

SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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.

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 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with NFPA 70E.
- D. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- E. Comply with ANSI Z535.4 for safety signs and labels.
- F. **(Select based on project location) [Comply with City of Chicago Codes and Standards.] [Comply with City of Evanston Codes and Standards.]**
- G. Comply with most current edition of the Northwestern University Design Standards.
- H. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 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 more than 600 V:
 - 1. Black letters on a yellow field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-(75-mm-) high letters.
- C. Colors for Raceways Carrying Circuits at 277 V up to 600V: and conduits larger than two inches:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- D. Colors for Raceways Carrying Circuits at 120 V up to 240V: and conduits larger than two inches:
 - 1. Black letters on a white field.
 - 2. Legend: Indicate voltage and system or service type.
- E. 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.
- F. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less and conduits larger than two inches: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- G. Colors for Raceways Carrying Circuits at 600 V or Less and conduits two inches and less:
 - 1. Comply with Section 26 0533.

2.2 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. 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.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tapes not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

- B. 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.
- C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- D. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 FLOOR MARKING TAPE

- A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 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, consisting of a printed pigmented polyolefin film, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - 4. Overall Thickness: 5 mils (0.125 mm).
 - 5. Foil Core Thickness: 0.35 mils (0.00889 mm).
 - 6. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
 - 7. 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).
- 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.

2.6 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70, 70E, and 29 CFR 1910.145.
- B. Baked-Enamel Warning Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
 - 3. Nominal size, 7 by 10 inches (180 by 250 mm).

C. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, non-fading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 10 by 14 inches (250 by 360 mm).

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 48 INCHES (1220 MM)."
3. Arc Flash Protection Field Marking: All panelboards, switchgear, switchboards, panelboards motor control centers, motor control panels and electrical control panels shall be provided with a black on yellow warning sign per ANSI Z535.4 and ISO 3864. The sign shall read: "WARNING! ARC FLASH and SHOCK HAZARD. APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT REQUIRED." The sign shall be prominently mounted on the front of the equipment, readily visible and indicate all relevant class information. If the equipment has multiple removable front covers, a sign shall be mounted on each cover. For flush mounted panelboards in finished spaces, the sign shall be mounted on the inside of the door or inside cover. Manufacturers' standard labels are not acceptable.

2.7 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) 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.
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.8 EQUIPMENT IDENTIFICATION NAMEPLATES

- A. Engraved, Laminated Acrylic or Melamine Nameplate: Minimum letter height shall be 1/2 inch (13 mm). Refer to Drawings for Nameplate Detail.
- B. Fasteners for nameplates: stainless steel screws that do not change the NEMA or NRTL rating of the enclosure, adhesive labels shall not be used.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in 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. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways Larger than Two Inches: Each color-coding band shall completely encircle conduit. Locate bands at changes in direction, at penetrations of walls and floors, at 30-foot maximum intervals in straight runs, in electrical rooms and vaults color shall be solid, see "Raceways" Section.
- F. System Identification Labels for Raceways carrying circuits above 600V: Locate labels at changes in direction, at penetrations of walls and floors, at 30-foot maximum intervals in straight runs, at 10-foot maximum intervals in electrical rooms and vaults, and within six inches of pull or junction boxes.
- G. System Identification Labels for Raceways carrying circuits 600V and less: Locate labels at changes in direction, at penetrations of walls and floors, at 30-foot maximum intervals in straight runs.
- H. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 18 inches overall. Comply with Section 26 0543.
- I. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. 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, system voltage, and panel/circuit number. System legends shall comply with Section 26 0533 – 3.5.D.
 - 1. Normal power.
 - 2. Emergency power.
 - 3. UPS.

- B. Power-Circuit Conductor Identification, 600 V or Less: .For conductors in electric rooms or vaults pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
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.
 - a. Color shall be factory applied.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral: White.
 - 5) Ground: Green.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral: Gray.
 - 5) Ground: Green with Yellow Stripe.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) 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.
 - e. Switch loops shall retain correct color code with a white tracer.
 - f. For new work in existing buildings, the existing identification method shall be used for new conductors provided it meets all requirements of this Section and the NEC.
- C. Install instructional sign including the color code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Emergency Sources: A sign shall be placed at the service entrance equipment indicating the type and location of on-site emergency power sources per NEC Art. 700.
- E. Elevator Disconnects: Provide "Fed From" signs indicating the location of the supply side OCPD for each elevator power source.
- F. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- G. 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.

- H. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- I. 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.
- J. Arc Flash warning labels shall be provided on all new electrical equipment and existing equipment that has been modified a part of a project and conform to Arc Flash report.
- K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs or Metal-backed, butyrate warning signs.
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage.
 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. Other equipment as indicated on the Drawings.
- L. 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.
- M. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer and load shedding.
- N. Provide permanent nameplates for all pull and junction boxes identifying circuits, voltage, and source.
- O. Wiring device identification: comply with Section 26 2726 – 3.2.B.
- P. Equipment Identification Nameplates: On each unit of equipment, install unique designation nameplate that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply nameplates to Switchgears, Switchboards, Distribution Panels, Panelboards, Transformers, Individual Starters, Contactors, Disconnect Switches, Transfer Switches, Control Panels and Similar Equipment. Systems include power, lighting, and control systems unless equipment is provided with its own identification.
1. Colors for equipment nameplates:
 - a. NORMAL power system:
 - 1) 120V – 240V: black letters on white background.
 - 2) 277V – 600V: black letters on orange background.
 - 3) 600V and up: black letters on yellow background.

- b. Emergency (EM) & Essential (ES) 480/277V loads as defined by NEC Art. 700 – Red letters w/black outline on Orange background. Differentiate EM from ES (Chicago) and EM, LR, OS, and CS (Evanston).
- c. LIFE SAFETY loads as defined by NEC Art. 700: white letters on red background.
- d. Emergency (EM) & Essential (ES) 208/120V as defined by NEC Art. 700 – Red letters on white background. Differentiate EM from ES (Chicago) and EM, LR, OS, and CS (Evanston).
- e. LEGALLY REQUIRED loads as defined by NEC Art. 701(elevators, smoke control, HVAC, etc.): **TBD**.
- f. OPTIONAL STANDBY loads as defined by NEC Art. 702 (Labs, HVAC, etc.): Red letters on white background.

2. Labeling Instructions:

- a. Identify the piece of equipment, the source, voltage characteristics, and the load served
- b. Indoor Equipment: Engraved, laminated acrylic or melamine nameplate. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
- c. Outdoor Equipment: Engraved, laminated acrylic or melamine nameplate. Unless otherwise indicated, provide a single line of text with one-inch- (26-mm-) high letters on 3-inch- (76-mm-) high label; where two lines of text are required, use labels 4 inches (100 mm) high.
- d. Elevated Components: Increase sizes of nameplates and letters to those appropriate for viewing from the floor.
- e. Fasten nameplates with appropriate stainless steel screws that do not change the NEMA or NRTL rating of the enclosure. Stick-on or adhesives are not acceptable unless the NEMA enclosure rating is compromised, then only epoxy adhesive shall be used to attach nameplates.

END OF SECTION 26 0553