

# **DIVISION 26 – ELECTRICAL**

## **26 05 13 MEDIUM-VOLTAGE CABLES**

### **PART 1 - GENERAL**

#### 1.01 SCOPE

##### A. System Voltages – Three phase

1. 4,160 Volts: WSU Primary distribution.
2. 4,160 Volts: WSU Emergency Primary Distribution.

##### B. Usage and Conditions:

1. Tunnels: Use multi-conductor Aluminum Interlocked Armor (AIA) cable.
2. Make terminations outside the tunnel and above ground. Any proposed terminations, splices or taps inside tunnels or vaults require review and approval from WSU Construction Manager and WSU Engineering Services.
3. Install all cable (single conductor or multi-conductor AIA) in red-dyed concrete encased duct bank. Use above ground load break centers for all terminations, splices or taps.
  - i. Install warning tape 12” above concrete-encased duct bank.

##### C. Listing: All medium-voltage materials, including but not limited to cable, splices, enclosures, and rubber goods, shall be UL listed or field evaluated by an approved WA State testing agency to meet WAC.

### **PART 2 - PRODUCTS**

#### 2.01 GENERAL

##### A. Medium Voltage Primary Cable

1. The following shall apply to both shielded 5KV and shielded 15KV medium voltage power conductors used as single conductors or assembled into Aluminum Interlocked Armor.
  - i. Conductors: Class B stranded, concentric, soft or annealed copper per current, adopted Part 2 of ICEA S-68-516.
  - ii. Strand Screen: Extruded semi-conducting thermosetting compound applied over the conductor. The material shall be compatible with the conductor metal, shall be uniformly and firmly bonded to the overlying insulation, and be free of stripping from the conductor.

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- iii. Insulation: High quality heat, moisture, ozone and corona resistant Ethylene Propylene Rubber compound. The insulation shall contrast in color from the strand screen and insulation shield per AEIC CS 6. Insulation level shall be 133% (115 mils for 5KV, 220 mils for 15KV). The minimum thickness of the insulation at any point shall not be less than 90 percent of the specified nominal thickness. The insulation shall contain no more than 2% polyethylene.
- iv. Insulation Shield: Extruded semi-conducting thermosetting compound applied directly over the insulation. The material shall be compatible with the insulation and overlying metallic shield. The insulation shield shall be clean and free of stripping from the insulation and comply with Paragraph D.1 of AEIC CS 6.
- v. The strand screen, insulation and insulation shield shall be applied with a triple tandem process providing a virtual corona-free core. The EPR insulation system shall not be exposed to the atmosphere during manufacture.
- vi. Metallic Shield and Individual Jacket: .005" thickness of copper tape helically applied over the insulation shield material with a 25% overlap covered with an extruded PVC jacket meeting the requirements of current and adopted version of ICEA S-68-516 Paragraph 4.4.10.
- vii. Identification: The following information shall be surface printed on the overall jacket: Manufacturer's name, cable size, cable type, year of manufacture and voltage rating.

#### **B. Armored Cable**

- 1. Grounding Conductors: Bare copper, stranded in accordance with current, adopted ICEA S-68-516, Part 2. Size shall be in accordance with current, adopted UL 1072, Table 11A; or sized to handle fault current as specified on drawings.
- 2. Filler Material: Non-hygroscopic material, fine fiber, completely filling center and peripheral interstices.
- 3. Binder Tape: Applied over assembly to provide a solid core.
- 4. Armor: Aluminum Interlocked Armor (AIA), interlocked armor in accordance with current, adopted ICEA S-68-516, Part 4 and UL 1072, Part 25.11. Any proposed use of galvanized steel armor or welded armor requires review and approval from WSU Construction Manager and WSU Engineering Services.

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5. Overall Jacket:
  - i. Polyvinyl Chloride (PVC) in accordance with current, adopted ICEA S-68-516 paragraph 4.4.10.
  - ii. Color: Yellow.
6. Listings: Finished cable shall be UL listed as Type MC, MV-105, for cable tray use (CT), direct burial, and service entrance (SE) (where applicable).

#### **C. Pre-approved Manufacturers**

1. 5 and 15kV Single conductors: General Cable, South Wire.
2. 5 and 15kV Armored cables: General Cable, South Wire.

#### **D. Splices and Terminations**

1. Connections and Terminations (Armored Cable and Single Conductor): Use Raychem "HVT" or 3M "Quick Term" series 5600 termination kits.
  - i. Splices are to be housed in a UL-listed or field-evaluated enclosure:
    - 1) Raychem shielded to non-shielded cable splice (HVSA-3-823S kit); coordinate kit size with manufacture and existing cable sizes.
    - 2) The preferred junction is installing an above-ground LBC junction enclosure with ground sleeve.
2. All splices and terminations are performed by WSU Utilities.
  - i. Contractor provides all materials for a complete installation.
  - ii. Contractor to coordinate a pre-installation meeting with WSU prior to ordering materials.

## **PART 3 - EXECUTION**

### **3.01 GENERAL INSTALLATION**

#### **A. Identification**

1. Color coding for medium voltage conductors is to match 120/208V conductors (A-Black, B-Red, C-Blue, G-Green).
2. Label medium voltage cable within tunnel every 50' and within 10' of all terminations with feeder name and "4,160V". Use plastic engraved nameplate.

#### **B. Installation:**

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1. Install medium voltage cable and conductors in GRC where installed inside building envelope. Coordinate with WSU Construction Manager for exceptions. Label GRC every 25' with 3" high red lettering stating the feeder name and "DANGER – 4160V" in conspicuous locations. Leave 4" gap in GRC where GRC enters building to eliminate moisture entering downstream electrical equipment.
2. Provide cable installation work plan in accordance with cable manufacturer's specifications to WSU Construction Manager prior to cable installation.
3. WSU Construction Manager shall witness cable pull.

#### **C. Testing**

1. All medium voltage testing shall be performed by a 3<sup>rd</sup> party testing agency approved in the state of Washington.
2. Test cable according to manufacturer instructions after installation and before terminations are made. Provide results to WSU Construction Manager.

**END OF SECTION**