SECTION 260513 - MEDIUM-VOLTAGE CABLES

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

See "Sustainable Design Considerations" Article in the Evaluations for a discussion of sustainable design requirements that may impact the editing of this Section.

1. GENERAL
   * + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
      1. SUMMARY
         1. Section includes cables and related cable splices, terminations, and accessories for medium-voltage (2001 to 35,000 V) electrical distribution systems.
      2. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

* + - * 1. Jacket: A continuous nonmetallic outer covering for conductors or cables.
        2. NETA ATS: Acceptance Testing Specification.
        3. Sheath: A continuous metallic covering for conductors or cables.
      1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For each type of cable. Include splices and terminations for cables and cable accessories.

Retain "Samples" paragraph below for single-stage Samples, with a subordinate list if applicable.

* + - * 1. Samples: 16-inch lengths for each type of cable specified.
        2. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        3. Coordination Drawings: Indicate location of each cable, splice, and termination.

Coordinate "Qualification Data" paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article.

* + - * 1. Qualification Data: For [**Installer**] [**testing agency**].

Retain "Material Certificates" paragraph below to require submittal of material certificates from manufacturers.

* + - * 1. Material Certificates: For each type of cable and accessory.

Revise "Design Data" paragraph below to indicate characteristics of the installation that need to be reviewed by the Engineer.

* + - * 1. Design Data: Cable pulling calculations, including conduit size and fill percentage, pulling tensions, cable sidewall pressure, jam probability, voltage drop, and ground wire sizing for each cable.

Retain reports below if required.

* + - * 1. Source quality-control reports.

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + - * 1. Field quality-control reports.
      1. QUALITY ASSURANCE

Revise "Installer" paragraph below to include certification that may be specific to Project location.

* + - * 1. Installer: Engage a cable splicer, trained, and certified by splice material manufacturer, to install, splice, and terminate medium-voltage cable.

Retain "Testing Agency Qualifications" paragraph below if Contractor or manufacturer selects testing agency or if Contractor is required to provide services of a qualified testing agency in "Field Quality Control" Article.

* + - * 1. Testing Agency Qualifications: Member company of NETA or an NRTL.

Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

* + - * 1. If brand names other than those specified are proposed for use, furnish the AEIC core and thermo-mechanical qualification test reports. Include a list of 5 Completed Installations indicating name of facility contact person with phone number, voltage, size, and length of EPR cable installed.
        2. Equipment Qualifications for Products Other Than Those Specified:

At the time of submission provide written notice to the Director of the intent to propose an “or equal” for products other than those specified. Make the “or equal” submission in a timely manner to allow the Director sufficient time to review the proposed product, perform inspections and witness test demonstrations.

If products other than those specified are proposed for use furnish the name, address, and telephone numbers of at least 5 comparable installations that can prove the proposed products have performed satisfactorily for 3 years. Certify in writing that the owners of the 5 comparable installations will allow inspection of their installation by the Director's Representative and the Company Field Advisor.

Make arrangements with the owners of 2 installations (selected by the Director) for inspection of the installations by the Director's Representative. Also obtain the services of the Company Field Advisor for the proposed products to be present. Notify the Director a minimum of 3 weeks prior to the availability of the installations for the inspection and provide at least one alternative date for each inspection.

Only references from the actual owner or owner’s representative (Security Supervisor, Maintenance Supervisor, etc.) will be accepted. References from dealers, system installers or others, who are not the actual owners of the proposed products, are not acceptable.

Verify the accuracy of all references submitted prior to submission and certify in writing that the accuracy of the information has been confirmed.

The product manufacturer shall have test facilities available that can demonstrate that the proposed products meet the contract requirements.

Make arrangements with the test facility for the Director's Representative to witness test demonstrations. Also obtain the services of the Company Field Advisor for the proposed product to be present at the test facility. Notify the Director a minimum of 3 weeks prior to the availability of the test facility and provide at least one alternative date for the testing.

Provide written certification from the manufacturer that the proposed products are compatible for use with all other equipment proposed for use for this system and meet all contract requirements. Include proof that the installed cables:

Have the same rating and construction as the proposed cable.

Have the same insulation compound as the proposed cable.

* + - * 1. Company Field Advisor: Secure the services of the cable manufacturer's Company Field Advisor for a minimum of 16 working hours for the following:

Render advice regarding method of installing cable.

Inspection of equipment for installing cable.

Witness representative amount of cable pulling.

Witness construction of at least one splice and one termination by each cable splicer who will be doing the actual cable splicing.

If the splices or terminations are other than the cable manufacturer's, secure the services of the splice and termination manufacturer's Company Field Advisor to concurrently witness construction of the splices and terminations and also certify with an affidavit that the splices and terminations were constructed in accordance with the splice and termination manufacturer's recommendations.

Witness high voltage after installation test.

Certify with an affidavit that the aforementioned particulars are satisfactory, and the cable is installed in accordance with cable manufacturer's recommendations.

* + - * 1. Testing Company: Secure the services of an independent International Electrical Testing Association (NETA) accredited testing company for a high voltage after installation test.
        2. Factory Inspection of Ethylene-Propylene Insulated Cables (For Brand Names Other Than Those Specified):

An inspector from an independent cable testing laboratory designated by the Director shall witness AEIC electrical tests required for completed cables (ac and dc voltage withstand, partial discharge, jacket spark test, and insulation resistance).

Have applicable AEIC qualification tests available for use by the cable inspector to evaluate the tests being made on the completed cable.

Request name of independent testing laboratory at least 2 weeks before cable is to be tested. Arrange directly with the testing laboratory for the cable inspector's visit to factory. Pay all expenses.

* + - 1. FIELD CONDITIONS

Delete this article if no interruption of existing electric service is required.

* + - * 1. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Director’s Representative or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

Notify [**Architect**] [**Construction Manager**] [**Director’s Representative**] no fewer than [**five**] <**Insert number**> days in advance of proposed interruption of electric service.

Do not proceed with interruption of electric service without [**Architect's**] [**Construction Manager's**] [**Director’s Representative**] written permission.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and Masterworks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. SYSTEM DESCRIPTION
         1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

Revise paragraph below to suit Project. See Editing Instruction No. 2 in the Evaluations.

* + - * 1. Comply with IEEE C2 and NFPA 70.
        2. Source Limitations: Obtain cables and accessories from single source from single manufacturer.
      1. CABLES
         1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

General Cable; Prysmian Group North America.

Okonite Company (The).

Prysmian Cables and Systems; Prysmian Group North America.

Southwire Company.

Or equal.

Retain first option in "Cable Type" paragraph below for crosslinked polyethylene insulation and second option for ethylene-propylene insulation.

* + - * 1. Cable Type: [**Type MV 90**] [**Type MV 105**].

See Evaluations for a discussion about insulation options in "Conductor Insulation" paragraph below. Coordinate with "Cable Type" paragraph above.

* + - * 1. Conductor Insulation: [**Crosslinked polyethylene**] [**Ethylene-propylene rubber**].

Options in "Voltage Rating" subparagraph below are cable voltage ratings, not system voltages.

Voltage Rating: [**5**] [**8**] [**15**] [**35**] kV.

Insulation Thickness: [**100**] [**133**] percent insulation level.

Insulation: Ethylene Propylene rubber (EPR), 105C, colored to contrast with the shield layers. The nominal insulation thickness shall 115 mils for 5kv and 8kv, 220 mils for 15kv and 420 mils for 35kv. Physical and electrical properties of the insulation shall be in accordance with ICEA S-97-682 for Class III insulation.

* + - * 1. Conductor: [**Copper**] [**Aluminum**].

Retain first option in first paragraph below for tape shielded cables and second option for concentric neutral designs. See Editing Instruction No. 3 in the Evaluations.

* + - * 1. Comply with UL 1072, AEIC CS8[**, ICEA S-93-639/NEMA WC 74, and ICEA S-97-682**] [**, and ICEA S-94-649**].

Coordinate "Conductor Stranding" paragraph below with options in paragraph above.

* + - * 1. Conductor Stranding: [**Compact round, concentric lay, Class B**] [**Concentric lay, Class B**].

Retain "Strand Filling" paragraph below if strand filling is required for Project.

* + - * 1. Strand Filling: Conductor interstices are filled with impermeable compound.

Retain "Shielding" or "Shielding and Jacket" paragraph below for shielded cables. All conductors and cables rated above 2.4 kV, with few exceptions, are shielded. See Editing Instruction No. 4 in the Evaluations.

* + - * 1. Insulation Shield: Extruded thermoset semi-conducting polymeric layer, free stripping from the insulation. It shall be in intimate contact with the outer surface of the insulation and shall be free-stripping, leaving no conducting particles or other residue on the insulation surface. The layer shall be legibly identified as being semi-conducting. The thickness and properties of the layer shall be in accordance with ICEA S-97-682.
        2. Shielding and Jacket: Corrugated copper drain wires embedded in extruded, chlorinated, polyethylene jacket.

Metallic Shield: 5 mil annealed copper tape shield with a nominal 25% overlap. The tape shall meet the requirements of ICEA S-97-682.

Jacket: Polyvinyl Chloride (PVC), Thermoset Chlorinated Polyethylene (CPE), or Thermoplastic CPE overlaying jacket with physical properties and thicknesses in accordance with the requirements of UL 1072 and ICEA S-93-639.

For "triplexed" single-conductor cable, retain "Three-Conductor Cable Assembly" paragraph below with or without ground conductors; otherwise, delete below.

* + - * 1. Three-Conductor Cable Assembly: Three insulated, shielded conductors cabled together [**with ground conductors**].

Retain "Circuit Identification" subparagraph below for multiconductor cable.

Circuit Identification: Color-coded tape (black, red, blue) under the metallic shielding.

Retain "Cable Sheath" paragraph below where single or multiconductor cable construction requires metallic outer sheath (Type MC).

* + - * 1. Cable Sheath: [**Interlocked aluminum**] [**Interlocked galvanized steel**] [**Corrugated aluminum tube**] applied over cable.

Jackets can be applied over insulation or a sheath.

* + - * 1. Cable Jacket: [**Sunlight-resistant PVC**] [**Chlorosulfonated polyethylene**].
      1. CONNECTORS
         1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Adalet.

G&W Electric Company.

nVent (RAYCHEM).

Or equal.

* + - * 1. Comply with ANSI C119.4 for connectors between aluminum conductors or for connections between aluminum to copper conductors.

Aluminum barrel crimped connectors in "Copper-Conductor Connectors" paragraph below are typically universally selected for aluminum or copper conductors. Check the splice manufacturer's literature or the connector body for conformation. Specifying the connector may not be necessary if using a splice kit with manufacturer's standard connectors supplied as part of the kit.

* + - * 1. Copper-Conductor Connectors: [**Copper barrel crimped**] [**Aluminum barrel crimped**] [**Copper shear bolt**] connectors.
      1. SOLID TERMINATIONS
         1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Adalet.

G&W Electric Company.

nVent (RAYCHEM).

Or equal.

* + - * 1. Ampere Rating: Not less than ampere rating of cable.
        2. Voltage Rating: Not less than voltage rating of cable.

Retain one of or both "Multiconductor Cable Sheath Seals" and "Shielded-Cable Terminations" paragraphs below.

* + - * 1. Multiconductor Cable Sheath Seals: Type recommended by seal manufacturer for type of cable and installation conditions, including orientation.

Retain first subparagraph below for Type MC cable.

Compound-filled, cast-metal-body, metal-clad cable terminator for metal-clad cable [**with**] [**without**] external plastic jacket.

Retain one of three subparagraphs below.

Cold-shrink sheath seal kit with preformed sleeve openings sized for cable and insulated conductors.

Heat-shrink sheath seal kit with phase- and ground-conductor rejacketing tubes, cable-end sealing boot, and sealing plugs for unused ground-wire openings in boot.

Cast-epoxy-resin sheath seal kit with wraparound mold and packaged, two-part, epoxy-resin casting material.

* + - * 1. Shielded-Cable Terminations: Comply with the following classes of IEEE 48. Insulation class shall be equivalent to that of cable. Include shield ground strap for shielded cable terminations.

Retain one or more of six subparagraphs below.

Class 1 Terminations: Modular type, furnished as a kit, with stress-relief tube; multiple, molded-silicone-rubber, insulator modules; shield ground strap; and compression-type connector.

Class 1 Terminations: Heat-shrink type with heat-shrink inner stress control and outer nontracking tubes; multiple, molded, nontracking skirt modules; and compression-type connector.

Class 1 Terminations: Modular type, furnished as a kit, with stress-relief shield terminator; multiple-wet-process, porcelain, insulator modules; shield ground strap; and compression-type connector.

Class 1 Terminations, Indoors: Kit with stress-relief tube, nontracking insulator tube, shield ground strap, compression-type connector, and end seal.

Class 2 Terminations, Indoors: Kit with stress-relief tube, nontracking insulator tube, shield ground strap, and compression-type connector. Include silicone-rubber tape; cold-shrink-rubber sleeve; or heat-shrink, plastic-sleeve moisture seal for end of insulation whether or not supplied with kits.

Class 3 Terminations: Kit with stress cone and compression-type connector.

* + - 1. SEPARABLE INSULATED CONNECTORS

Retain "Description" paragraph below to ensure that elbow-type terminators at equipment such as substations, transformers, and switchgear mate with bushing terminals in equipment.

* + - * 1. Description: Modular system, complying with IEEE 386, with disconnecting, single-pole, cable terminators and with matching, stationary, plug-in, dead-front terminals designed for cable voltage and for sealing against moisture.
        2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Cooper Power.

Elastimold.

nVent (RAYCHEM)

Or equal.

Retain "Terminations at Distribution Points" paragraph below for terminations that take the place of splices at cable junctions, such as in manholes and cable vaults.

* + - * 1. Terminations at Distribution Points: Modular type, consisting of terminators installed on cables and modular, dead-front, terminal junctions for interconnecting cables.
        2. Load-Break Cable Terminators: Elbow-type units with 200-A-load make/break and continuous-current rating; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.
        3. Dead-Break Cable Terminators: Elbow-type unit with [**200**] [**600**]-A continuous-current rating; designed for de-energized disconnecting and connecting; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.
        4. Dead-Front Terminal Junctions: Modular bracket-mounted groups of dead-front stationary terminals that mate and match with above cable terminators. Two-, three-, or four-terminal units as indicated, with fully rated, insulated, watertight conductor connection between terminals and complete with grounding lug, manufacturer's standard accessory stands, stainless-steel mounting brackets, and attaching hardware.

Protective Cap: Insulating, electrostatic-shielding, water-sealing cap with drain wire.

Portable Feed-Through Accessory: Two-terminal, dead-front junction arranged for removable mounting on accessory stand of stationary terminal junction.

Grounding Kit: Jumpered elbows, portable feed-through accessory units, protective caps, test rods suitable for concurrently grounding three phases of feeders and carrying case.

Standoff Insulator: Portable, single dead-front terminal for removable mounting on accessory stand of stationary terminal junction. Insulators suitable for fully insulated isolation of energized cable-elbow terminator.

Retain "Test-Point Fault Indicators" paragraph below to require fault indicators.

* + - * 1. Test-Point Fault Indicators: Applicable current-trip ratings and arranged for installation in test points of load-break separable connectors, and complete with self-resetting indicators capable of being installed with shotgun hot stick and tested with test tool.
        2. Tool Set: Shotgun hot stick with energized terminal indicator, fault-indicator test tool, and carrying case.
      1. SPLICE KITS
         1. Description: For connecting medium voltage cables; type as recommended by cable or splicing kit manufacturer for the application.
         2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

3M.

Adalet.

G&W Electric Company.

Or equal.

* + - * 1. Standard: Comply with IEEE 404.
        2. Splicing Products: As recommended, in writing, by splicing kit manufacturer for specific sizes, materials, ratings, and configurations of cable conductors. Include all components required for complete splice, with detailed instructions.

Retain applicable subparagraphs below.

Splicing kit must be from a single manufacturer.

Combination tape and cold-shrink-rubber sleeve kit with rejacketing by cast-epoxy-resin encasement or other waterproof, abrasion-resistant material.

Heat-shrink splicing kit of uniform, cross-section, polymeric construction with outer heat-shrink jacket.

Premolded, cold-shrink-rubber, in-line splicing kit.

Premolded, EPDM splicing body kit with cable joint sealed by interference fit of mating parts and cable.

Separable multiway splice system with all components for the required splice configuration.

Splices Installed in Vaults, Manholes (any wet locations): Waterproof and submersible.

* + - 1. MEDIUM-VOLTAGE TAPES
         1. Description: Electrical grade, insulating tape rated for medium voltage application.
         2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

3M.

G&W Electric Company.

nVent (RAYCHEM).

Or equal.

Retain one or more of three types of medium-voltage tapes in this article.

* + - * 1. Ethylene/propylene rubber-based, 30-mil splicing tape, rated for 130 deg C operation. Minimum 3/4 inch wide.
        2. Silicone rubber-based, 12-mil self-fusing tape, rated for 130 deg C operation. Minimum 1-1/2 inches (38 mm) wide.
        3. Insulating-putty, 125-mil elastic filler tape. Minimum 1-1/2 inches wide.
      1. ARC-PROOFING MATERIALS
         1. Description: Fire retardant, providing arc flash protection.
         2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

3M.

G&W Electric Company.

nVent (RAYCHEM).

Or equal.

Retain this article to require arc-proof cables.

* + - * 1. Tape for First Course on Metal Objects: 10-mil- thick, corrosion-protective, moisture-resistant, PVC pipe-wrapping tape.
        2. Arc-Proofing Tape: Fireproof tape, flexible, conformable, intumescent to 0.3 inch thick, and compatible with cable jacket.
        3. Glass-Cloth Tape: Pressure-sensitive adhesive type, 1 inch wide.
      1. ACCESSORIES
         1. Pulling Compounds: As recommended by cable manufacturer.

Polywater “A”, “G”, “J” or “WJ” lubricants, Plymouth/Bishop No. 45 Cable Pulling Lubricant, Aqua-Gel II (Ideal Industries, Inc.) or Aqua-Gel CW (Ideal Industries, Inc.).

* + - * 1. Tags: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inches high.

Phenolic: Two color laminated engraver’s stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).

Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.

* + - 1. FAULT INDICATORS

Coordinate "Indicators" paragraph below with Drawings by indicating current-trip ratings and quantities.

* + - * 1. Indicators: [**Automatically**] [**Manually**] reset fault indicator [**with inrush restraint feature**], arranged to clamp to cable sheath and provide a display after a fault has occurred in cable. Instrument shall not be affected by heat, moisture, and corrosive conditions and shall be recommended by manufacturer for installation conditions.

Retain "Resetting Tool" paragraph below if retaining manually reset option in "Indicators" paragraph above.

* + - * 1. Resetting Tool: Designed for use with fault indicators, with moisture-resistant storage and carrying case.
      1. SOURCE QUALITY CONTROL

Revise first paragraph below for cable type specified. First option below refers to shielded cable, second option to concentric neutral cable designs.

* + - * 1. Test and inspect cables according to [**ICEA S-97-682**] [**ICEA S-94-649**] before shipping.

Retain paragraph below if sealed or strand-filled conductors are specified.

* + - * 1. Test strand-filled cables for water-penetration resistance according to ICEA T-31-610, using a test pressure of 5 psig.

1. EXECUTION
   * + 1. INSTALLATION
          1. Install cables according to IEEE 576.
          2. Proof conduits prior to conductor installation by passing a wire brush mandrel and then a rubber duct swab through the conduit. Separate the wire brush and the rubber swab by 48 to 72 inches on the pull rope.

Wire Brush Mandrel: Consists of a length of brush approximately the size of the conduit inner diameter with stiff steel bristles and an eye on each end for attaching the pull ropes. If an obstruction is felt, pull the brush back and forth repeatedly to break up the obstruction.

Rubber Duct Swab: Consists of a series of rubber discs approximately the size of the conduit inner diameter on a length of steel cable with an eye on each end for attaching the pull ropes. Pull the rubber duct swab through the duct to extract loose debris from the duct.

Include details on Drawings for sizing raceways for the number and size of conductors. Consider the conductor insulation voltage level and its impact on raceway sizing due to conduit fill and jam ratios.

* + - * 1. Pull Conductors: Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

Where necessary, use manufacturer-approved pulling compound or lubricant that does not deteriorate conductor or insulation.

Use pulling means, including fish tape, cable, rope, and basket-weave cable grips, that do not damage cables and raceways. Do not use rope hitches for pulling attachment to cable.

Use pull-in guides, cable feeders, and draw-in protectors as required to protect cables during installation.

Do not pull cables with ends unsealed. Seal cable ends with rubber tape.

Include details or instructions on Drawings for cable locations and routing.

* + - * 1. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

Include support details on Drawings for special situations where not fully defined in the Specifications.

Include details on Drawings for transitions from underground to aboveground cable or conduit systems. Do not repeat requirements contained in other Contract Documents.

* + - * 1. Install direct-buried cables on leveled and tamped bed of 3-inch- thick, clean sand. Separate cables crossing other cables or piping by a minimum of 2 inches of tamped earth, plus an additional 2 inches of sand. Install permanent markers at ends of cable runs, changes in direction, and buried splices.
        2. Install "buried-cable" warning tape 12 inches above cables.
        3. In manholes, handholes, pull boxes, junction boxes, and cable vaults, train cables around walls by the longest route from entry to exit; support cables at intervals adequate to prevent sag.
        4. Install sufficient cable length to remove cable ends under pulling grips. Remove length of conductor damaged during pulling.

Revise first paragraph below if using separable insulated connectors.

* + - * 1. Install cable splices at pull points and elsewhere as indicated; use standard kits. [**Use dead-front separable watertight connectors in manholes and other locations subject to water infiltration.**]
        2. Install terminations at ends of conductors, and seal multiconductor cable ends with standard kits.

Coordinate first paragraph below with Drawings by indicating locations of separable insulated connectors.

* + - * 1. Install separable insulated-connector components as follows:

Protective Cap: At each terminal junction, with one on each terminal to which no feeder is indicated to be connected.

Portable Feed-Through Accessory: At each terminal junction, with one on each terminal.

Standoff Insulator: At each terminal junction, with one on each terminal.

Retain "Arc Proofing" paragraph below to require arc-proofed cables. If not all cables are arc proofed, indicate the extent of arc proofing on Drawings.

* + - * 1. Arc Proofing: Unless otherwise indicated, arc proof medium-voltage cable at locations not protected by conduit, cable tray, direct burial, or termination materials. In addition to arc-proofing tape manufacturer's written instructions, apply arc proofing as follows:

Clean cable sheath.

Wrap metallic cable components with 10-mil pipe-wrapping tape.

Smooth surface contours with electrical insulation putty.

Apply arc-proofing tape in one half-lapped layer with coated side toward cable.

Band arc-proofing tape with two layers of 1-inch- wide half-lapped, adhesive, glass-cloth tape at each end of the arc-proof tape.

Coordinate first paragraph below with Drawings by indicating locations of fault indicators or revise paragraph to describe locations.

* + - * 1. Install fault indicators on each phase where indicated.

Retain one of first two paragraphs below. Follow cable and termination manufacturer's written instructions for grounding shields. There are advantages to lowering the resistance to ground by grounding at all termination and splice points, and other advantages for not creating paths for circulating current by grounding at one point only. Continuity of the shield across splices is imperative even if grounded.

* + - * 1. Ground shields of shielded cable at terminations, splices, and separable insulated connectors. Ground metal bodies of terminators, splices, cable and separable insulated-connector fittings, and hardware.
        2. Ground shields of shielded cable at one point only. Maintain shield continuity and connections to metal connection hardware at all connection points.
        3. Identify phase and circuit number of each conductor at each splice, termination, pull point, and junction box. Arrange identification so that it is unnecessary to move the cable or conductor to read the identification.
      1. FIELD QUALITY CONTROL

Retain “Testing Agency,” “Manufacturer’s Field Service,” and “Perform the following tests and inspections” paragraphs below to identify who shall perform tests and inspections. If retaining second option in “Testing Agency” paragraph or if retaining “Manufacturer’s Field Service” or “Perform the following tests and inspections” paragraph, retain “Field quality-control reports” paragraph in "Informational Submittals" Article.

* + - * 1. High Voltage After Installation Test: (Test Record-Power Cable Proof Test) form (BDC-362).
        2. Testing Agency: [**Director’s Representative will engage**] [**Engage**] a qualified testing agency to perform tests and inspections.

Retain "Manufacturer's Field Service" paragraph below to require a factory-authorized service representative to perform tests and inspections.

* + - * 1. Manufacturer's Field Service: Engage a Company Service Advisor to test and inspect components, assemblies, and equipment installations, including connections.

Retain "Perform the following tests and inspections" paragraph below to require Contractor to perform tests and inspections.

* + - * 1. Perform the following tests and inspections [**with the assistance of a** Company Service Advisor]:

See Evaluations for discussion about NETA testing.

Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.

After installing medium-voltage cables and before electrical circuitry has been energized, test for compliance with requirements.

Retain one or more of three subparagraphs below, or delete all. Each of the three tests performs different functions, and the tests are not mutually exclusive. See Evaluations for comparative discussion of the three test methods.

Perform direct-current High Potential test of each new conductor according to NETA ATS, Ch. 7.3.3. Do not exceed cable manufacturer's recommended maximum test voltage.

Perform Partial Discharge test of each new conductor according to NETA ATS, Ch. 7.3.3 and to test equipment manufacturer's recommendations.

Perform Dissipation Factor test of each new conductor according to NETA ATS, Ch. 7.3.3 and to test equipment manufacturer's recommendations.

See Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

* + - * 1. Medium-voltage cables will be considered defective if they do not pass tests and inspections.
        2. Prepare test and inspection reports.
      1. PRIMARY NEUTRAL
         1. When a primary neutral is required use XHHW-2 or THWN-2 insulated cable rated 600 volts.

END OF SECTION 260513