SECTION 26 05 13

MEDIUM VOLTAGE CABLES AND TERMINATIONS

PART 1 - DESIGN DIRECTIVES

1.1 SECTION DESCRIPTION

A. Campus medium voltage cable and terminations. Greater than 1000 V.

1.2 CAMPUS MEDIUM VOLTAGE DISTRIBUTION SYSTEM DESCRIPTION

A. See Section 26 10 00 - Medium-Voltage Electrical Distribution and Feeder Entrance.

1.3 DESIGN CRITERIA

- A. Dartmouth FOM-Engineering and Utilities' Approved Medium-Voltage Electrical Engineer shall perform the following.:
 - 1. Design campus medium-voltage electrical distribution up to the building Medium Voltage (MV) entrance feeder and equipment.
- B. Dartmouth College FOM Electric Shop shall perform the following.
 - 1. Specify medium voltage splice, elbow and termination materials for each location such as manholes, and at switchgears.
 - 2. Perform all splices and terminations.
 - a. May be performed by an approved contractor.

1.4 CAMPUS MEDIUM VOLTAGE DISTRIBUTION SYSTEM FEEDER CABLES

- A. In Conduit/Ductbank, or in Cable Tray Not Accessible to Unqualified Persons:
 - 1. 4160 V Systems:
 - a. Three 15 kV, #350 kcmil cables plus one 600V insulated #4/0 XHHW neutral conductor per feeder enabling future use at the higher voltage.
 - 1) 5/8 kV cable will be allowed with permission of FOM-Engineering & Utilities.
 - 2. 13.2 kV Systems:
 - a. Three 15 kV, # 350 kcmil cables plus one 600V insulated #4/0 XHHW neutral conductor per feeder.
- B. In Cable Tray Accessible to Unqualified Persons or As Directed by FOM Engineering & Utilities:
 - 1. Type CLX:
 - a. Three 5 kV or 15 kV, # 350 kcmil cables plus one 600 V insulated #4/0 neutral conductor per feeder.
- C. For Feeders from a Fused Switch to a Building Transformer:

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- 1. For 4160 V System:
 - a. Three 15 kV, #2/0 kcmil cables plus one 600 V insulated XHHW #4/0 neutral conductor per feeder.
 - 1) 5/8 kV cable will be allowed with permission of FOM-Engineering & Utilities.
- 2. For 13.2 kV System:
 - a. Three 15 kV, # 2/0 kcmil cables plus one 600 V insulated XHHW #4/0 neutral conductor per feeder.
- D. Cables in Accessible Locations such as Manholes and Cable Trays: Wrap with fireproofing tape.
- E. Junction Points: Wall mounted in manholes for loadbreak and deadbreak elbow connections.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. Dartmouth College FOM Electric Shop:
 - 1. Will specify all medium voltage splice, elbow and termination materials for each location such as manholes and switchgears. Part Numbers: Subject to change.
 - 2. Product shall be used from Dartmouth College stock with stock replenishment from new product supplied with project.

2.2 APPROVED MANUFACTURERS

- A. Cables: Okonite; Keywright
- B. Terminations: 3M and Richards
- C. Junction Points: Elastimold
- D. Load Break Elbows: Elastimold, 3M and Richards
- E. Splices: 3M and Richard.
- F. Grounding Materials: Burndy
- G. Fireproofing Wrap Tape: 3M and Scotch

2.3 MATERIALS

- A. Cables: Okonite Okogaurd MV-105 EPR 115 mil with Copper Tape Shield:
 - 1. 5/8 kV: 350 kcmil. Okoguard-Okoseal Type MV-105, EPR insulation. Cat #114-23-3837
 - 2. 15 kV: 350 kcmil. Okoguard-Okoseal Type MV-105, EPR insulation. Cat #115-23-3127
 - 3. 15 kV: #2/0. Okoguard-Okoseal Type MV-105, EPR insulation. Cat #115-23-3117
- B. CLX Cable:
 - 1. 15 kV: #350 kcmil. Okogaurd Power Cable-Aluminum Sheath C-L-X, Type MV-105, EPR insulation, Cat. #571-23-3536

- C. Fireproofing Tape: Scotch No. 77 or approved equal
- D. Junction Points:
 - 1. Elastimold 600 Series Deadbreak. Cat. #K650J2; 2-point
 - 2. Elastimold 600 Series Deadbreak. Cat. #K650J3; 3-point
- E. Butt Splices, Terminations:
 - 1. 5 kV Systems:
 - a. Butt Splices: 3M Cold Shrink Splice Kits.
 - 1) 3M #5551 (#6 to 4/0)
 - 2) 3M #5552 (4/0 to 500 kcmil)
 - 3) 3M #5553 (500 to 1000 kcmil)
 - b. Terminations: 3M Cold Shrink Termination Kits
 - 1) 3M #7622-T-110 (4/0 to 400 kcmil)
 - 2) 3M #7624-T-110 (50 to 750 kcmil)
 - 2. 15 kV Systems:
 - a. Butt Splices: Raychem or Richards Splice Kits.
 - 1) Raychem #HVS-1521S (#2 to 4/0)
 - 2) Raychem #HVS-1522S (250 to 350 kcmil)
 - b. Terminations: Raychem or Richards Splice Kits
 - 1) Raychem #HVT-151-G (4 to 1/0)
 - 2) Raychem #HVT-152-G (2/0 to 350 kcmil)

F. Grounding Materials:

- 1. Crimp Connectors: Burndy or other approved equal.
 - a. #4/0 to 4/0. Burndy #YGHC29C29
 - b. #4/0 to #4. Burndy #YGHC29C26
 - c. #4 to #4. Burndy #YGHC2C2

G. Loadbreak Elbows:

- 1. 5 kV Load break Elbows: Elastmold or Richards product.
 - a. 200 Amp: Elastimold #166LR-WX
 - b. 600 Amp: Elastimold #K655LR-W0X. #20MA grounding kits
- 2. 15 kV Deadbreak Elbows:
 - a. 600 Amp: Elastimold Cat. # K656BLR
 - b. Cold Shrinkable Seal with Braid Grounding Kits: Elastimold or Richards.
 - 1) Elastimold Cat. #200ESG3 for 350 kcmil cable.

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- 3. Test Points: Provided at all loadbreak elbows.
- H. Fault Indicators: On cables at switchgear terminations.
 - 1. Remote Indicating: Provide where fault indicators are located in enclosed switchgear.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Medium Voltage Splicing:
 - 1. College Electricians: Will perform medium voltage splicing and terminations (4.16 &13.2 KV systems) unless decided otherwise by Dartmouth College.
 - a. Dartmouth College: Reserves right to decide what firms perform medium voltage splicing on a case-by-case basis.
 - 1) Contractor: Must provide for College review, evidence of their staff qualifications.
- B. Medium Voltage Termination and Splice Materials:
 - 1. Submitted and approved by Dartmouth College FOM Engineering and Electric Shop.
 - a. Dartmouth College FOM: Will provide a detailed list of required termination and splice materials for project.
- C. College Electricians:
 - 1. Are the only workers allowed to operate equipment on the medium voltage system.
 - 2. Will make the final connections to utility system and energize medium voltage feeders supplying new and remodeled facilities on campus.
 - 3. Approval to Energize New Equipment in Completed Installation:
 - a. Contingent on approval by Dartmouth College FOM-Engineering and the Town of Hanover Zoning Office.
 - b. See Electrical Energizing Requirements in Section 26 21 00 Medium-Voltage Electrical Distribution and Feeder Entrance.

3.2 TERMINATION OF DE-ENERGIZED CABLES RETAINED FOR FUTURE USE (ONLY WITH DARTMOUTH FO&M APPROVAL)

- A. Dry, Environmentally Controlled Locations: Such as utility tunnel or buildings.
 - 1. Individual Cables De-Energized and Left for Future Use:
 - a. Sealed with a heat shrink cap.
 - 2. CLX Cable Assemblies:
- B. Terminated with a breakout boot, sealing the armor.
 - a. Individual Cable Ends: Sealed with a heat shrink cap.

- C. Environmentally Uncontrolled Locations: Such as manholes and handholes.
 - 1. Individual Cables:
 - a. Terminated with a deadbreak elbow and mounted to parking bushings.
 - 2. CLX Cable Assemblies:
 - a. Terminated with a breakout boot, sealing the armor
 - b. Individual Cable Ends: Terminated with deadbreak elbows and mounted to parking bushings.

END OF SECTION