

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

Latest Update: 5-6-2017 See underlined text for Edits.

(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all "Underlines".)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 26.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.

- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

1.6 WARRANTY/GUARANTEES

- A. See Division 26 Specification Section “Basic Electrical Requirements” for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. LEM Products, Inc.
 - 2. Panduit Corp.
 - 3. Brady
 - 4. Approved Equal

2.2 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-high letters on twenty (20) inch centers.
- D. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: four (4) inch- wide black stripes on ten (10) inch centers diagonally over orange background that extends full length of raceway or duct and is twelve (12) inches wide. Stop stripes at legends.

2.3 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with three (3) inch- high letters on twenty (20) inch centers.
- D. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.4 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

- B. Colored Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label. Tape shall not be less than 3 mils thick by 1 inch wide.

2.5 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3- mils thick by one (1) to two (2) inches wide.

2.6 FLOOR MARKING TAPE

- A. Two (2) inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.7 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for “RED”-Colored Tapes: “ELECTRIC LINE, HIGH VOLTAGE”.
3. Inscriptions for “ORANGE”-Colored Tapes: “TELEPHONE CABLE”, “CATV CABLE”, “COMMUNICATIONS CABLE”, “OPTICAL FIBER CABLE”.

C. Tag: Type I:

1. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Thickness: 4 mils.
3. Weight: 18.5 lb/1000 sq. ft.
4. Three (3) Inch Tensile According to ASTM D 882: 30 lbf, and 2,500 psi.

2.8 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Interior Baked-Enamel Warning Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. One quarter (1/4) inch grommets in corners for mounting.
 - 3. Nominal size, seven (7) inches by ten (10) inches.
- C. Exterior Metal-Backed, Butyrate Warning Signs:
 - 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
 - 2. One quarter (1/4) inch grommets in corners for mounting.
 - 3. Nominal size, ten (10) inches by fourteen (14) inches.
- D. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
 - 3. <Insert names and wording of warning signs or labels; e.g., arc-flash, multiple services and voltages, and others>.

2.9 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum one sixteenth (1/16) inch thick for signs up to twenty (20) sq. inches and one eighth (1/8) inch thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
 - 4. Minimum letter height shall be three eighth (3/8) inch.

2.10 EQUIPMENT IDENTIFICATION LABELS

- A. Stenciled Legend: In non-fading, waterproof, black ink or paint. Minimum letter height shall be one (1) inch.

2.11 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one (1) piece, self locking, Type 6/6 nylon.
1. Minimum Width: Three sixteenth (3/16) inch.
 2. Tensile Strength at 73°F, According to ASTM D 638: 12,000 psi.
 3. Temperature Range: -40°F to +185°F.
 4. Color: “BLACK” except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one (1) piece, self locking, Type 6/6 nylon.
1. Minimum Width: Three sixteenth (3/16) inch.
 2. Tensile Strength at 73°F, According to ASTM D 638: 12,000 psi.
 3. Temperature Range: -40°F to +185°F.
 4. Color: “BLACK”.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
1. Minimum Width: Three sixteenth (3/16) inch.
 2. Tensile Strength at 73°F, According to ASTM D 638: 7,000 psi.
 3. UL 94 Flame Rating: 94V-0.
 4. Temperature Range: -50°F to +284°F.
 5. Color: “BLACK”.

2.12 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two (2) color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at fifty (50) foot maximum intervals in straight runs, and at twenty five (25) foot maximum intervals in congested areas. List typical color codes for systems, i.e. fire alarm, “RED”; security, “BLUE” and “YELLOW”; etc.
- G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- H. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at six (6) inches to eight (8) inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds sixteen (16) inches overall.
- I. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, more than 600 V, within Buildings: Tape and stencil four (4) inch wide black stripes on ten (10) inch centers over orange background that extends full length of raceway or duct and is twelve (12) inches wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with three (3) inch- high black letters on twenty (20) inch centers. Stop stripes at legends. Apply to the following finished surfaces:
 - 1. Floor surface directly above conduits running beneath and within twelve (12) inches of a floor that is in contact with earth or is framed above unexcavated space.
 - 2. Wall surfaces directly external to raceways concealed within wall.
 - 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Self-adhesive vinyl labels. Install labels at ten (10) foot maximum intervals.

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- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at ten (10) foot maximum intervals.
- D. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall include panel and circuit information.
1. Emergency Power – “RED”
 2. UPS
 3. Fire Alarm System – “RED”
 4. Fire-Suppression Supervisory and Control System – “RED” and “YELLOW”
 5. Security – “BLUE” and “YELLOW”
 6. Mechanical and Electrical Supervisory Systems – “GREEN” and “BLUE”
 7. Telecommunication System – “ORANGE” and “YELLOW”
 8. Control Wiring – “GREEN” and “RED”
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors 1/0 and larger in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the source and circuit number for each set of conductors. For single phase conductors, identify each phase.
1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: “BLACK”.
 - 2) Phase B: “RED”.
 - 3) Phase C: “BLUE”.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: “BROWN”.
 - 2) Phase B: “ORANGE”.
 - 3) Phase C: “YELLOW”.
- F. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of six (6) inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

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- G. Install instructional sign including color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- H. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- J. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Limit use of underground-line warning tape to direct-buried cables.
 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- K. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
 - c. <Insert items>.
- M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

- N. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum three eighths (3/8) inch- high letters for emergency instructions at equipment used for power transfer and/or load shedding.
- O. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label or Stenciled legend 4 inches high. Unless otherwise indicated, provide a single line of text with one half (1/2) inch high letters on one and one half (1-1/2) inch- high label; where two (2) lines of text are required, use labels two (2) inches high.
 - b. Outdoor Equipment: Stenciled legend four (4) inches high.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets - laminated acrylic or melamine labels.
 - c. Access doors and panels for concealed electrical items laminated acrylic or melamine labels.
 - d. Switchgear – stencil and paint
 - e. Switchboards – stencil and paint
 - f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary – stencil and paint.
 - g. Substations – stencil and paint.
 - h. Emergency system boxes and enclosures – stencil and paint.
 - i. Motor-control centers – stencil and paint.
 - j. Enclosed switches – laminated acrylic or melamine label.
 - k. Enclosed circuit breakers – laminated acrylic or melamine label.
 - l. Enclosed controllers – laminated acrylic or melamine label.
 - m. Variable-speed controllers – laminated acrylic or melamine label.
 - n. Push-button stations – laminated acrylic or melamine label.

- o. Power transfer equipment – laminated acrylic or melamine label.
- p. Contactors – laminated acrylic or melamine label.
- q. Remote-controlled switches, dimmer modules, and control devices – laminated acrylic or melamine label.
- r. Battery-inverter uni – laminated acrylic or melamine label
- s. Battery racks – laminated acrylic or melamine label. Power-generating units – stencil and paint.
- t. Communication Cabinets/Racks – laminated acrylic or melamine label.
- u. Security Cabinets – laminated acrylic or melamine label.
- v. Fire Alarm and Annunciator Cabinets – laminated acrylic or melamine label.
- w. Control System Cabinets – laminated acrylic or melamine label.
- x. Monitoring and control equipment – laminated acrylic or melamine label.
- y. UPS equipment – laminated acrylic or melamine label.
- z. Each receptacle, light switches and receptacles mounted in surface raceways shall be neatly marked on the inside cover with indelible marker identifying the panel and breaker from which it is fed and durable markers or tag inside outlet box. This to ensure the correct covers are restored after room renovations and/or painting. In addition to marking circuit identification inside the cover, also provide laminated label with circuit number on device cover plates. Provide white background label with black bold lettering.
- aa. <Insert equipment>.

END OF SECTION 260553