

**SECTION 260513  
MEDIUM-VOLTAGE CABLES**

**PART 1 - GENERAL**

**1.1 STIPULATIONS**

- A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Cables.
  - 2. Connectors.
  - 3. Solid terminations.
  - 4. Separable insulated connectors.
  - 5. Splice kits.
  - 6. Medium-voltage tapes.
  - 7. Arc-proofing materials.
  - 8. Fault indicators.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of cable. Include splices and terminations for cables and cable accessories.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Indicate location of each cable, splice, and termination.
- B. Material Certificates: For each type of cable and accessory.
- C. Calculations, including conduit size and fill percentage, pulling tensions, cable sidewall pressure, jam probability, voltage drop, and ground wire sizing for each cable.
- D. Source quality-control reports.
- E. Field quality-control reports.

## **PART 2 - PRODUCTS**

### **2.1 SYSTEM DESCRIPTION**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with IEEE C2 and NFPA 70.
- C. Source Limitations: Obtain cables and accessories from single source from single manufacturer.

### **2.2 CABLES**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. General Cable; Prysmian Group North America.
  - 2. Hendrix Wire and Cable; Marmon Holdings, Inc.; Berkshire Hathaway Inc.
  - 3. Southwire Company, LLC.
- B. Cable Type: Type MV 105.
- C. Conductor Insulation: Ethylene-propylene rubber.
  - 1. Voltage Rating: 15 kV.
  - 2. Insulation Thickness: 133 percent insulation level.
- D. Conductor: Copper.
- E. Comply with UL 1072, AEIC CS8, ICEA S-93-639/NEMA WC 74, and ICEA S-97-682.
- F. Conductor Stranding: Concentric lay, Class B.
- G. Strand Filling: Conductor interstices are filled with impermeable compound.
- H. Shielding: Copper tape, helically applied over semiconducting insulation shield.
- I. Shielding and Jacket: Corrugated copper drain wires embedded in extruded, chlorinated, polyethylene jacket.

### **2.3 CONNECTORS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. 3M.
  - 2. ABB, Electrification Business.
  - 3. Eaton.
- B. Comply with ANSI C119.4 for connectors between aluminum conductors or for connections between aluminum to copper conductors.

- C. Copper-Conductor Connectors: Copper barrel crimped connectors.

## **2.4 SOLID TERMINATIONS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. 3M.
  - 2. ABB, Electrification Business.
  - 3. TE Connectivity Ltd.
- B. Shielded-Cable Terminations: Comply with the following classes of IEEE 48. Insulation class shall be equivalent to that of cable. Include shield ground strap for shielded cable terminations.
  - 1. Class 1 Terminations:
    - a. Modular type, furnished as a kit, with stress-relief tube; multiple, molded-silicone-rubber, insulator modules; shield ground strap; and compression-type connector.

## **2.5 SEPARABLE INSULATED CONNECTORS**

- A. Description: Modular system, complying with IEEE 386, with disconnecting, single-pole, cable terminators and with matching, stationary, plug-in, dead-front terminals designed for cable voltage and for sealing against moisture.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ABB, Electrification Business.
  - 2. Eaton.
  - 3. Richards Manufacturing Co.
- C. Terminations at Distribution Points: Modular type, consisting of terminators installed on cables and modular, dead-front, terminal junctions for interconnecting cables.
- D. Load-Break Cable Terminators: Elbow-type units with 200 A load make/break and continuous-current rating; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.
- E. Dead-Break Cable Terminators: Elbow-type unit with 200A continuous-current rating; designed for de-energized disconnecting and connecting; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.
- F. Dead-Front Terminal Junctions: Modular bracket-mounted groups of dead-front stationary terminals that mate and match with above cable terminators. Two-, three-, or four-terminal units as indicated, with fully rated, insulated, watertight conductor connection between terminals and complete with grounding lug, manufacturer's standard accessory stands, stainless steel mounting brackets, and attaching hardware.
  - 1. Protective Cap: Insulating, electrostatic-shielding, water-sealing cap with drain wire.
  - 2. Portable Feed-Through Accessory: Two-terminal, dead-front junction arranged for removable mounting on accessory stand of stationary terminal junction.

3. Grounding Kit: Jumpered elbows, portable feed-through accessory units, protective caps, test rods suitable for concurrently grounding three phases of feeders, and carrying case.
  4. Standoff Insulator: Portable, single dead-front terminal for removable mounting on accessory stand of stationary terminal junction. Insulators suitable for fully insulated isolation of energized cable-elbow terminator.
- G. Test-Point Fault Indicators: Applicable current-trip ratings and arranged for installation in test points of load-break separable connectors, and complete with self-resetting indicators capable of being installed with shotgun hot stick and tested with test tool.
- H. Tool Set: Shotgun hot stick with energized terminal indicator, fault-indicator test tool, and carrying case.

## **2.6 SPLICE KITS**

- A. Description: For connecting medium voltage cables; type as recommended by cable or splicing kit manufacturer for the application.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 3M.
  2. ABB, Electrification Business.
  3. Eaton.
- C. Standard: Comply with IEEE 404.
- D. Splicing Products: As recommended, in writing, by splicing kit manufacturer for specific sizes, materials, ratings, and configurations of cable conductors. Include all components required for complete splice, with detailed instructions.
1. Combination tape and cold-shrink-rubber sleeve kit with re-jacketing by cast-epoxy-resin encasement or other waterproof, abrasion-resistant material.
  2. Heat-shrink splicing kit of uniform, cross-section, polymeric construction with outer heat-shrink jacket.
  3. Premolded, cold-shrink-rubber, in-line splicing kit.
  4. Premolded, EPDM splicing body kit with cable joint sealed by interference fit of mating parts and cable.

## **2.7 MEDIUM-VOLTAGE TAPES**

- A. Description: Electrical grade, insulating tape rated for medium voltage application.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 3M.
  2. HellermannTyton.
  3. Scapa Industrial; Scapa Group plc.
- C. Ethylene/propylene rubber-based, splicing tape, rated for 130 deg C operation. Minimum 3/4 inch (20 mm) wide.

- D. Silicone rubber-based, self-fusing tape, rated for 130 deg C operation. Minimum 1-1/2 inch (38 mm) wide.

## **2.8 FAULT INDICATORS**

- A. Indicators: Automatically reset fault indicator with inrush restraint feature, arranged to clamp to cable sheath and provide a display after a fault has occurred in cable. Instrument shall not be affected by heat, moisture, and corrosive conditions and shall be recommended by manufacturer for installation conditions.
- B. Resetting Tool: Designed for use with fault indicators, with moisture-resistant storage and carrying case.

## **2.9 SOURCE QUALITY CONTROL**

- A. Test and inspect cables according to ICEA S-97-682 before shipping.
- B. Test strand-filled cables for water-penetration resistance according to ICEA T-31-610, using a test pressure of 5 psig (35 kPa).

# **PART 3 - EXECUTION**

## **3.1 INSTALLATION**

- A. Install cables according to IEEE 576.
- B. Proof conduits prior to conductor installation by passing a wire brush mandrel and then a rubber duct swab through the conduit. Separate the wire brush and the rubber swab by 48 to 72 inch (1200 to 1800 mm) on the pull rope.
  - 1. Wire Brush Mandrel: Consists of a length of brush approximately the size of the conduit inner diameter with stiff steel bristles and an eye on each end for attaching the pull ropes. If an obstruction is felt, pull the brush back and forth repeatedly to break up the obstruction.
  - 2. Rubber Duct Swab: Consists of a series of rubber discs approximately the size of the conduit inner diameter on a length of steel cable with an eye on each end for attaching the pull ropes. Pull the rubber duct swab through the duct to extract loose debris from the duct.
- C. Pull Conductors: Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
  - 1. Where necessary, use manufacturer-approved pulling compound or lubricant that does not deteriorate conductor or insulation.
  - 2. Use pulling means, including fish tape, cable, rope, and basket-weave cable grips, that do not damage cables and raceways. Do not use rope hitches for pulling attachment to cable.
  - 3. Use pull-in guides, cable feeders, and draw-in protectors as required to protect cables during installation.
  - 4. Do not pull cables with ends unsealed. Seal cable ends with rubber tape.

- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- E. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
- F. Install "buried-cable" warning tape 12 inch (305 mm) above cables.
- G. In manholes, handholes, pull boxes, junction boxes, and cable vaults, train cables around walls by the longest route from entry to exit; support cables at intervals adequate to prevent sag.
- H. Install sufficient cable length to remove cable ends under pulling grips. Remove length of conductor damaged during pulling.
- I. Install cable splices at pull points and elsewhere as indicated; use standard kits. Use dead-front separable watertight connectors in manholes and other locations subject to water infiltration.
- J. Install terminations at ends of conductors, and seal multiconductor cable ends with standard kits.
- K. Seal around cables passing through fire-rated elements according to Section 078413 "Penetration Firestopping."
- L. Install fault indicators on each phase where indicated.
- M. Ground shields of shielded cable at terminations, splices, and separable insulated connectors. Ground metal bodies of terminators, splices, cable and separable insulated-connector fittings, and hardware.
- N. Ground shields of shielded cable at one point only. Maintain shield continuity and connections to metal connection hardware at all connection points.
- O. Identify cables according to Section 260553 "Identification for Electrical Systems." Identify phase and circuit number of each conductor at each splice, termination, pull point, and junction box. Arrange identification so that it is unnecessary to move the cable or conductor to read the identification.

### **3.2 FIELD QUALITY CONTROL**

- A. Tests and Inspections:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
  - 2. After installing medium-voltage cables and before electrical circuitry has been energized, test for compliance with requirements.
- B. Medium-voltage cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

**END OF SECTION**