety-six (96) hours in an air oven at 200 degrees C. Tensile strength and elongation of the insulation shall not drop below 85% of the original values.

4.3 Bend Test - The insulated wires shall withstand the following bend test:

4.3.1 Test specimens shall be cooled to minus 65 degrees C for four (4) hours. The test specimens shall then be wound around a mandrel as specified in Table 2, located in Section 9 of this specification, while still in the cold chamber. The winding shall be done at a rate of one turn in four seconds, until at least six turns are wound on the mandrel. The wire shall then be re-wrapped in the opposite direction on the mandrel. After this test, the wire shall be examined for insulation cracks or damage and brought to room temperature, plus 25 Degrees C. The coiled or bent section shall be immersed in tap water for one (1) hour at room temperature (plus 25 degrees C.), and then be subjected to, and withstand, 3,000 volts AC RMS for one (1) minute.

CTA 3789-06

4.4 **Weight Loss** - The insulated wires shall not exceed one percent (1%) weight loss when tested subjected to a temperature of plus 130 degrees C for 500 hours.

5. **PACKAGING**

5.1 Cable shall be supplied on manufacturer's non-returnable reels or spools. Each reel or spool shall be indelibly marked in legible characters in a suitable location, the following information: CTA item number, order number, the name of the manufacturer, type of cable, its size and length.

5.2 Each reel or spool shall be continuous, without splices unless otherwise approved. Unless otherwise called for or approved, reel or spool length shall not be less than 500 feet or greater than 1,000 feet.

6. **TEST REPORTS**

6.1 When called for in the Contract Documents, the Contractor shall provide certified test reports of all tests performed, as called for in Section 4 of this specification, with the final test results.

7. **APPROVED AND NON-APPROVED ITEM INFORMATION**

7.1 Contractor shall only furnish and deliver CTA approved items under the terms of a given contract. Should a potential contractor wish to offer for CTA consideration an alternate item not currently approved, the potential contractor shall first contact the CTA Procurement Administrator or Buyer for details on the CTA's item approval process. The time required for reviewing and/or testing each item offered will vary and depend on applicable procedures. Approval of an item does not guarantee an order under a currently proposed or future contract. Upon award of a contract, each item furnished by the contractor shall be identical to the item that was approved.

8. **ADDITIONAL INFORMATION FOR POTENTIAL BIDDERS**

8.1 Bidders requiring additional information shall contact the Procurement Administrator listed on the front page of this Contract Document. Potential Bidders requiring addition information from a person or persons listed in the Special Conditions must route their requests through the Procurement Administrator. Potential Bidders who contact any Authority personnel other than the Procurement Administrator will be considered in violation of the provisions of the Contract Document.

CTA 3789-06

9 TABLES

TABLE 1 Cable Physical Requirements			
SIZE OF CONDUCTOR	MINIMUM NO. of STRANDS	INSULATION MINIMUM THICKNESS in INCHES	NOMINAL O.D. in INCHES
16 AWG	26	0.025	0.113
12 AWG	37	0.030	0.146
10 AWG	104	0.030	0.186
8 AWG	133	0.035	0.244

TABLE 2 <u>Cold Bend Mandrels</u>	
Nominal Conductor Size (AWG)	Mandrel Diameter (Inches)
16	0.075
12/10	2.0
8	3.0

DISTRIBUTION: Mgr., Technical Services-Rail

Initial Spec. - 7/30/80

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