SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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

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

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:

Labels.

Bands and tubes.

Tapes and stencils.

Tags.

Signs.

Cable ties.

Miscellaneous identification products.

* + - 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 product.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

Retain "Samples" Paragraphparagraph below for single-stage Samples if Project requirements are complex.

* + - * 1. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
				2. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

Retain "Delegated-Design Submittal" Paragraphparagraph below if arc-flash hazard study has been delegated to Contractor. Note that this Section does not specify requirements for an arc-flash hazard study, only the materials used to label equipment.

* + - * 1. Delegated-Design Submittal: For arc-flash hazard study.
				2. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
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. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

* + - 1. PERFORMANCE REQUIREMENTS

Retain option in first paragraph below for projects with electrical utility work, including underground and overhead distribution and medium-voltage cabling. By reference, IEEE C2 requires compliance with ANSI Z531.1 through ANSI Z531.5.

* + - * 1. Comply with ASME A13.1[**and IEEE C2**].
				2. Comply with NFPA 70.

Retain first paragraph below if danger, caution, or safety instruction signs (including arc-flash warning labels) are to be specified.

* + - * 1. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
				2. Comply with ANSI Z535.4 for safety signs and labels.

Retain first paragraph and at least one option below if arc-flash warning labels are to be specified.

Retain first paragraph below if retaining self-adhesive products.

* + - * 1. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
				2. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

Differential values in "Temperature Change" Subparagraphsubparagraph below (for aluminum in particular) are suitable for most of the United States.

Temperature Change: [**120 deg F, ambient; 180 deg F, material surfaces**] <**Insert temperature change**>.

* + - 1. COLOR AND LEGEND REQUIREMENTS
				1. Raceways and Cables Carrying Circuits at 600 V or Less:

[**Black letters on an orange field**] <**Insert color scheme**>.

Legend: Indicate voltage[**and system or service type**].

If only one voltage level is present, no color-coding may be required. If different voltage levels are present, the neutral must be a different color for each system.

* + - * 1. Color-Coding for Phase- [**and Voltage-Level**] Identification, 600 V or Less: Use colors listed below for ungrounded [**service**] [**feeder**] [**and**] [**branch-circuit**] conductors.

Color shall be factory applied[**or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit**].

Colors for 208/120-V Circuits:

Phase A: Black.

Phase B: Red.

Phase C: Blue.

Colors for 240-V Circuits:

Phase A: Black.

Phase B: Red.

Colors for 480/277-V Circuits:

Colors specified in first three subparagraphs below are generally used for phase conductors at this voltage.

Phase A: Brown.

Phase B: Orange.

Phase C: Yellow.

Color for Neutral: [**White**] [**or**] [**gray**].

Color for Equipment Grounds: [**Bare copper**] [**Green**] [**Green with a yellow stripe**].

Colors for Isolated Grounds: Green with two or more yellow stripes.

* + - * 1. Raceways and Cables Carrying Circuits at More Than 600 V:

Black letters on an orange field.

Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

* + - * 1. Warning Label Colors:

Identify system voltage with black letters on an orange background.

<**Insert colors**>.

* + - * 1. Warning labels and signs shall include, but are not limited to, the following legends:

Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

"Workspace Clearance Warning" Subparagraphsubparagraph below applies to OSHA requirements for building operations and does not reflect the clear working space required by NFPA 70.

Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

<**Insert names and wording of warning signs or labels (for example, arc flash, multiple services and voltages, and others**>.

* + - * 1. Equipment Identification Labels:

Black letters on a white field.

<**Insert specific requirements for equipment to be labeled, such as transformers, panelboards, etc.**>

* + - * 1. Nameplates:

General: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.

Phenolic: Two color laminated engravers 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.

Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.

Retain appropriate articles below to require identification exceeding NFPA 70 requirements. See "NFPA Identification Requirements" Article in the Evaluations. Coordinate retained Section Text articles with "Installation" and "Identification Schedule" articles. See the Evaluations for discussion on self-adhesive products.

* + - 1. LABELS
				1. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

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:

Brady Corporation.

Panduit Corp.

Seton Identification Products; a Brady Corporation ccompany.

Or equal.

* + - * 1. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

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:

Brady Corporation.

Panduit Corp.

Seton Identification Products; a Brady Corporation ccompany.

Or equal.

* + - * 1. Self-Adhesive Wraparound Labels: [**Preprinted**] [**Write-on**], 3-mil- thick, [**polyester**] [**vinyl**] flexible label with acrylic pressure-sensitive adhesive.

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:

Brady Corporation.

Ideal Industries, Inc.

Thomas & Betts Corp.

Or equal.

Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.

Marker for Labels:

Retain one of two subparagraphs below.

Permanent, waterproof, black ink marker recommended by tag manufacturer.

Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

* + - * 1. Self-Adhesive Labels: [**Polyester**] [**Vinyl**], thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

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:

Brady Corporation.

Ideal Industries, Inc.

Thomas & Betts Corp.

Or equal.

For arc-flash labels, coordinate with Section 260574 "Overcurrent Protective Device Arc-Flash Study" and with "Identification Schedule" Article.

Minimum Nominal Size:

1-1/2 by 6 inches for raceway and conductors.

3-1/2 by 5 inches for equipment.

As required by authorities having jurisdiction.

* + - 1. BANDS AND TUBES
				1. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.

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:

Brady Corporation.

HellermannTyton.

Panduit Corp.

Or equal.

* + - * 1. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

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.

Brady Corporation.

Panduit Corp.

Or equal.

* + - 1. TAPES AND STENCILS
				1. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

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:

HellermannTyton.

Ideal Industries, Inc.

Panduit Corp.

Or equal.

Self-adhesive vinyl tape is generally used to identify flexible conduits and phase conductors. See Part 3 for application instructions.

* + - * 1. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

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:

Brady Corporation.

Carlton Industries, LP.

emedco.

Or equal.

* + - * 1. Tape and Stencil: 4-inch- wide black stripes on 10-inch centers placed diagonally over orange background and are 12 inches wide. Stop stripes at legends.

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:

Brimar Industries, Inc.

HellermannTyton.

Seton Identification Products; a Brady Corporation company.

Or equal.

* + - * 1. Floor Marking Tape: 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with [**black and white**] [**yellow and black**] stripes and clear vinyl overlay.

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.

Carlton Industries, LP.

Seton Identification Products; a Brady Corporation company.

Or equal.

* + - * 1. Underground-Line Warning Tape:

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:

Brady Corporation.

Ideal Industries, Inc.

Seton Identification Products; a Brady Corporation company.

Or equal.

Tape:

Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical [**and communications**]utility lines.

Printing on tape shall be permanent and shall not be damaged by burial operations.

Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

Color and Printing:

Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.

Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE" <**Insert inscription**>.

Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE" <**Insert inscription**>.

Insert drawing designation in four "Tape" subparagraphs below. Use these designations on Drawings to identify each product.

First two subparagraphs are generally standard- and extra-strength nonconducting protective tapes. Third and fourth subparagraphs are conductive tapes suitable for conductive or inductive tracing to locate and identify the underground utility; the sequence is for standard- and extra-strength tapes. Specified weight, width, thickness, and strength of tapes are for generally available stock.

Tape [**Type I**] <**Insert drawing designation**>:

Pigmented polyolefin, bright colored, [**continuous-printed on one side with the inscription of the utility,**]compounded for direct-burial service.

Width: 3 inches.

Thickness: 4 mils.

Weight: 18.5 lb/1000 sq. ft..

Tensile according to ASTM D882: 30 lbf and 2500 psi.

Tape [**Type II**] <**Insert drawing designation**>:

Multilayer laminate, consisting of high-density polyethylene scrim coated with pigmented polyolefin; bright colored, [**continuous-printed on one side with the inscription of the utility,**]compounded for direct-burial service.

Width: 3 inches.

Thickness: 12 mils.

Weight: 36.1 lb/1000 sq. ft..

Tensile according to ASTM D882: 400 lbf and 11,500 psi.

Tape [**Type ID**] <**Insert drawing designation**>:

Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, [**continuous-printed on one side with the inscription of the utility,**]compounded for direct-burial service.

Width: 3 inches.

Overall Thickness: 5 mils.

Foil Core Thickness: 0.35 mil.

Weight: 28 lb/1000 sq. ft..

Tensile according to ASTM D882: 70 lbf and 4600 psi.

Tape [**Type IID**] <**Insert drawing designation**>:

Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright-colored, [**continuous-printed on one side with the inscription of the utility,**]compounded for direct-burial service.

Width: 3 inches.

Overall Thickness: 8 mils.

Foil Core Thickness: 0.35 mil.

Weight: 34 lb/1000 sq. ft..

Tensile according to ASTM D882: 300 lbf and 12,500 psi.

Retain "Stenciled Legend" Paragraphparagraph below to specify type of label for identifying outdoor equipment if specified in "Identification Schedule" Article.

* + - * 1. Stenciled Legend: In nonfading, waterproof, [**black**] <**Insert color**> ink or paint. Minimum letter height shall be [**1 inch**] <**Insert dimension**>.
			1. TAGS
				1. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

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:

Brady Corporation.

Carlton Industries, LP.

Seton Identification Products; a Brady Corporation company.

Or equal.

Retain units in "Nonmetallic Preprinted Tags" Paragraphparagraph below for use as phase markers. Specify thicker tags where exposed to damage or rough service.

* + - * 1. Nonmetallic Preprinted Tags: Polyethylene tags, [**0.015 inch**] [**0.023 inch**] thick, color-coded for phase and voltage level, with factory [**screened**] [**printed**] permanent designations; punched for use with self-locking cable tie fastener.

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:

Brady Corporation.

Panduit Corp.

Seton Identification Products; a Brady Corporation company.

Or equal.

* + - * 1. Write-on Tags:

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:

Brimar Industries, Inc.

Carlton Industries, LP.

Seton Identification Products; a Brady Corporation company.

Or equal.

Specify thicker tags in "Polyester Tags" Subparagraphsubparagraph below where exposed to damage or rough service.

Polyester Tags: [**0.010 inch**] [**0.015 inch**] <**Insert dimension**> thick, with corrosion-resistant grommet and cable tie for attachment.

Marker for Tags:

Retain one of two subparagraphs below.

Permanent, waterproof, black ink marker recommended by tag manufacturer.

Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

* + - 1. SIGNS
				1. Baked-Enamel Signs:

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:

Carlton Industries, LP.

Champion America.

Marking Services, Inc.

Or equal.

Preprinted aluminum signs, [**high-intensity reflective,**]punched or drilled for fasteners, with colors, legend, and size required for application.

1/4-inch grommets in corners for mounting.

Nominal Size: 7 by 10 inches.

* + - * 1. Metal-Backed Butyrate Signs:

Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.

1/4-inch grommets in corners for mounting.

Nominal Size: 10 by 14 inches.

* + - * 1. Laminated Acrylic or Melamine Plastic Signs:

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:

Brady Corporation.

Carlton Industries, LP.

Marking Services, Inc.

Or equal.

Engraved legend.

Thickness:

For signs up to 20 sq. in., minimum 1/16 inch thick.

For signs larger than 20 sq. in., 1/8 inch thick.

Retain first option in first subparagraph below for instruction signs; retain second option for identification signs.

Engraved legend with [**black letters on white face**] [**white letters on a dark gray background**] <**Insert colors**>.

[**Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting**] [**Self-adhesive**].

Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

* + - 1. CABLE TIES
				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:

HellermannTyton.

Ideal Industries, Inc.

Panduit Corp.

Or equal.

Retain one or more of "General-Purpose Cable Ties," "UV-Stabilized Cable Ties," and "Plenum-Rated Cable Ties" paragraphs below. Coordinate with "Installation" Article.

* + - * 1. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

Minimum Width: 3/16 inch.

Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.

Temperature Range: Minus 40 to plus 185 deg F.

Color: Black, except where used for color-coding.

* + - * 1. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

Minimum Width: 3/16 inch.

Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.

Temperature Range: Minus 40 to plus 185 deg F.

Color: Black.

* + - * 1. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

Minimum Width: 3/16 inch.

Tensile Strength at 73 Deg F according to ASTM D638: 7000 psi.

UL 94 Flame Rating: 94V-0.

Temperature Range: Minus 50 to plus 284 deg F.

Color: Black.

* + - 1. MISCELLANEOUS IDENTIFICATION PRODUCTS
				1. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
				2. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.
1. EXECUTION
	* + 1. PREPARATION
				1. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.
			2. INSTALLATION
				1. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
				2. Install identifying devices before installing acoustical ceilings and similar concealment.
				3. Verify identity of each item before installing identification products.
				4. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
				5. Apply identification devices to surfaces that require finish after completing finish work.
				6. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

Retain "System Identification for Raceways and Cables under 600 V" Paragraphparagraph below to specify general identification requirements for systems operating at 600 V or less.

* + - * 1. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

Secure tight to surface of conductor, cable, or raceway.

Retain "System Identification for Raceways and Cables over 600 V" Paragraphparagraph below to specify general identification requirements for systems operating at 600 V or more.

* + - * 1. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.

Secure tight to surface of conductor, cable, or raceway.

* + - * 1. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
				2. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for [**power transfer**] [**load shedding**] <**Insert emergency operations**>.
				3. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
				4. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

"EMERGENCY POWER."

"POWER."

"UPS."

<**Insert name**>.

Paragraphs below specify requirements unique to identification products.

* + - * 1. Vinyl Wraparound Labels:

Secure tight to surface of raceway or cable at a location with high visibility and accessibility.

Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

* + - * 1. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.
				2. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
				3. Self-Adhesive Labels:

On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.

Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.

* + - * 1. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
				2. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
				3. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
				4. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

If field-applied color-coding is permitted, retain "Field-Applied, Color-Coding Conductor Tape" Subparagraphsubparagraph below.

Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

* + - * 1. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
				2. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
				3. Underground Line Warning Tape:

During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench [**or concrete envelope**]exceeds 16 inches overall.

Retain one of two subparagraphs below for warning tape installation.

Limit use of underground-line warning tape to direct-buried cables.

Install underground-line warning tape for direct-buried cables and cables in raceways.

* + - * 1. Metal Tags:

Place in a location with high visibility and accessibility.

Secure using [**general-purpose**] [**UV-stabilized**] [**plenum-rated**] cable ties.

* + - * 1. Nonmetallic Preprinted Tags:

Place in a location with high visibility and accessibility.

Secure using [**general-purpose**] [**UV-stabilized**] [**plenum-rated**] cable ties.

* + - * 1. Write-on Tags:

Place in a location with high visibility and accessibility.

Secure using [**general-purpose**] [**UV-stabilized**] [**plenum-rated**] cable ties.

* + - * 1. Baked-Enamel Signs:

Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on minimum 1-1/2-inch- high sign; where two lines of text are required, use signs minimum 2 inches high.

* + - * 1. Metal-Backed Butyrate Signs:

Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.

* + - * 1. Laminated Acrylic or Melamine Plastic Signs:

Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.

* + - * 1. Cable Ties: General purpose, for attaching tags, except as listed below:

Outdoors: UV-stabilized nylon.

In Spaces Handling Environmental Air: Plenum rated.

* + - 1. IDENTIFICATION SCHEDULE

Retain this article to describe label and sign legends.

* + - * 1. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
				2. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

Retain "Concealed Raceways, Duct Banks, More Than 600 V, within Buildings" Paragraphparagraph below if Project contains concealed wiring (operating at more than 600 V) that is adjacent to accessible building surfaces (for example, wiring below floors or wiring in vertical shafts behind gypsum board or masonry partitions).

* + - * 1. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3-inch- high, black letters on 20-inch centers.

Locate identification at changes in direction, at penetrations of walls and floors, and at [**10-foot**] [**30-foot**] maximum intervals.

Retain "Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V" Paragraphparagraph below for circuits operating at more than 600 V; paragraph contains requirements exceeding those in NFPA 70.

* + - * 1. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: [**Vinyl wraparound labels**] [**Snap-around labels**] [**Self-adhesive labels**] [**Snap-around color-coding bands for raceway and cables**].

Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

Retain one of first two paragraphs below, or both. Delete both for existing systems and replace with the existing identification scheme. Paragraphs contain requirements exceeding those in NFPA 70.

* + - * 1. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than [**30**] <**Insert number**> A and [**120**] <**Insert number**> V to Ground: Identify with self-adhesive [**raceway labels**] [**vinyl tape applied in bands**].

Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

* + - * 1. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

"EMERGENCY POWER."

"POWER."

"UPS."

<**Insert name**>.

Retain "Power-Circuit Conductor Identification, 600 V or Less" Paragraphparagraph below if color-coding of power and lighting conductors for phase- or voltage-level identification is required to comply with authorities having jurisdiction or special Project requirements. If retaining, coordinate with Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and revise to indicate extent of color-coding required. For existing buildings, indicate whether requirements apply to both old and new wiring or to new wiring only. Below applies only to phase conductors. Color-coding of grounded and grounding conductors shall be conducted according to NFPA 70. Verify that Owner does not require another color code. Specify that colors for factory-assembled cable, such as MC and AC, match colors listed below.

* + - * 1. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use [**vinyl wraparound labels**] [**self-adhesive wraparound labels**] [**snap-around labels**] [**snap-around color-coding bands**] [**self-adhesive vinyl tape**] to identify the phase.

Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

* + - * 1. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use [**write-on tags**] [**nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation**].
				2. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use [**write-on tags**] [**self-adhesive labels**] with the conductor or cable designation, origin, and destination.
				3. Control-Circuit Conductor Termination Identification: For identification at terminations, provide [**heat-shrink preprinted tubes**] [**self-adhesive labels**] with the conductor designation.

Retain "Conductors to Be Extended in the Future" Paragraphparagraph below for future expansion of circuits or if required for circuits for other purposes. Coordinate with Drawings.

* + - * 1. Conductors to Be Extended in the Future: Attach [**write-on tags**] [**marker tape**] to conductors [**and list source**].
				2. Auxiliary Electrical Systems Conductor Identification: [**Marker tape**] [**Self-adhesive vinyl tape**] that is uniform and consistent with system used by manufacturer for factory-installed connections.

Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

* + - * 1. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
				2. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:

Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.

Wall surfaces directly external to raceways concealed within wall.

Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

* + - * 1. Workspace Indication: Apply [**floor marking tape**] [**or**] [**tape and stencil**] to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
				2. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
				3. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: [**Self-adhesive labels**] [**Baked-enamel warning signs**] [**Metal-backed, butyrate warning signs**].

Apply to exterior of door, cover, or other access.

For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

Power-transfer switches.

Controls with external control power connections.

<**Insert items**>.

Arc-flash analysis should be performed by qualified personnel, with labels printed or made for each piece of equipment, and should comply with NFPA 70E and Section 260574 "Overcurrent Protective Device Arch-Flash Study." Retain "Delegated-Design Submittal" Paragraphparagraph in "Action Submittals" Article if Contractor is responsible for arc-flash analysis.

* + - * 1. Arc Flash Warning Labeling: Self-adhesive labels.
				2. Operating Instruction Signs: [**Self-adhesive labels**] [**Baked-enamel warning signs**] [**Metal-backed, butyrate warning signs**] [**Laminated acrylic or melamine plastic signs**].
				3. Emergency Operating Instruction Signs: [**Self-adhesive labels**] [**Baked-enamel warning signs**] [**Metal-backed, butyrate warning signs**] [**Laminated acrylic or melamine plastic signs**] with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for [**power transfer**] [**load shedding**] <**Insert emergency operations**>.

Coordinate "Equipment Identification Labels" Paragraphparagraph below with Eelectrical Sections. Delete items not in Project.

* + - * 1. Equipment Identification Labels:

Indoor Equipment: [**Self-adhesive label**] [**Baked-enamel signs**] [**Metal-backed butyrate signs**] [**Laminated acrylic or melamine plastic sign**].

Outdoor Equipment: [**Laminated acrylic or melamine sign**] [**Stenciled legend 4 inches high**].

Equipment to Be Labeled:

Identification labeling of some items listed below may be required by individual Sections or by NFPA 70.

Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a [**self-adhesive, engraved,**] [**engraved,**] laminated acrylic or melamine label.

Enclosures and electrical cabinets.

Access doors and panels for concealed electrical items.

Switchgear.

Switchboards.

Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.

Substations.

Emergency system boxes and enclosures.

Motor-control centers.

Enclosed switches.

Enclosed circuit breakers.

Enclosed controllers.

Variable-speed controllers.

Push-button stations.

Power-transfer equipment.

Contactors.

Remote-controlled switches, dimmer modules, and control devices.

Battery-inverter units.

Battery racks.

Power-generating units.

Monitoring and control equipment.

UPS equipment.

<**Insert equipment**>.

END OF SECTION 260553