

**SPECIFICATION STANDARD**  
**Copper Cable Splicing and Outside**  
**Protected Terminations 27 13 13**

## **PART 1: GENERAL**

The contractor, designated agent, or employee is held responsible to be familiar with the provisions contained herein and with other Sections of this Specification as applicable to the completion of the installation.

### **1.01 SCOPE OF WORK**

- A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the performance of multi-pair copper cable splicing as described on the Drawings and/or required by these specifications.
- B. The contractor shall provide hardware for the grounding and bonding of cable and closures and all associated hardware necessary for the routing and management of communication cable in the vicinity of splices.

### **1.02 COORDINATION**

- A. The contractor shall coordinate the work specified in this Section with the work in other parts of the Project.
- B. Plans in general are diagrammatic. It is the full responsibility of the Contractor to be familiar with the location of equipment involved under the work of other trades to eliminate conflicts between the copper splicing and the work of other trades.
- C. All questions and issues concerning coordination shall be directed to UNM IT.

### **1.03 SUBMITTALS**

- A. All submittals shall be provided to the UNM IT and approved before work proceeds.
- B. Shop drawings shall include the manufacturer's printed information with each item. The information submitted shall include overall dimensions, weights, performance characteristics, and manufactured specifications. Shop drawings and Manufacturer's cut sheets where required shall be submitted by the Contractor to UNM IT for approval before installation.
- C. Closure Supports, such as Threaded Rod and Channel Trapeze configurations can be fabricated on the job site if required.

**SPECIFICATION STANDARD**  
**Copper Cable Splicing and Outside**  
**Protected Terminations 27 13 13**

### **1.03 STANDARDS FOR MATERIALS**

- A. All materials shall conform with the current applicable industry standards including, but not limited to:
  - 1. NEMA (National Electrical Manufacturers' Association)
  - 2. ANSI (American National Standards Institute)
  - 3. ASTM (American Society for Testing and Materials)
  - 4. ICEA (Insulated Cable Engineers Association)
  - 5. IEEE (Institute of Electrical and Electronic Engineers)
  - 6. National Electrical Safety Code
- B. In addition, all Materials shall be Underwriters' Laboratories listed unless otherwise indicated or from other UNM IT-approved Testing labs.

### **1.04 QUALITY ASSURANCE**

- A. Verification: UNM IT will provide Quality Control Inspections on all Projects. It is incumbent upon the Contractor to verify that the installation and material used have been inspected before it is enclosed within building features, or otherwise hidden from view. The Contractor shall bear costs associated with uncovering or exposing installations or features that have not been inspected.
- B. Equipment Qualifications: The Contractor is to use equipment and rigs designed for splicing, preparation, and drilling of closure end caps, drilling masonry, installing masonry anchors, etc., to install the splice supports and cable management hardware.

### **1.05 RELATED SECTIONS:**

- A. Division 26 Electrical
- B. Division 27 Communications Systems
- C. Division 28 Electronic Safety and Security

## **PART 2: PRODUCTS**

### **2.01 CLOSURES**

- A. The closure shall be designed to meet the following requirements.
  - 1. Accommodate the number of cables to be spliced.
  - 2. Watertight
  - 3. Meets the approved use of the manufacturer and application.

**SPECIFICATION STANDARD**  
**Copper Cable Splicing and Outside**  
**Protected Terminations 27 13 13**

4. Allow through splices with an equal number of cable entries.
  5. The splice closure shall be designed for multiple re-entries.
  6. Encapsulate shall not be used in indoor splice closures.
  7. Encapsulate shall be used within splices installed within manholes, handholes, buried, or as specified by UNM IT.
  8. The Contractor shall use all parts, tool kits, and splice rigs specified by the splice closure manufacturer for the splice closure provided.
  9. Splice closures shall be submitted for approval to UNM IT before procurement.
- B. Indoor closures for vaults, tip splices, service entrance facilities, risers, and building distribution systems shall be a complete flame retardant closure using manufacturer parts and installation procedures. Specify 3M 4-Type closures, 3M K&B Vault and Riser, or UNM IT-approved equivalent.
- C. Buried splice closures shall be a complete closure designed for buried applications using manufacturer parts and installation procedures. Specify 3M Better Buried, 3M Scotch cast 89 Series Closures, or UNM IT-approved equivalent.
- D. Underground and Tunnel closures where applications are not subject to water infiltration using manufacturer parts and installation procedures. Specify 3M 2-Types Closures or UNM IT-approved equivalent.
- E. Aerial Closures shall be a complete closures designed for aerial applications using manufacturer parts and installation procedures. Specify 3M Z Watertight Closure System or UNM IT-approved equivalent.

## **2.02 COPPER CABLE SPLICE CONNECTORS**

- A. The splice connector shall be a modular splicing system with the following features and specifications.
1. The splice connector shall be compatible with the 24 AWG PIC and DEPIC copper conductors, and 26 AWG protector fuse tails.
  2. The splice connector shall be part of a modular system that includes:
    - a. Splice connectors.
    - b. Bridge connectors.
    - c. Half-tap connectors.
  3. The splice connector shall be manufacturer specified for use with 24 AWG PIC and DEPIC copper conductors, and 26 AWG protector fuse tails.
    - a. The splice connector shall be dry for indoor applications.
    - b. The splice connector shall be filled for use in outdoor applications.

**SPECIFICATION STANDARD**  
**Copper Cable Splicing and Outside**  
**Protected Terminations 27 13 13**

- c. The splice connector shall have a capacity of 25 pairs for multiple-pair splices.
- d. The splice connector shall be constructed to allow multiple configurations based on a 2 or 3-piece standard assembly. The splice connector shall be 3M 710 Splicing System or 3M Micro Splice (MS2) 4000 Series Splicing Modules or the 710 modular equivalents, as appropriate for the closure and multiple pair splicing operations.
- e. The splice connector and system for single pairs splicing operations shall be 3M Scotch Lok Connectors and tools or UNM IT-approved equivalent.

## **2.03 MULTIPAIR COPPER CABLE IDENTIFICATION TIES**

- A. The Contractor shall use Panduit PIC color-coded cable ties included within the Panduit Cable Marker Kit part number PAN-TY PPC25X50F for identifying multipair copper cable binder groups within splice closures.

## **2.04 ENCAPSULANT**

- A. The Contractor shall inject 3M High Gel Re-Enterable Encapsulate in those closures specified. 3M Part Number 4442 or UNM IT-approved equivalent.

## **2.05 DAMMING COMPOUND**

- A. The Contractor shall apply damming compound over the end of filled copper cables once they are fanned out into splice closures intended for dry, indoor environments. 3M Haplec Blocking Compound, 3M Part Number 4408, or UNM IT-approved equivalent.

## **2.06 BONDING CONNECTORS**

- A. Scotch Lok Bonding Connectors, 3M Part Number Series 4460 or equivalent, shall be used to bond multipair copper cable jackets to appropriate ground copper

## **2.07 CIRCUIT PROTECTION**

- A. Circa 1880 ECA (110 to 110 connection) or 1880 B (cable stub) Type Multipair Protector Panels installed with Circa C3B1S 5 pin digital fault protected units or UNM IT approved equivalent. Install per manufacturer's instructions.
- B. The Contractor is required to confirm with UNM IT before purchasing to ensure proper application for PBX and Equipment Room installations.

**SPECIFICATION STANDARD**  
**Copper Cable Splicing and Outside**  
**Protected Terminations 27 13 13**

## **PART 3: EXECUTION**

### **3.01 CABLE SPLICING**

- A. The Contractor shall configure splice closures for straight splices in manholes or confined spaces unless otherwise approved by UNM IT.
- B. The Closure shall be sized to ensure capacity for all pairs to be connectorized with appropriate splice modules, even if all pairs entering the closure are not to be spliced within the scope of the Project.
- C. All 25-pair binder groups within each cable entering the splice closure are to be connectorized with splice modules. The Contractor shall use the same type and manufacture of connectors for all pairs. Splice modules will be installed according to the manufacturer's specifications. The foldback splice method shall be used for all splicing operations. The foldback's length shall be sufficient to fold to the opposite sheath opening and neatly assembled for uniformed splice module storage when the splice is closed.
- D. When breaking out any multipair copper cable of 25 pairs or greater for splicing or termination, the binder groups shall have PIC color-coded cable ties and shall be labeled with cable designation and pair count attached to the cable at the point of fan out from supergroups for splicing, and at the point of fanout for termination on termination blocks. (Panduit Part Number PAN-TY PPC25X50F).
- E. The Contractor shall ensure the cables to be spliced are routed into the closure in a manner observing the bend radii restrictions of the cables being spliced.
- F. Install shield bond connectors to the shields of all cables entering the closure and bond to the grounding lug of the closure before sealing the closure assembly.
- G. The splice shall be located in an area that will allow future access and re-entry. Stagger or offset the splice closures when more than one closure is installed in parallel within Utility Tunnels. Allow enough cable slack in all cables entering the closure to allow the dismounting of the closure from its supports and to ensure convenient access or reentry.
- H. The Contractor shall apply an appropriate amount of damming compound over the end of filled copper cables in indoor or dry environments to prevent seepage of cable filling compounds where encapsulate will not be used.
- I. Before closure assembly in dry or indoor installations, all exposed cable pairs shall have

**SPECIFICATION STANDARD**  
**Copper Cable Splicing and Outside**  
**Protected Terminations 27 13 13**

the filling compound thoroughly cleaned off the cable insulation or sheath using appropriate cleaning solvents.

- J. All pairs spliced shall be tested per the Specifications, and all splice-related faults cleared before sealing the closure assembly.
- K. Assemble the closure casing such that the hardware and fasteners are easily accessible without twisting or turning the cables.
- L. Unfilled splice closures shall be sealed to provide air- and water-tight integrity, and left unpressurized after the splices. Nitrogen gas shall be injected into the assembled closures and pressure tested to 6-10 psi for leakage.
- M. Splice Closure Mounting
  - 1. Within Manholes: The contractor shall mount assembled closures to cable hooks and manhole racking between 18" and 48" inches above the floor of the structure, measured from the bottom of the enclosure canister. Mount closures on the manhole or handhole walls away from entrance conduits steps or handholds to avoid the splice closure being used as a step for ascent or descent. Do not install splice closures on walls that contain duct bank entrances or block entrance conduits on side walls.
  - 2. Within Utility Tunnels and Vaults: Placement in existing cable trays, attachment to racking, or attachment to stranded messenger may be required. The Contractor shall coordinate the location for the splice and alternative mounting techniques with UNM IT before cutting cables in preparation for splicing.

### **3.02 SPLICE CLOSURE LABELING**

- A. Label the assembled closure following the UNM IT instructions.
- B. All cables shall be labeled with cable designation, pair count including dead count, Contractor name, and date of completion within one foot of the splice case at each entrance and exit point of the splice case. Labels shall be mechanically printed and secured with stainless steel ties.

### **3.03 ACCEPTANCE AND TESTING**

- A. Physical inspection requirements include:
  - a. Installation evaluation
  - b. Placement and support
  - c. Conduits seals
  - d. Splices – bonding, color coding, neatness, fold back
  - e. Splice cases – NEC and Manufacturer's instructions
  - f. Grounding and bonding including continuity to each cable.

**SPECIFICATION STANDARD**  
**Copper Cable Splicing and Outside**  
**Protected Terminations 27 13 13**

- g. Waterproofing compound
  - h. Labeling
  - i. Photographs of splice before closure. Include images of the splice bonding apparatuses.
  - j. Cleanup
- B. Testing and documentation requirements include:
  - a. Line mapping result: Pass/Fail
  - b. Proper wiring configuration for cable pairs and bundles
  - c. Open conductors – provide footage for failures
  - d. Split pairs
  - e. Reversed pairs
  - f. Shorts – provide ohms & provide loop resistance in ohms
  - g. Grounds – provide ohms & distance to fault on failures
  - h. Crossed pairs
  - i. Grounds and bonds – provide ohms measurement
- C. Provide all test results in the following format.
  - a. Two (2) copies in electronic format on CD or Thumb Drive
  - b. Provide test results in EXCEL Format
- D. Provide as-builts in the original format provided.

**End of Section**