

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 (and IEEE C2 as or if applicable). Comply with NFPA 70. Comply with 29 CFR 1910.144 and 29 CFR 1910.145. Comply with ANSI Z535.4 for safety signs and labels. 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 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: Provide black letters on an orange field, and indicate voltage and system or service type.
- C. 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 clear adhesive tape for securing ends of legend label.
- D. Vinyl Labels for Empty "Spare" conduits: Provide labels with description of purpose, and location of opposite end, on each end of conduits provided for future.

2.2 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 cable size. Provide black letters on orange field for cables carrying circuits at 600 V and Less, and provide legend that indicates voltage and system or service type.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label. Provide preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.3 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 cable size.

- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide (where permitted by NEC for large feeder and sub-feeder conductors).
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.
- C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed using indelible process.

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.
 - 4. Provide tape with printing that most accurately indicates respective type of service of buried cable.
- 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 SELF-ADHESIVE LABELS

- A. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated, installed level and plumb.

2.7 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes, installed level and plumb.
 - 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.

2.8 EQUIPMENT AND FIELD NAMEPLATE IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting, black letters on a white background for normal applications, minimum letter height shall be 3/8 inch, installed level and plumb. Provide 1/16" thickness for units up to 20 sq. in. or 8" length; provide 1/8" thickness for larger units.
- B. Provide white letters on a black background for normal power distribution system equipment.
- C. Provide white letters on a dark gray background for power distribution system equipment that is part of an optional standby backup power system.

2.9 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Arc-Flash Hazard Warning Labels: Provide pre-printed "as-built" labels on power distribution and like equipment to warn of potential electric arc flash hazard. Provide in compliance with Article 110.16 of NFPA 70.
- C. Warning labels and signs shall also 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 for 0-150 volts to ground equipment: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
 - 3. Workspace Clearance Warning for 151-600 volts to ground equipment: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 48 INCHES."

2.10 FIELD IDENTIFICATION LABELS

- A. Identification of Disconnecting Means: Provide pre-printed "as-built" nameplate identification labels at all service equipment to indicate the maximum available fault current. Provide in compliance with Article 110.24 (A) of NFPA 70.

- B. Available Fault Current: Provide pre-printed “as-built” nameplate identification labels at each piece of power distribution equipment, each disconnecting means, etc. to indicate its purpose. Provide in compliance with Article 110.22 (A) of NFPA 70.
- C. Circuit Directory/Identification: Provide pre-printed “as-built” identification at circuit sources, using directory cards intended for the purpose, for all circuits. Provide in compliance with Article 408.4 (A) of NFPA 70.
- D. Source of Supply Identification: Provide pre-printed typewritten “as-built” nameplate identification labels at all electrical power distribution equipment that specifically indicates the exact source of the power supply that serves the respective equipment. Provide in compliance with Article 408.4 (B) of NFPA 70.

2.11 CABLE TIES

- A. UV-Stabilized Cable Ties
 - 1. Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 2. Minimum Width: 3/16 inch.
 - 3. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
 - 4. Temperature Range: Minus 40 to plus 185 deg F.
 - 5. Color: Black.
- B. Plenum-Rated Cable Ties
 - 1. Self -extinguishing, UV stabilized, one piece, self locking.
 - 2. Minimum Width: 3/16 inch.
 - 3. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
 - 4. UL 94 Flame Rating: 94V-0.
 - 5. Temperature Range: Minus 50 to plus 284 deg F.
 - 6. Color: Black.

2.12 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify final operational and as-built identity of each item before installing identification products. All equipment & system identification nomenclature shown on drawings and listed herein may be shown for general design and installation reference only. Field-verify the actual nomenclature prior to fabrication. Prepare record documents accordingly. Unless determined otherwise in field, provide text matching terminology and numbering of the contract documents.

- B. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. No labeling is required for raceways with readily identifiable terminations within the same room.
- C. 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.
- D. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied. Coordinate installation of identifying devices with location of access panels and doors. Install identifying devices before installing acoustical ceilings and similar concealment.
- E. Apply identification devices to surfaces that require finish after finish work is complete. Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- F. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands 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.
- H. Cable Ties: For attaching tags. Cut off excess lengths after installing ties. Use general-purpose type, except the following: Outdoors, UV-stabilized nylon; Indoors: Plenum rated.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or envelope/encasement exceeds 16 inches overall. Install line marker for every buried cable, regardless of whether direct-buried or installed in conduit.
- J. In accessible ceiling spaces and where exposed in unfinished areas, label conduit with panel and circuit numbers of conductors routed through the conduit. Label conduit at all wall penetrations and connections to all panels, junction boxes, and equipment served.

3.2 IDENTIFICATION DEFINITION

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less: Identify with self-adhesive vinyl label. Locate 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. Do not install in finished occupied areas.
- B. Accessible Raceways and Cables within Buildings: Identify raceways, cables, junction and pull boxes of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows: Power.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes, and handholes, use color-coding to identify the phase. Color shall be factory applied to conductor insulation or field applied for sizes No. 4 AWG and larger, if authorities having jurisdiction permit. These colors apply for factory-assembled cables as well as for individual insulated conductors. Use colors listed below for conductors.
1. Colors for 208/120-V Circuits:
 - a. Phase A: Black
 - b. Phase B: Red
 - c. Phase C: Blue
 - d. Neutral: White
 2. Color for Equipment Grounding: Green
 3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 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.
- D. Conductor and Cable Supplemental Identification in Damp Locations, Wet Locations and Below Grade, 600 V or less: Use metal tags. Provide correct identification on conductors and cables installed in manholes, grade mounted junction boxes, handholes, and similar damp and wet locations. Provide tag in each location with not less than two tags per cable, one near each conduit/duct through which the cable enters and leaves the hole. Attach tags immediately after cable is installed. Mark the tags to contain an abbreviation of the name of the system/facility served by the cable. Field verify identification nomenclature prior to fabrication of tags. Attach tags in strict accordance with manufacturer's recommendations. The identification described below is shown for schematic purposes only.
1. "6" 100V to 600V Power
 2. "P" Power
 3. "T" Telephone
 4. "C" Control
 5. "F" Fire Alarm
 6. "S" Signal

7. "IT" Communication and Information Technology
 8. "A,B,C,N" Phases and Neutral
- E. Install instructional signs including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
 - F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive, self-laminating polyester labels or self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.
 - G. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes, or self-adhesive, self-laminating polyester labels or self-adhesive vinyl labels with the conductor designation.
 - H. Conductors to Be Extended in the Future: Attach write-on tags or marker tape to conductors and list source.
 - I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections. 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. Install underground-line warning tape for both direct-buried cables and cables in raceway. Install detectable tape at trenches containing empty conduits and conduits containing optical fiber cable.
 - K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels. Comply with 29 CFR 1910.145. Identify system voltage with black letters on an orange background. 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.
 - L. Operating and Warning Instruction Signs: Provide pre-manufactured operating and warning signage if indicated on drawings and where required by NEC or local authority having jurisdiction. 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 high letters for emergency instructions at applicable equipment.

- N. 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. Equipment: Self-adhesive, engraved, laminated acrylic or melamine label for normal conditioned areas, and mechanically-fastened engraved, laminated acrylic or melamine label for areas with adverse environments (outdoor, unconditioned, high humidity, detrimental vapors, etc.). 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.
 - b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - c. Select and install mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure. Secure to substrate with stainless steel fasteners on main switchboards and switchgear and in locations where adhesives cannot be expected to work long-term due to environmental conditions
 2. Equipment to Be Labeled: (Project may not include all pieces of equipment.)
 - a. Equipment Enclosures and Cabinets (including section, and including typewritten directory of circuits in the location provided by equipment manufacturer where applicable, and including clear description of upstream equipment and device from which the power originates).
 - b. Access doors and panels for concealed electrical items.
 - c. Monitoring and local/remote-controlling devices via engraved nameplates or wall plates as applicable.
 - d. Other similar equipment designated by Owner's Representative or Design Professional in field.
 - e. Service Entrances: Include name of engineering firm, name of installing contractor and year of installation at service-entrance equipment.
- O. Fire Alarm Systems: Provide permanent identification for boxes, enclosures, etc. that are associated with fire alarm system work. Paint and identify fire alarm system pull boxes, junction boxes, and other access/pull points (boxes and covers) in accordance with NEC/NFPA. Provide fire alarm system control panel equipment cabinets, enclosures, etc. with engraved nameplates (white letters on red background) with the first line of text to read "FIRE ALARM" and the remaining lines to include the necessary descriptive text. Properly identify system components, wiring, cabling, and terminals. Install framed instructions in a location visible from fire-alarm control unit. Provide red color on jacket of all fire alarm cables associated with the fire alarm system.

Provide red-colored breaker handle and red-colored lock-on device at source circuit breakers that feed fire alarm related equipment. Provide red coloring for all fire alarm system junction boxes, along with identification.

END OF SECTION 260553