SECTION 26 05 13 - MEDIUM VOLTAGE POWER CABLE

PART I - GENERAL

1.1 SECTION INCLUDES

A. This specification describes single conductor EPR (Ethylene-propylene-rubber) insulated, shielded power cables for use in grounded neutral circuits not exceeding 5,000 or 15,000 volts phase-to-phase at conductor temperatures of 105 degree Centigrade for continuous normal operation, 140 degree Centigrade for emergency overload conditions, and 250 degree Centigrade for short-circuit conditions. Cables shall be type MV-105 or higher, otherwise, they are intended for general purpose power cable applications in wet or dry locations, including conduit, duct, direct burial, and aerial installation.

1.2 QUALITY ASSURANCE

A. The following standards shall form a part of this specification.

1. UL Standard 1072 for Medium-Voltage Solid-Dielectric Cable.

2. ICEA S-97-682 *Utility Shielded Power Cable Rated 5-46 kV*

3. NFPA, NEC

B. Cable shall be tested in accordance with ICEA S-97-682, UL Standard 1072, and International Electrical Testing Association – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (Refer to the medium voltage cable DC testing requirements.)

C. The medium voltage power cable shall have 20 year performance record in utility and industrial applications.

1.3 SUBMITTALS

A. Submit in accordance with submittal procedures as described in *Division 01*.

B. Cable Splicer: Provide the Owner with the names of the cable splicers to be employed, together with satisfactory proof that each splicer has had at least three years' experience in splicing high-voltage cables and is experienced with the type and rating of cables to be spliced.

PART 2 - PRODUCTS

2.1 MEDIUM VOLTAGE CABLE CONDUCTORS

A. Manufacturers: Cable shall be manufactured by Okonite, General Cable, Aetna, or Kerite.

B. Conductor: The cable shall be single-conductor, AWG sized as noted on the drawings. The conductor material shall be Annealed copper compact stranded per ASTM B-496

C. Strand Screen: The conductor shall be covered with Extruded semiconducting EPR strand screen. Meets or exceeds the electrical and physical requirements of ICEA S-93-639/NEMA WC74 & S-97-682, AEIC CS8, CSA C68.3 and UL 1072.

D. Insulation: Directly over the conductor shielding shall be applied a homogenous wall of EPR insulation. Meets or exceeds electrical and physical requirements of ICEA S-93-639/NEMA WC74 & S-97-682, AEIC CS8, CSA C68.3 and UL 1072. The minimum average insulation thickness is 115 mills for 5/8 KV and 220 mills for 15KV.

E. Insulation Screen: Extruded semiconducting EPR insulation screen applied directly over the insulation. Meets or exceeds electrical and physical requirements of ICEA S-93-639/NEMA WC74 & S-97-682, AEIC CS8, CSA C68.3 and UL 1072.

F. Shield: 5 mil bare copper tape helically applied with 25% nominal overlap.

G. Jacket: Meets or exceeds electrical and physical requirements of ICEA S-93-639/NEMA WC74 & S-97-682, CSA C68.3 and UL 1072 for chloronated polyethylene jackets. UL listed as Type MV-105, sunlight resistant and for use in cable tray in accordance with UL 1072. CSA C68-3 listed and rated FT4 (1/0 AWG and larger) and -40°C.

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2.1 IDENTIFICATION

A. Identification: All cable shall be identified by means of surface printing or indenting, indicating manufacturer, size, insulation type, voltage rating, and UL designations.

2.2 MEDIUM VOLTAGE GROUND CONDUCTOR

A. Ground Conductor: All medium voltage power circuits in duct shall be paralleled by a grounded conductor intended to minimize fault current in power cable shields. The ground conductor shall be copper, THWN insulation, rated at 600 volts, and the size shall be in accordance with the latest revision of the NEC, or the drawings, whichever is larger.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Manufacturer's Recommendations: This cable is for extension of campus electric distribution system to buildings and shall be installed in strict accordance with manufacturer recommendations. Particular attention to manufacturer requirements about installation in cold weather shall be given to bending radius and pulling tension.

B. Type MV cable shall be installed, terminated, and tested by qualified persons. Work shall follow IEEE 576-2000, *Recommended Practice for Installation, Termination, and Testing of Insulated Power Cables as Used in Industrial and Commercial Applications*.

C. Whenever work is done in an enclosure, manhole, switchyard, etc., containing energized parts, all work shall be done in compliance with the safety regulations in the current edition of NFPA 70E: *Standard for Electrical Safety in the Workplace.*

D. Rigid Conduit or Encased Ducts: Cables shall be installed in rigid conduit inside buildings and in concrete encased ducts outside of buildings.

E. Direct Buried High Voltage Cable: Direct buried High voltage primary cable is acceptable South of Windsor Road. Cable shall be suited for the application. High Voltage direct buried cable maybe used anywhere as long as approved in writing by the Owner. Direct buried cable shall be a three conductor cable, and shall be terminated using 3M QT-III termination kits, or approved equal, with break-out boot.

F. Splices: Wye splices are not acceptable. No splices shall be installed in duct runs or conduits. Splices shall be made with 3M QT-III cold-shrink splice kits, or approved equal.

G. Cable Protection: Duct shields are required for protection of the cable, and the cable shall be placed on heavy duty fiberglass cable rack arms. Cables shall be secured to fiberglass racks, after fireproofing is installed, using plastic cable ties or other approved method.

H. Fireproof: Cables shall be fireproofed in manholes, vaults, switchgear, and other locations where exposed. 3M Fire-Retardant Electric Arc Proofing Tape 77, or approved equal. Apply 77 tape in half-lapped layers. Since the 77 Series is not adhesive coated, it must be held in place after wrapping with bands of 3M Electrical Tape 69.

I. Labels: Cables shall be labeled with plastic engraved plates with minimum ½" letters in manholes and other locations where exposed. Secure to cables with plastic cable ties or other approved method. Consult with F&S for conductor label designations and colors.

J. Cable Terminations:

1. Modular Molded Rubber Termination: ANSI/IEEE 386. Kit form, suitable for use with cable specified, including stress cone, ground clamp, connector, rubber cap, and aerial lug. 3M Modular Splicing System – such as 5815 Series, or approved equal.

2. Indoor Cold Shrink Terminations: one-piece, non-skirted, silicone rubber terminations, qualified as IEEE Standard 48-1990 Class 1 for indoor and weather-protected applications; Terminating of all 5, 8.7, 15, 25/28 and 35kV shielded power cables, indoors and in weather-protected equipment, shall be performed in accordance with instructions included in the termination kit. The termination must be of a pre-stretched cold shrink design, installed without the application of a heat source. Kits shall be 3M QT-III, or approved equal.

3. Outdoor Weather-Exposed Cold Shrink Terminations: one-piece, skirted, silicone rubber terminations, qualified as IEEE Standard 48-1996 Class 1 for outdoor weather-exposed applications. The termination shall be of a skirted design, constructed of tracking resistant silicone rubber, and shall be performed in accordance with instructions included in the termination kit. The termination must be of a pre-stretched cold shrink design, installed without the application of a heat source. Kits shall be 3M QT-III, or approved equal.

4. Motor Terminations: Terminations for 5KV motors shall use 3M Series 5300 8KV Motor Lead Pigtail Splice kits, or approved equal. The splice's main component, the lug or splice cover, is made from EPDM rubber either as a slip-on or as a cold shrink insulator. Mastic is used for the moisture seal on the pigtail kits. The 5/8 kV kits designed for shielded feeder cables utilize a high dielectric constant (K) stress control material or the feeder cable's electrical stress control. These kits are designed to be used with copper compression, one or two hole lugs. After being crimped onto the cables, the lugs are bolted together in an inline or pigtail configuration, then insulated and sealed with the motor lead splicing kits. Kits shall be installed per manufacturer's instructions.

5. Loadbreak Elbows: Where required, loadbreak elbows shall be 3M 5810 Series, Cooper Power Systems, or approved equal by. Elbows will be 200 ampere, and molded using high quality EPDM insulation. Loadbreak Elbows will be a fully shielded and insulated plug-in separable connector for connecting 5 to 25 kV underground cables to transformers, switchgear and junctions equipped with loadbreak bushings.

K. Lugs: Use compression or irreversible type lugs on all terminations. Standard mechanical lugs are not acceptable.

3.2 PROTECTION

A. Protect Cable: During installation cables shall be protected from physical damage and infiltration of water.

B. Damaged Cable: Damage to cable or observed presence of water inside of the cable shall cause the cable to be rejected and replaced at the Contractor's expense.

C. Handling and Storage: Cables shall be transported and stored on circular reel legs and not stored on their side.

3.3 MEDIUM VOLTAGE GROUND CONDUCTOR

A. Shared Duct: This cable is necessary to limit power cable shield current when power cable failures occur. Between manholes, the cable shall be installed in the same duct cell as power circuits.

B. Splices: Splices in duct runs are unacceptable.

C. Bonding: At source and load ends of power cables, this cable shall be bonded to source and building grounding systems. Bonding shall be done with materials that are UL listed for grounding purposes. Where this grounding conductor is over 2000 feet in length and passes through manholes, it shall be bonded to the ground rod in the manholes every 2000 feet. Do not bond to ground rods on lengths under 2000 feet. The power cable shields of all spliced power cables shall also be bonded to the ground conductor.

END OF SECTION 26 05 13

This section of the *U of I Facilities Standards* establishes minimum requirements only.
It should not be used as a complete specification.