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# Special Specification 6154

## Aluminum Electrical Conductors

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### 1. DESCRIPTION

Furnish and install aluminum electrical conductors.

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### 2. MATERIALS

Provide new materials that comply with the details shown on the plans and the requirements of this Item. Use stranded insulated conductors that are rated for 600 volts; approved for wet locations; and marked in accordance with NEC, UL, and CSA requirements.

- 2.1. **Conductor.** Ensure that equipment grounding conductors size AWG No. 8 and larger are stranded copper, except for the grounding electrode conductor, which will be a solid copper conductor. Aluminum conductors may be used as equipment grounding conductors only if they contain no splices or terminations located underground or within 18 in. of the earth. Aluminum equipment grounding conductors must be insulated. Do not use bare aluminum conductors.

For all aluminum conductors, provide AA-8000 series aluminum alloy, compact stranded, 600V, insulated with type XHHW-2 abrasion, moisture and heat resistant black cross-linked polyethylene conductors, listed as per UL Standard 44.

Use white insulation for grounded (neutral) conductors, except that grounded conductors size 4 AWG and larger may be black with white tape marking at every accessible location. Do not use white insulation or marking for any other conductor except control wiring specifically shown on the plans.

Ensure insulated grounding conductors are green, except that insulated grounding conductors size 4 AWG and larger may be black with green tape marking at every accessible location. Do not use green insulation or marking for any other conductor except control wiring specifically shown on the plans.

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### 3. CONSTRUCTION

Install conductors in accordance with the NEC. Do not exceed the manufacturer's recommended pulling tension. Use lubricant as recommended by the manufacturer.

Make insulation resistance tests on the conductors prior to making final connections, and ensure that each continuous run of insulated conductor has a minimum DC resistance of 5 megohms when tested at 1,000 volts DC. The Engineer may require verification testing of all or part of the conductor system. The Engineer will witness these verification tests. Replace conductors exhibiting an insulation resistance of less than 5 megohms.

Splice conductors only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type or split bolt pressure connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

Do not install splices or terminations of aluminum equipment grounding conductors underground or within 18 in. of the earth.

Splice as shown on the plans. Ensure the connectors used are listed for the intended purpose, either underground or above-ground installations. Pressure-type connectors listed for use with both aluminum and copper conductors are marked AL7CU or AL9CU (or CU7AL or CU9AL).

Connectors listed for use with aluminum conductors are listed in the UL Electrical Construction Equipment Directory. The category name for these connectors is "Wire Connectors and Soldering Lugs (ZMVV)."

### 3.1

**Compression-type Connections.** Follow these steps to splice aluminum conductors using compression-type connectors. All manufacturers' instructions should also be followed:

- Use listed AL7CU or AL9CU connectors sized to accept aluminum conductors of the ampacity specified. The lugs should be marked with wire size, die index, number and location of crimps and should be suitably color coded. Lug barrel should be factory pre-filled with a listed joint compound.
- Using a suitable stripping tool to avoid damage to the conductor, strip the insulation from the end of each conductor. Strip back far enough so the conductor will go fully into the connector, but also make sure the insulation fits closely to the connector.
- Wire brush the stripped conductor. Apply an oxide inhibitor joint compound to the bare conductor after it has been wire brushed if connector does not have factory pre-filled joint compound. Ensure joint compound is compatible with conductor type, insulation type and components used for splicing and terminating.
- Insert the stripped end of the conductor into the connector as far as it will go.
- Apply the crimping tool designed for that type of connector and crimp fully in accordance with the manufacturer's instructions. Be sure to select the correct crimping tool die for the size of the connector and the conductor being spliced.
- Wipe off any excess joint compound and insulate the connection using hot melt adhesive tape and heavy wall heat shrink tubing, gel-filled insulating splice covers, or other approved insulating material to provide a watertight splice.

### 3.2

**Screw-type and Split Bolt Connections.** Follow these steps to splice aluminum conductors using screw-type and split bolt connectors. All manufacturers' instructions should also be followed:

- Use listed AL7CU or AL9CU connectors sized to accept aluminum conductors of the ampacity specified.
- Using a suitable stripping tool to avoid damage to the conductor, strip the insulation from the end of each conductor. Strip back far enough so the conductor will go fully into the connector, but also make sure the insulation fits closely to the connector.
- Wire brush the stripped conductor. Apply an oxide inhibitor joint compound to the bare conductor after it has been wire brushed if connector does not have factory pre-filled joint compound. Ensure joint compound is compatible with conductor type, insulation type and components used for splicing and terminating.
- Insert the stripped end of the conductor into the connector as far as it will go or as required.
- Tighten the connection per the manufacturer's recommendation. In absence of specific recommendations, use the torque values (for screw-type connections) shown in Annex I of the 2014 NEC.
- Wipe off any excess joint compound and insulate the connection using hot melt adhesive tape and heavy wall heat shrink tubing, gel-filled insulating splice covers, or other approved insulating material to provide a watertight splice.

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**4. MEASUREMENT**

This Item will be measured by the foot of each single conductor.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

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**5. PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Aluminum Electrical Conductors" of the types and sizes specified. This price is full compensation for furnishing, installing, and testing aluminum electrical conductors, furnishing and installing breakaway connectors; and for materials, equipment, labor, tools, and incidentals, except that:

- conductors used in connecting the components of electrical services will be paid for under Item 628, "Electrical Services";
- conductors used for internal wiring of equipment will not be paid for directly but will be subsidiary to pertinent Items; and
- copper conductors will be paid for under Item 620, "Electrical Conductors."