

December 2012, rev 00

## **22 0513 – Medium Voltage Cables**

### **PART-1. GENERAL**

#### 1.01 Section Includes

- A. Medium Voltage Cables
- B. Cable Terminations

#### 1.02 References

- A. IEEE C2 – National Electrical Safety Code: Institute of Electrical Engineers; 2007
- B. IEEE 48 – Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV; Institute of Electrical Engineers; 1996 (R2009)
- C. NETA STD ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009
- D. NFPA 70 – National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements

#### 1.03 Submittals

- A. Product Data: Provide for cable, terminations, and accessories.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Project Record Requirements: Record actual sizes and locations of cables.

#### 1.04 Quality Assurance

- A. Comply with NFPA 70.
- B. Manufacturer's Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of the Project.

- C. Installer Qualifications: Authorized installer of specified manufacturer with service facilities within 100 miles of the Project.
- D. Products: Listed and classified by Underwriters laboratories Inc. as suitable for the purpose specified and indicated.

## PART-2. PRODUCTS

### 2.01 Manufacturers

#### A. Wire and Cable

- 1. Okonite
- 2. Prysmian

#### B. Connectors

- 1. 3M Corporation
- 2. Cooper Power System

#### C. 15 kV Power Cable

- 1. Primary voltage power cable shall be 15,000 volts; single conductor Class “B” stranded copper, ethylene propylene thermosetting type elastomer insulation (EPR), tape shielded and PVC jacketed. The cable shall be suitable for wet or dry location in conduit underground duct system and direct burial. Contractor shall indicate if cable is compact or compressed stranded.
- 2. The cable shall be rated 105 degrees C for normal operations, 140 degrees C for emergency overload operation, and 250 degrees C for short circuit conditions.
- 3. The insulation system shall consist of a triple tandem extruded semi-conducting thermostat EPR strand screen, ethylene propylene rubber insulation, and a semiconducting thermoset EPR insulation screen. The insulation shall contain no polyethylene nor exceed 72 percent by weight of ethylene in the copolymer to the limit the degree of susceptibility to treeing. The insulation thickness shall be 220 mils (133 percent insulation level).
- 4. The metallic shielding shall be a 5 mil bare copper tape with a 2 V@ percent nominal overlap.
- 5. The overall jacket shall be polyvinylchloride of a minimum average thickness of 80 mils.
- 6. The cable shall be manufactured and tested in complete and strict accordance with AEIC CS6-82 and applicable sections of ICEA CS6.

#### D. 15kV Termination

- 1. Termination kits shall be capable of properly terminating a 15kV single conductor polymer-insulated cable. Kits shall meet Class 1 requirements and

be designed proof tested per IEEE 48- 1 975 and be capable of passing a test sequence per draft and revisions of IEEE 404-1 986. Kits as specified shall accommodate any common form of cable shielding/construction without the need for special adaptors or accessories, and shall accommodate a wide range of cable size and, also, be capable of being properly installed on out-of-round or out-of-tolerance cable as per relevant IDEA standards. Kits shall accommodate commercially available connectors.

2. Terminations for single conductor cable shall consist of cold-shrink stress control and outer non-tracking insulation tubes along with a high relative permittivity stress relief mastic for insulation shield cutback treatment with a cold shrink sealant for environmental sealing. Outdoor terminations shall include rain shields.
3. Termination kits shall be manufactured by 3M Corporation and/or Cooper Power Systems.
4. **Hold Point** Existing medium voltage cable is closed transition. Prior to spicing any cable in manhole, care will be taken to properly identify and maintain phasing. This shall be witnessed by representatives of the NIU Electric Shop, (815)753-6264.
5. Deadbreak separable splices shall be equipped with peroxide-cured EDPM insulation, capacitive test points, and shall meet IEEE Standard 386 for separable insulated connector systems. Provide splices as indicated on Drawings. Cooper SSPL series or similar.
6. All 600A connector plugs and 2001600A load adapters shall be EDPM insulation only.

### PART-3. EXECUTION

#### 3.01 Examination

- A. Verify that conduit, ductbank, trench, or manholes are ready to receive cable.
  1. Cable racks within manholes shall be heavy duty nonmetallic cable rack mounting hardware, drop-in anchor installation as manufactured by Underground Devices, Inc. [www.udevices.com](http://www.udevices.com). Quantities and sizes to be determined by job specifics.
- B. Verify that field measurements are as indicated.
- C. Verify routing and termination locations of cable bank prior to rough-in.
- D. Cable routing is shown in approximate locations unless dimensioned. Route as required to complete wiring system.

#### 3.02 Preparation

- A. Use swab to clean conduits before pulling cable.

### 3.03 Installation

- A. General: Install electrical cables, wires and connectors as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices as well as Owner's requirements.
1. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface.
  2. Pull conductors together where more than one is being installed in a raceway.
  3. Use pull compound or lubricant, where necessary; compound must not deteriorate conductor insulation.
  4. Use pulling means, including fish tape, cable or rope which cannot damage raceway.
  5. Install exposed cable, parallel and perpendicular to surfaces or exposed structural members and follow surface contours, where possible.
  6. No conductor splices shall be made without Engineer's written approval.
  7. Install splices and taps which have mechanical strength. Current and insulation rating shall be equivalent-or-better than conductor. All splices shall be compression type with cold shrink wrap and taped.
  8. Use splice and tap connectors which are compatible with conductor material.

### 3.04 Field Quality Control

- A. Prior to energization, high pot test cables and connectors using a non-destructive high voltage insulation resistance tester. Provide written test reports for all cables and connectors tested and submit them to the Engineer's or Owner's representative prior to energizing. Correct malfunctions where detected.
- B. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements.

### 3.05 Protection

- A. Protect installed cables from entrance of moisture

End of Division 26 0513

**This section of the NIU Design and Construction Standards establishes minimum requirements only. It should not be used as a complete specification.**