

**AUSTIN ENERGY**  
**PURCHASE SPECIFICATION**  
**FOR**

**CABLE, DISTRIBUTION, URD, 3PH, 1/0, 500 KCMIL, 750 KCMIL, 15 KV**  
**THREE CONDUCTOR, PARALLELED, ALUMINUM**

| <b>DATE PREPARED</b> | <b>BY ISSUANCE/REVISION</b> | <b>APPROVAL MANAGER</b>            |
|----------------------|-----------------------------|------------------------------------|
| 11/07/97             | Peter Soosay                | Matt Monroe / Herman Millician     |
| 02/23/98             | Peter Soosay                | Matt Monroe / Herman Millician     |
| 03/02/98             | Peter Soosay                | Matt Monroe / Herman Millician     |
| 04/27/98             | Peter Soosay                | Matt Monroe / Herman Millician     |
| 08/28/98             | Peter Soosay                | George M. Martinez / Gary Williams |
| 04/26/16             | Brantley Gosey              | Michael Pittman                    |
| 05/15/20             | Brantley Gosey              | Michael Pittman                    |

***REASON FOR REVISION***

***AFFECTED PARAGRAPHS***

04/26/16: General updates and improvements

All

05/15/20: Clarification circuit ft or linear ft

5.8.1

This specification, until rescinded, shall apply to each future purchase and contract for the commodity described herein.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

## **1.0 SCOPE AND CLASSIFICATION**

### 1.1 Scope

The City of Austin Electric Utility Department is hereinafter referred to as Austin Energy (AE). Austin Energy requires a qualified Manufacturer to supply 15 kV Three Conductor Paralleled Aluminum URD Cable, 133% Cable Insulation Level.

### 1.2 Classification

The 15 kV Three Conductor Paralleled Aluminum URD Cable will be used in either conduit or direct buried installation.

## **2.0 APPLICABLE STANDARDS**

The latest revision of the following standards:

- 2.1 AEIC CS8 Specification for Extruded Dielectric Shielded Power Cables Rated 5 through 46kV
- 2.2 ICEA S-94-649 – Standard for Concentric Neutral Cables Rated 5 Through 46kV
- 2.3 Federal Standard 209D - Clean Room And Work Station Requirements, Controlled Environment
- 2.4 ASTM B3 - Soft or Annealed Copper Wire
- 2.5 ASTM B231 - Concentric-Lay-Stranded Aluminum 1350 Conductors
- 2.6 ASTM B263 - Determination of Cross-Sectional Area of Stranded Conductors
- 2.7 ICEA T-31-610 - Guide for Conducting a Longitudinal Water Penetration Resistance Test for Sealed Conductor
- 2.8 ICEA T-32-645 - Guide For Establishing Compatibility of Sealed Conductor Filler Compounds with Conducting Stress Control Materials

## **3.0 URD CABLE DESIGN**

### 3.1 CLEAN ROOM

THE CABLE MANUFACTURER'S CLEAN ROOMS (INCLUDING CABLE HANDLING, RECEIPT, STORAGE, TRANSFER AND EXTRUSION) SHALL HAVE A CLASS 100,000 PROTECTION (MINIMUM), THAT IS, THERE SHALL BE NO MORE THAN 100,000 ARTICLES OF SIZE 0.5  $\mu$ M OR LARGER, PER CUBIC FEET, IN ACCORDANCE WITH FEDERAL STANDARD 209D.

### 3.2 Material

The URD Cable shall be single conductor, concentric neutral, Tree Retardant Cross-linked Polyethylene (XLPE), rated for 15 kV grounded neutral operation at maximum conductor temperatures not exceeding 90°C for continuous normal operation, 130°C for emergency overload conditions and 250°C for short circuit conditions as defined by AEIC CS8.

### 3.3 Aluminum 1350 Center Conductor

3.3.1 The cable shall be configured with center conductor of stranded Aluminum 1350. The Aluminum 1350 conductor, shall be  $\frac{3}{4}$  hard-drawn or hard-drawn, concentric lay, Class B stranded and compressed, in accordance with ASTM B231 and ASTM B263.

#### 3.3.2 DC Resistance

The DC resistance of each conductor shall be measured on each completed cable and corrected to 25°C. The measured resistance, shall not be greater than 2% of the values in Table 2-3 of ICEA S-94-649.

#### 3.3.3 Conductor Water Blocking

The conductor interstices shall have water blocking components. The outer most layer of conductors shall be free of water blocking components. The water blocking component shall have a normal and emergency temperature rating of 90°C and 130°C respectively. The water blocking components shall be in compliance with ICEA T-32-645 and ICEA T-31-610.

### 3.4 Conductor Shield

3.4.1 The conductor shall be strand shielded by extruding a semi-conducting compound over the conductor.

#### 3.4.2 Conductor Shield Thickness (as per ICEA S-94.649)

| Conductor Size<br>(AWG or kcmil) | Minimum Point<br>(mils) |
|----------------------------------|-------------------------|
| 1/0                              | 12                      |
| 500 kcmil                        | 16                      |
| 750 kcmil                        | 20                      |

3.4.3 The conductor shield shall be free-stripping from the conductor, leaving no residue. The stripping shall be done without the use of heat, wire brushing or chemicals.

3.4.4 The semi-conducting compound shall be compatible with the Aluminum 1350 conductor and shall uniformly and firmly bond to the overlying insulation.

### 3.5 Insulation

The insulation shall be DOW HFDB 4202 or DOW HFDC 4202 or Borealis LE 4212, tree retardant cross-linked thermosetting polyethylene in compliance with AEIC CS8 and ICEA S-94-649. The nominal insulation thickness shall be 220 mils with a minimum point thickness of 210 mils and a maximum point thickness of 250 mils. The insulation shall have no less than five (5) years of field tested experience.

### 3.6 Insulation Shield

3.6.1 An extruded single layer of semi-conducting thermosetting material shall be applied directly over the insulation. The material shall be compatible with the insulation (§ 3.5) throughout the allowable operating temperatures for which the cable is rated.

3.6.2 Shielding over the insulation shall be a semi-conducting black Cross-linked Polyolefin compound compatible with the insulation and in accordance with AEIC CS8 and ICEA S94-649. The compound shall be easily strippable, that is, the minimum allowable shield stripping tension shall be 6 lbs. and the maximum allowable shield stripping tension shall be 18 lbs. The compound shall have no less than five (5) years of field tested experience.

3.6.3 The insulation shield shall be control-strippable from the insulation surface, leaving no residue. The stripping shall be done without the use of heat, wire brushing or chemicals.

3.6.4 Insulation Shield Thickness (as per AEIC CS8)


| <u>Conductor Size</u><br>(AWG or kcmil) | <u>Minimum Point</u><br>(mils) |
|---|--------------------------------|
| 1/0                                     | 30                             |
| 500 kcmil                               | 40                             |
| 750 kcmil                               | 40                             |

3.6.5 Indent of concentric neutral conductors on the insulation shielding, shall be in compliance with ICEA S-94-649 Table 5-1.

### 3.7 Extrusion

The conductor shield (§ 3.4), insulation (§ 3.5) and insulation shield (§ 3.6) shall be applied by true triple extrusion, dry cure process. During the extrusion process, each layer of shielding and insulation shall be protected from moisture, contaminants and exposure to the ambient environment.

### 3.8 Concentric Copper Neutral Conductors

The concentric copper neutral conductors shall be in accordance with ICEA S-94-649. The concentric copper neutral conductors shall be configured as 1/3 neutral. The copper concentric for the 1/0 cable shall be either six (6), #14 AWG or nine (9), #16 AWG  annealed bare copper wires helically secured over the insulation shielding (§ 3.6). The concentric copper neutral for the 500 kcmil cable shall be twenty five (25), #14 AWG annealed copper wires. The concentric copper neutral for the 750 kcmil cable shall be twenty four (24), #12 AWG annealed copper wires.

The lay of the concentric copper neutral conductors, shall not exceed ten (10) times the calculated diameter of the concentric copper neutral conductor.

### 3.9 Jacket

The jacket shall be a black polyethylene compound, in accordance with ICEA S-94-649. The jacket shall not be bonded to the insulation shield. The extruded jacket thickness, over the concentric copper neutral conductors shall be as follows:

| <u>Conductor Size</u><br>AWG or kcmil | <u>Jacket Nominal Thickness</u><br>(mils) | <u>Minimum Thickness at any point</u><br>(mils) |
|---------------------------------------|---|---|
| 1/0                                   | 50  | 45  |
| 500 kcmil                             | 80  | 70  |
| 750 kcmil                             | 80  | 70  |

### 3.10 Cable Identification

The cable identification shall be in accordance with AEIC CS8 and ICEA S-94-649.

#### 3.10.1 Cable Jacket

The cable jacket (§ 3.9) shall have, include but not be limited to, the following permanent distinctive markings:

- a) Manufacturer's Name
- b) Sequential footage, every 2 ft.

The markings on the cable jacket shall be readily legible throughout the operational life of the cable.

#### 3.10.2 Phase Marking

The cable jacket shall have permanent distinctive phase (ABC) markings. The phase markings on the cable jacket, shall be readily legible throughout the operational life of the cable.

## 4.0 TEST REQUIREMENTS

4.1 The Manufacturer cable test shall be as per AEIC CS8 and ICEA S-94-649 and shall include:

4.1.1 Partial discharge shall not exceed five (5) pC at 200V/mil. A X-Y recording shall be made of the partial discharge.

4.1.2 AC Withstand Production Test

4.2 Test Reports

The test reports shall encompass all tests in accordance with AEIC CS8 and ICEA S-94-649 and with the exceptions detailed in this specification. The test reports shall also have, include but not be limited to, the following information:

- 4.2.1 Type of semiconducting compound and Supplier
- 4.2.2 Type of insulating compounds and Supplier
- 4.2.4 Stripping tension for insulation shield in pounds (lbs.)
- 4.2.6 Conductor shield protrusion in mils

## **5.0 OTHER REQUIREMENTS**

### **5.1 Cable Test Reports**

- 5.1.1 All production tests required by AEIC CS8 and ICEA S-94-649 shall be performed.
- 5.1.2 Certified cable test reports shall be provided for each shipping reel.
- 5.1.3 Only certified cable test reports of the shipping reels, will be accepted by the AE Distribution Standards Supervisor.
- 5.1.4 All certified test reports, shall be sent to the Austin Energy Distribution Standards Supervisor, prior to sale of the cable. Failure to produce test reports prior to sale, will result in the automatic rejection of the cable.

### **5.2 Cable Design**

- 5.2.1 The Cable Manufacturer shall send hard copy design drawings of the cable described herein, to the AE Distribution Standards Supervisor for approval, upon completion of any revision of the drawings and when requested by Austin Energy.
- 5.2.2 The cable design drawings, shall indicate detailed dimensions and material properties.
- 5.2.3 Prior to any changes in cable design, the Cable Manufacturer shall notify the AE Distribution Standards Supervisor. The Cable Manufacturer can make cable design changes, only upon receiving a written approval from the AE Distribution Standards Supervisor.

### **5.3 Cable Inspection & Samples**

The Austin Energy reserves the right to carry out random testing of cables.

- 5.3.1 The Austin Energy Distribution Standards will contact the Cable Vendor to schedule the cutting of cable samples. Each cable sample shall be a minimum of 30 inches long. The Cable Vendors will be notified five (5) business days, prior to a visit by the Austin Energy Distribution Standards, to witness the samples cut from the cable reels.

- 5.3.2 The cables shall be cut by the Cable Vendor's personnel, in the presence of Austin Energy Distribution Standards personnel.
- 5.3.3 It is the responsibility of the Cable Vendor's personnel to secure the cable reels for shipment, after the cable samples are cut. The Austin Energy Distribution Standards personnel will not cut any cable samples.
- 5.3.4 Notification of Cable Test
- a) The Austin Energy Distribution Standards personnel will require ten (10) business days, to carry out all necessary testing of the cable samples, collected from the Cable Vendor's site.
  - b) Upon completion of the cable tests, the cable vendor will be notified by fax. Only cables approved by the Austin Energy Standards department will be accepted for sale to Austin Energy. The cable vendor cannot sell to Austin Energy, cables not approved by Austin Energy Standards department.
  - c) If the cables fail the tests conducted the Austin Energy Distribution Standards, the Cable Vendor will be notified by the AE Standards Supervisor and appropriate actions will be taken, inclusive of "non-acceptance" of the cable by Austin Energy.

5.4 Austin Energy Standards Supervisor  
Austin Energy  
4411-B Meinardus Drive  
Austin, TX 78744

- 5.5 The Cable Manufacturer shall have twenty (20) years (minimum) experience in manufacturing 15 kV Three Conductor Paralleled Aluminum URD cable.

5.6 Material Qualification

The supplier shall either submit with the quotation, or have on file with Austin Energy, certified support data for the qualification tests required by ICEA S-94-649 Part 10.

5.7 Manufacturer Guarantee

The Manufacturer guarantee shall be in accordance with AEIC CS8.

5.8 Packaging

- 5.8.1 The packaging of the cables shall be in accordance with ICEA S-94-649 and NEMA WC26. **THE LENGTH OF CABLE ON EACH REEL SHALL BE APPROXIMATELY 1000 circuit ft or 3000 linear ft. ± 10.0%.**

- 5.8.2 The cable shall be supplied on non-returnable reels.



- 5.8.3 The reels shall be covered with one layer of weather-resistant material such as treated cardboard or fiberboard wrapping secured with tape or plastic straps, to provide physical protection for the cables during transit and during ordinary storage and handling operations.
- 5.8.4 Prior to accepting a contract Austin Energy shall receive a full test report from a reputable domestic testing lab on subject product(s). The lab shall not be affiliated directly with the manufacturer of subject product(s). Tests performed on product(s) shall be according to (ANSI STD). Test results shall indicate the exact product number that the tests were performed on. In addition to initial testing prior to accepting contract, Austin Energy reserves the right to require testing at any time during the term of the contract, and maintains the ability to nullify contract if lab results are not received within a reasonable time from or if lab results are determined unsatisfactory by Austin Energy.
- 5.8.5 AE item numbers impacted by this specification include, but are not limited to the following:
- 1746
  - 1208