Cable Splicing and Terminating, Medium-Voltage

4 Days, 3.2 CEUs

Solid dielectric power cable systems are subject to higher voltages than ever before. Inadequate installation and testing of cable joints and terminations is the number one cause of failure (IEEE Std 493-2007 Table 10-33). Yet over the last few decades, cable splicing as a profession has declined as multi-crafting and departmental mergers have made it just a function among many. Proper installation of cable splices and terminations drastically improves the lifetime of cables and prevents damage to downstream equipment and nearby personnel.

This hands-on course is intended for new or experienced electricians and technicians that install, maintain, repair or troubleshoot 5-35 kV solid dielectric power cables. The student should have some field experience and basic knowledge of AC/DC electricity. In addition, students must bring cut resistant, minimum level 4 protective gloves.

Learning Objectives:
Upon completion of this course, the student will be qualified to:
• Explain medium voltage cable components and construction
• Identify applications of different cable types including marine, offshore, mining, underground (URD) and tech
• Prepare cable for splicing utilizing hand tools, abrasives and solvents
• Install taped, molded and heat shrink splices on tape-shielded and jacketed concentric (JCN) cables
• Install taped, cold shrink and molded elbow terminations
• Utilize a DC high potential tester for performing dielectric strength tests on assembled splices
• Identify the causes of splice and termination failures
• Explain procedures for buried, duct and tray installation and relevant OSHA safety requirements

SCOPE

I. Introduction
   A. Pretest
   B. Schedule
   C. Course Outline

II. Medium Voltage Splicing and Termination
   A. Material Technology
   B. Human Factors in Splicing

III. Types of High Voltage Cables
   A. Tape Shielded
   B. Drain Wire Shielded
   C. BICC UniShield
   D. Concentric Neutral (CN)
   E. Jacketed Concentric Neutral (JCN)
   F. Type of Configurations

IV. High Voltage Cable Components
   A. Conductor
      1. Concentric Stranding
      2. Compressed Stranding
      3. Compact Stranding
   B. Strand Shielding
   C. Insulation
   D. Insulation Shield System
   E. Metallic Shielding
   F. Jacket
   G. How Solid Dielectric Cables are Made

V. Cable Installation and Handling
   A. Safety
   B. Environmental Protection
   C. Light, Power and Ventilation

   D. Housekeeping
   E. Cable Handling
   F. Direct Bury
   G. Duct and Tray Installation
   H. Causes of Cable Failures

VI. Cable Preparation
   A. Safety
   B. Hand Tools
   C. Abrasives and Solvents
   D. Supplies and Materials
   E. Cable Preparation Procedures
   F. Cable Prep Lab

VII. Cable Splicing and Terminating Technologies and Standards
   A. Splicing Technology
      1. Modular
      2. Molded
      3. Tape Systems
      4. Shrink Technologies
      5. Other
   B. Terminations
      1. Modular
      2. Molded
      3. Tape Systems
      4. Shrink Technologies
      5. Other

VIII. Cable Splicing
   A. Molded Splice
      1. Cable Preparation
      2. Review Splicing Instructions
      3. Molded Splicing Installation Lab
   B. Taped Splice
      1. Cable Preparation
      2. Review Splicing Instructions
      3. Taped Splicing Installation Lab
   C. Heat Shrink Splice
      1. Cable Preparation
      2. Review Splicing Instructions
      3. Heat Shrink Splicing Installation Lab

IX. Cable Terminations
   A. Cold Shrink Termination
      1. Cable Preparation
      2. Review Termination Instructions
      3. Cold Shrink Termination Lab
   B. Elbow Termination
      1. Cable Preparation
      2. Review Termination Instructions
      3. Elbow Termination Installation Lab

X. Cable Testing Methods
   A. Insulation Resistance
   B. DC Hipot
   C. Very Low Frequency Testing
   D. Partial Discharge Testing
   E. Power Factor Testing
   F. Cable Testing Lab

XI. Conclusion
   A. Final Exam
   B. Completion of Course Paperwork