

SECTION 16115

MEDIUM VOLTAGE CABLE

PART 1 GENERAL

1.1 SUMMARY

A. Description Of Systems

1. Provide medium voltage wire and cable systems as required, and all materials and equipment, including wire and cable, connectors and lugs, splicing and terminating kits and identification, as indicated or specified.

1.2 QUALITY ASSURANCE

A. Source Quality Control

1. Furnish wire and cable on which standard factory tests established by ASTM, ANSI, ICEA and NEMA have been performed.

1.3 SUBMITTALS

- A. Furnish submittals for items that are identified in this SECTION by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to SECTION 01340 for definition of codes for types of submittals and the administrative requirements governing submittal procedure. Additional submittal requirements pertaining to this SECTION are specified herein under this Article.
- B. Submit product data for each type and size of wire and cable. Identify material, construction data, insulation thickness, jacket thickness, suitability for application intended, factory impulse test value and manufacturer's recommendations for items specified.
- C. Submit cable identification system for approval.
- D. Submit test data for wire and cable as specified under the paragraph "SOURCE QUALITY CONTROL". Do not install wire and cable for which test data has been requested until test data is approved.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Wire And Cable Delivery

1. Deliver all wire and cable to the site on reels, plainly marked with complete identification, including wire or cable size, number of conductors, type of wire or cable, length, weight, thickness and character of insulation and the name of the manufacturer.

B. Pulling Eyes

1. Order all cables in lengths required by the installation. Mount on separate reels with factory-installed pulling eyes on each required length. Attach pulling eyes directly to conductors. Factory-seal cable ends to prevent the entrance of moisture.

PART 2 PRODUCTS

2.1 MATERIALS

A. Wire And Cable

1. General Requirements. Furnish wire and cable meeting the standard specifications established for such material and construction by ASTM, ANSI, ICEA AND NEMA, where applicable. Furnish stranded conductors of copper or aluminum as specified and conductor size as indicated.
2. Acceptable manufacturers:
 - a. The Okonite Co. "Okoguard-Okoseal" Type MV-105.
 - b. Approved Equal
3. *Cable [U]*; Reduced conductor size cable for Power Distribution at 13,800 Volts for wet or dry locations in Conduit and Underground Ducts. Single conductor or three conductor triplex assembly, consisting of compact stranded annealed copper individual conductors covered with an extruded thermoset semiconducting stress control layer, insulated with a heat, moisture, corona, electrochemical treeing, and ozone-resistant ethylene propylene rubber compound rated 105 degC (MV-105) with a 133% insulation level, 140°C emergency rating, 15,000 volts ungrounded, having a 5 mil with 25% normal overlap copper shield over the insulation and a PVC or chlorinated polyethylene jacket over the shielding. Provide continuous phase identification of individual conductors in triplex assembly.
4. *Cable [U]*; reduced conductor size cable for Power Distribution at 4,160 Volts for wet or dry locations in conduit and underground ducts. Single conductor or three conductor triplex assembly, consisting of compact stranded annealed copper individual conductors covered with an extruded thermoset semiconducting stress control layer, insulated with a heat, moisture, corona electrochemical treeing, and ozone-resistant ethylene propylene rubber compound rated 105 deg C (MV-105), 133% insulation level, 140°C emergency rating, 5000 volts ungrounded, having a 5 mil with 12.5% nominal overlap copper shield over the insulation and a PVC or chlorinated polyethylene jacket over the copper shielding tape. Provide continuous phase identification of individual conductors in triplex assembly.

B. Connectors For Splicing Copper Conductors

1. Connectors for Straight Splicing Conductors: Solderless compression 2-way type.
 - a. FCI/Burndy Type YS-L
 - b. IlSCO CT Series
 - c. Panduit
 - d. Thomas & Betts 54500 Series
2. Connectors for 3-Way Splicing Conductors: Solderless compression type.
 - a. FCI/Burndy YST
 - b. IlSCO
 - c. Panduit
 - d. Thomas & Betts 54700 Series

- C. Lugs For Terminating Copper Conductors
 - 1. Lugs; for Terminating Conductors Larger than No. 4/0 AWG. UL listed AL/CU compression type, two hole.
 - a. FCI/Burndy YA-A
 - b. IlSCO 2ACL Series
 - c. Thomas & Betts 60200

- D. Cable Splice And Termination Kits
 - 1. *Kits for Field Splicing and Terminating Cable [U]*: Of an appropriate design for the particular cables with which they will be used, and of a type recommended by the cable manufacturer. Include all material necessary for completion of the splice or termination in an individually packaged kit, with complete instructions for each step of the splicing or terminating procedure.
 - a. PLM Products Div. of Adalet
 - b. 3-M Co.
 - c. TYCO Electronics/Raychem ““HVTZ” Systems

- E. Miscellaneous
 - 1. Arc-Proofing Tape:
 - a. 3M Co. “Scotch 77”
 - b. T & B Corp. “Flame Safe Fire-Retardant Wrap”
 - c. Plymouth/Bishop Insulating Products “53 Plyarc”
 - 2. Banding Tape:
 - a. 3M Co. “Scotch 27”
 - b. Plymouth/Bishop Insulating Products “77 Plyglas”
 - 3. Wire Labels; See specification SECTION 16050 - Appendix “A”.
 - 4. Lubricating Compound:
 - a. American Polywater Corp.
 - b. Ideal 77 Yellow or Wire Lube
 - 5. *Performed Stress Relief Terminators [D,P]*:
 - a. Joslyn
 - b. 3M Co. “5600” or “5900” Series Termination Kits
 - c. TYCO Electronics/Raychem Corp. “HV” Series
 - 6. *Fasteners for cables in tray [U]*:
 - a. 3M 06220 Series.
 - b. Panduit Pan – PAN-TY Series
 - c. Thomas & Betts TY-RAP.

PART 3 EXECUTION

3.1 INSTALLATION

A. General

- 1. Install wiring in raceway and cable support systems, as indicated and as specified except where exposed wiring is indicated or specified. Install wiring only in completed raceway and cable support systems and when systems are protected from the weather. Install conductors continuous, without splices, between equipments, where possible.

2. Continuously lubricate all non-armored cables of the larger sizes at the pull-in point of conduit systems with a lubricating compound compatible with conductor insulation or jacket.
3. Install conductors in such a manner that the bending radius of any wire or cable is not less than the minimum recommended by ICEA or the manufacturer. In pulling cables, do not exceed the manufacturer's recommended values for maximum pulling tension. When cables are pulled by means of a powered winch, be particularly careful not to exceed cable tension limits; the ARCHITECT-ENGINEER may require the use of a dynamometer on all remaining pulls if in his opinion the tension limits are being exceeded.
4. Connect all wiring to equipment such that phasing is A-B-C left to right, top to bottom and front to back, where possible, and permanently identify phasing on the structure or housing adjacent to the bus. Phase identification A-B-C is equivalent to transformer phase identification X1-X2-X3 and H1-H2-H3. Identify individual conductors as to phase connection A, B, C, by means of wire labels, at each splice and termination.

B. In Underground Duct Systems

1. Brush and swab the duct line before pulling cables. Use flexible cable feeders of an appropriate size to lead the cable from the reel into the duct mouth. In manholes and handholes, install cables on cable rack insulators. In passing cables through manholes and handholes, take care to avoid crossovers so that each cable is accessible when placed on racks; and where feasible, install each cable in the duct in the same relative position throughout the underground system, unless otherwise required or indicated. Install cable so that spare ducts are accessible for use in the future.
2. Fireproof each cable at exposed locations in manholes and handholes as follows:
 - a. Install not less than 4 layers of arc-proofing tape, two layers half-lapped, in one direction. Terminate fireproofing approximately 1/2 inch from the duct face to permit inspection of the cable at the duct entrance and to prevent the fireproofing from interfering with the expansion and contraction of the cable.
 - b. In applying tape, snug the tape by twisting the tape with the hand. Where steep inclines are caused by changes in cable diameters, such as at splices, apply tape in a stairstep manner by increasing the lapping of the tape as required to maintain a minimum thickness of 4 layers. Increase lapping around cable bends to avoid decreasing the thickness below minimum on the outside of the cable bend.
 - c. Band the arc-proofing tape with 1/2 inch wide pressure-sensitive fiber glass cloth banding tape, at intervals not exceeding 12 inches on centers. Construct bands of not less than six turns of banding tape so applied that not more than three turns are in contact with the elastomer backing of the arc-proofing tape.

C. Splices And Terminations

1. Splice and terminate conductors with connectors and lugs as specified for the specific size and type of conductor. Terminate shielded cables with stress cones. Continue shields through splices and ground shields at splices and at terminations. Do not splice cables except where cable lengths are limited by maximum reel capacity or anticipated pulling tension. Do not splice direct burial cable underground. Indent all compression type connectors and lugs with tools as recommended by the connector or lug manufacturer.
2. Do not open cable prior to splicing or terminating unless unavoidable, and do not make splices or terminations if exposed to damp or inclement weather, except when prior

approval has been obtained from the ARCHITECT-ENGINEER and a cable splicer's tent or similar means of protection is employed. Train or rack cables into their final positions before cutting any cable. Cut cables to be spliced so that they butt squarely at the centerline of the splice. Once a cable is opened, proceed with the work immediately and continue uninterrupted until the splice or termination is completed, including any sealing or resealing required.

3. Thoroughly clean wire ends before connectors or lugs are applied. Before installing a compression connector or lug on an aluminum conductor, apply an aluminum joint compound, to the exposed conductor and wire brush through the compound to remove the aluminum oxide film. Install the connector immediately after wire brushing the conductor.
4. Whenever aluminum or copper lugs are terminated on aluminum bus, use a Belleville washer and two tin or cadmium plated washers, one on each side, in combination with aluminum joint compound on all contacting surfaces. Tighten and/or torque bolts until Belleville washer is flat. Provide new Belleville washer after original use.
5. Insulate splices and terminations with materials in packaged kits as specified. Follow instructions of the cable manufacturer for the work. Install rainshields for outdoor taped terminations. Install potheads, preformed stress relief terminators for outdoor terminations on poles or structures. Install armor terminators for armored cable terminations at equipment. Where splices are required in armored cables, use approved splicing sleeves and locate sleeves outside of and adjacent to the tray, not in the tray. Provide separate supports for same. Support all splices in non-armored cables in manholes and handholes adjacent to the splice, not on the splice. Terminate cable ground conductors on equipment ground bus.

D. Cable Identification

1. Identify cables as per SECTION 16050 - Appendix "A".

END OF SECTION

Revision History	
Date	Rev. No.
A	0
B	0
D	0
E	0
F	0
02-19-09	0

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