Austin Energy

Purchase Specification E-1985

For

CONDUCTOR, DIST, OH, 1/0–795 kcmil, 15 kV, COVERED, AAC-ACSR, XL-HDPE

DATE	PREPARED BY	CHANGE SUMMARY	APPROVAL
06/15/26	Brantley Gosey	Revision	
01-Aug-23	Julius Heslop P.E.	INITIAL	J. Heslop

Summary of Changes

Section	CHANGE SUMMARY
Entire document	Total rewrite to adhere with tested Prysmian conductor and analysis

1. Purpose

This document provides recommended purchase specification language for Austin Energy's 15 kV covered conductor specification. The intent is to ensure that covered conductor purchased for Austin Energy projects is consistent with the conductor properties, thermal modeling assumptions, and engineering basis used in the covered conductor system analysis.

The manufacturer shall provide conductor data sufficient for Austin Energy to reproduce and verify steady-state conductor temperature, ampacity, sag-tension, clearance, and structural loading evaluations.

2. Applicable Standards — Additions

The following standards and references shall be added to the applicable standards list:

1. **IEEE Std 738** — IEEE Standard for Calculating the Current-Temperature Relationship of Bare Overhead Conductors. This standard shall be used as the basis for steady-state ampacity and conductor-temperature verification.
2. **ICEA S-121-733** — Tree Wire and Messenger-Supported Spacer Cable. Covered conductor shall meet or exceed the applicable requirements for 15 kV systems.
3. **ASTM B230** — Aluminum 1350-H19 Wire for Electrical Purposes.
4. **ASTM B231** — Concentric-Lay-Stranded Aluminum 1350 Conductors.
5. **ASTM B232** — Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Reinforced.
6. **ASTM B400** — Compact Round Concentric-Lay-Stranded Aluminum 1350 Conductors.
7. **ASTM B498** — Zinc-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced.

3. Functional Requirements — Thermal and Ampacity Performance

3.1 General Thermal Performance Requirement

Covered conductor furnished under this specification shall be capable of meeting Austin Energy's covered conductor thermal modeling assumptions and operating requirements. The conductor shall support steady-state ampacity verification using IEEE 738 methodology under the environmental and surface-property assumptions listed in this section.

The conductor shall be suitable for use on Austin Energy's 15 kV overhead distribution system and shall be compatible with Austin Energy's covered conductor system modeling basis, including thermal verification, sag-tension analysis, clearance evaluation, and structural loading review.

3.2 Temperature Ratings

The supplied covered conductor shall meet the following minimum thermal ratings unless otherwise approved in writing by Austin Energy:

Rating Type	Minimum Required Rating
Continuous operating temperature	90°C
Emergency operating temperature	130°C
Short-circuit temperature	250°C

The 90°C continuous rating is the minimum acceptable rating used for Austin Energy's steady-state thermal verification. A conductor with a lower continuous operating temperature rating shall not be accepted unless specifically approved by Austin Energy after engineering review.

3.3 IEEE 738 Thermal Modeling Basis

The manufacturer shall provide an IEEE 738 steady-state thermal verification package for each conductor size proposed. The calculation shall demonstrate conductor performance using, at minimum, the following Austin Energy thermal model inputs:

Parameter	Required Value / Requirement
Thermal calculation method	IEEE 738 steady-state conductor temperature calculation
Ambient air temperature	112°F
Wind speed	2 ft/s
Wind angle to conductor	90 degrees
Solar condition	Clear-sky / maximum solar heating condition
Solar model input	June 21, or equivalent maximum solar heating assumption
Surface absorptivity, α	0.90
Surface emissivity, ε	0.90
Insulation system	Three-layer covered tree wire system
Conductor data	Certified manufacturer data for diameter, resistance, weight, stranding, material, and temperature rating

The thermal modeling basis above is used only for ampacity and conductor-temperature verification. It does not replace NESC structural loading cases, PLS-CADD sag-tension criteria, or Austin Energy structural design requirements.

3.4 Required Thermal Performance

The supplied conductor shall meet or exceed the following Austin Energy operating requirements when evaluated using the IEEE 738 inputs listed above:

Covered Conductor	Application	Normal Current	Emergency Current	Acceptance Requirement
795 kcmil 37W AAC, Arbutus covered three-layer tree wire	Mainline feeder applications	800 A	850 A	Conductor temperature shall not exceed 90°C / 194°F at 850 A. Austin Energy reference model result: approximately 188°F at 850 A.
1/0 AWG 6/1 ACSR, Raven covered three-layer tree wire	Lateral and reduced-ampacity applications	230 A	230 A	Conductor temperature shall not exceed 90°C / 194°F at 230 A.

If the manufacturer's certified conductor properties differ from the values used in Austin Energy's engineering model, the manufacturer shall provide revised IEEE 738 calculations using the certified values. Austin Energy reserves the right to reject any product whose certified properties require re-analysis and result in temperatures, sag, tension, clearances, or structural loading outside the accepted design basis.

3.5 Surface Optical Properties

The outer jacket shall be track-resistant XL-HDPE or approved equivalent and shall be suitable for use with the following thermal modeling surface properties:

Property	Modeled Value
Solar absorptivity, α	0.90
Surface emissivity, ε	0.90

The manufacturer shall identify the basis for the provided absorptivity and emissivity values, including whether the values are based on published material data, product testing, or industry-standard assumptions.

If certified product values are more adverse than Austin Energy's modeled values, the product shall be evaluated using the more conservative values unless Austin Energy approves otherwise.

For acceptance calculations, Austin Energy may require the following conservative convention:

- Use the greater of the certified absorptivity or 0.90.
- Use the lesser of the certified emissivity or 0.90.

4. Physical Requirements — Certified Modeling Data

4.1 Required Certified Conductor Data

For each conductor size proposed, the manufacturer shall provide certified physical, electrical, mechanical, and thermal properties sufficient to reproduce Austin Energy's IEEE 738 thermal calculations and PLS-CADD / PLS-Lite conductor models.

At minimum, the manufacturer shall provide the following data:

Required Data	Description
Conductor type	AAC, ACSR, compact AAC, or approved equivalent
Conductor size	AWG or kcmil designation
Stranding	Number and arrangement of aluminum and steel strands
Bare conductor diameter	Diameter before application of covering
Covered conductor outside diameter	Final outside diameter of covered conductor
Total covered conductor weight	Weight including conductor and covering
DC resistance at 20°C	In ohms per 1,000 ft or ohms per mile
AC resistance	At applicable operating temperature, if available
Rated tensile strength	RTS / breaking strength
Modulus of elasticity	For sag-tension modeling
Coefficient of thermal expansion	For sag-tension and temperature-dependent modeling
Creep / stress-strain data	Manufacturer data or PLS-CADD cable file
Continuous temperature rating	Minimum 90°C
Emergency temperature rating	Minimum 130°C
Short-circuit rating	Minimum 250°C
Insulation / covering system	Layer description and material
Surface absorptivity and emissivity	Certified or published basis
Ampacity data	IEEE 738 calculation package using Austin Energy assumptions

4.2 Reference Conductor Properties Used in Austin Energy Modeling

The following values represent the conductor types standardized in Austin Energy's covered conductor engineering basis. Products furnished under this specification shall match or exceed the required performance of these reference conductors, subject to Austin Energy review and approval.

Property	795 kcmil AAC Arbutus Covered Three-Layer Tree Wire	1/0 AWG 6/1 ACSR Raven Covered Three-Layer Tree Wire
Conductor type	All-Aluminum Conductor, compact AAC	Aluminum Conductor Steel Reinforced
Nominal area	795 kcmil	105.6 kcmil
Stranding	37-wire compact	6 aluminum / 1 steel
Bare conductor diameter	1.091 in	0.398 in
Covered conductor diameter	1.292 in	0.728 in
Total covered conductor weight	1.046 lb/ft, unless manufacturer-certified data requires AE review	0.269 lb/ft, unless manufacturer-certified data requires AE review
DC resistance at 20°C	0.02125 ohm / 1,000 ft	Manufacturer shall provide certified value
Rated tensile strength	26,900 lb	4,030 lb
Modulus of elasticity	9,500 ksi	10,600 ksi
Coefficient of thermal expansion	23×10^{-6} / °C	19.3×10^{-6} / °C
Insulation system	Three-layer TR-HDXLPE covered tree wire	Three-layer TR-HDXLPE covered tree wire
Continuous temperature rating	90°C minimum	90°C minimum
Emergency temperature rating	130°C minimum	130°C minimum

4.3 Insulation / Covering Construction

The covered conductor shall use a three-layer covered tree-wire system consisting of:

1. **Conductor shield:** semiconducting thermoset polymer.
2. **Inner insulating layer:** crosslinked low-density polyethylene or approved equivalent.

3. **Outer jacket:** solid gray, track-resistant, crosslinked high-density polyethylene or approved equivalent.

Minimum covering thickness shall comply with the current E-1985 requirements:

Conductor Size	Conductor Shield	Inner Layer	Outer Layer
1/0 AWG and 4/0 AWG	15 mils	75 mils	75 mils
795 kcmil	20 mils	80 mils	80 mils

5. Testing & Inspection — Thermal Qualification Submittals

5.1 Manufacturer Submittal Package

Before product approval or contract award, the manufacturer shall submit a complete technical data package for each proposed conductor catalog number. The package shall include:

1. Product cut sheet and construction drawing.
2. Certified dimensional data.
3. Certified conductor weight.
4. Certified DC resistance at 20°C.
5. Certified RTS, modulus of elasticity, coefficient of thermal expansion, and creep or stress-strain data.
6. Continuous, emergency, and short-circuit temperature ratings.
7. IEEE 738 steady-state ampacity and conductor-temperature calculations using Austin Energy's required assumptions.
8. Published or certified absorptivity and emissivity values for the outer jacket.
9. UV resistance test documentation.
10. Environmental stress-cracking test documentation.
11. Track-resistance test documentation.
12. Dielectric constant documentation.
13. ICEA S-121-733 compliance documentation.
14. PLS-CADD cable file, if available.
15. Any assumptions used in manufacturer ampacity tables.

The calculation package shall include all inputs and outputs necessary for independent review by Austin Energy. A summary ampacity table alone is not sufficient.

5.2 Independent Testing

Austin Energy may require third-party testing from an independent domestic laboratory. Test reports shall identify the exact manufacturer, conductor size, construction, and product number being submitted.

At minimum, the following tests shall be documented:

Test / Requirement	Minimum Acceptance Requirement
UV resistance	Per ICEA S-121-733
Environmental stress-cracking	Manufacturer shall submit test results
Track resistance	Per ICEA S-121-733
Track-resistance performance	Time to track one inch at 2.5 kV shall be at least 1,000 minutes
Dielectric constant	Maximum 3.5

8. Attachments — Covered Conductor Modeling Data Sheet

Attachment X — Covered Conductor Modeling Data Sheet

The manufacturer shall complete the following data sheet for each conductor size and catalog number submitted.

Item	Manufacturer Response
Manufacturer	
Product / catalog number	
Conductor size	
Conductor type	
Stranding	
Bare conductor diameter	
Covered conductor outside diameter	
Total covered conductor weight	
Conductor shield material	
Inner insulation material	
Outer jacket material	
Cover color	
DC resistance at 20°C	
AC resistance at 75°C	

Item	Manufacturer Response
AC resistance at 90°C	
Rated tensile strength	
Modulus of elasticity	
Coefficient of thermal expansion	
Creep / stress-strain data provided?	
Continuous operating temperature	
Emergency operating temperature	
Short-circuit temperature	
Surface absorptivity, α	
Surface emissivity, ε	
Basis for α and ε values	
IEEE 738 calculation included?	
Calculated temperature at AE normal current	
Calculated temperature at AE emergency current	
ICEA S-121-733 compliance included?	
UV testing included?	
Environmental stress-cracking testing included?	
Track-resistance testing included?	
Dielectric constant	
PLS-CADD cable file included?	
Exceptions or deviations	

Equivalent Product Acceptance

Products from manufacturers other than the reference manufacturer may be accepted only if the product meets or exceeds the construction, electrical, thermal, physical, and mechanical performance requirements listed in this specification.

Any deviation from the listed conductor diameter, conductor weight, resistance, RTS, modulus, coefficient of thermal expansion, covering construction, covering thickness, temperature rating, absorptivity, emissivity, or IEEE 738 thermal performance shall be clearly identified in the bid submittal.

Austin Energy reserves the right to require re-analysis before approving any substitute or alternate product. Products that cannot reproduce the accepted thermal, sag-tension, clearance, and structural modeling basis may be rejected.

Internal Engineering Note

This proposed language is intended to ensure that the purchased covered conductor aligns with the assumptions used in Austin Energy's engineering analysis. The most important purchasing controls are:

1. Require certified conductor data, not only catalog ampacity.
2. Require IEEE 738 calculations using Austin Energy's 112°F ambient temperature, 2 ft/s wind speed, 90-degree wind angle, clear-sky solar condition, absorptivity of 0.90, and emissivity of 0.90.
3. Require conductor temperature to remain at or below 90°C / 194°F under the AE emergency-current case.
4. Require manufacturer disclosure of any property deviations that would affect PLS-CADD, PLS-Lite, sag-tension, clearance, or structural loading.
5. Maintain the existing ICEA, UV, stress-cracking, tracking, and dielectric requirements already included in E-1985.