

September 2012, rev. 00

## **26 0553 – Identification for Electrical Systems**

### **PART 1. GENERAL**

#### 1.01 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.

#### 1.02 Submittals

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

#### 1.03 Quality Assurance

- ##### A. Comply with NFPA 70, including any identification requirements not included below.
- ##### B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- ##### C. Comply with ANSI Z535.4 for safety signs and labels.
- ##### D. Adhesive-attached labeling materials shall comply with UL 969.

#### 1.04 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.

## PART 2. PRODUCTS

### 2.01 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
- C. 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.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

### 2.02 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.
- C. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

### 2.03 Conductor Identification Materials.

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape 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, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

#### 2.04 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 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, with applicable voltage.
  - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE
    - a). 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 description of the utility, compounded for direct-burial service.
    - b). Overall Thickness: 5 mils (0.125 mm).
    - c). Foil Core Thickness: 0.35 mil (0.00889 mm).
    - d). Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
    - e). 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).

#### 2.05 Warning Labels and Signs

- A. **Comply with NFPA 70 and 29 CFR 1910.145.**
- B. 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.

C. 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).

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, 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).

E. 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 (915 MM)."

2.06 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: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

2.07 Equipment Identification Labels

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

B. Stenciled Legend (Outdoor Equipment): In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.08 Cable Ties

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch (5 mm).
  - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
  - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
  - 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 piece, self-locking, Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch (5 mm).
  - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
  - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
  - 4. Color: Black.
  
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.
  - 1. Minimum Width: 3/16 inch (5 mm).
  - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
  - 3. UL 94 Flame Rating: 94V-0.
  - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
  - 5. Color: Black

## 2.09 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

### 3.01 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 tags for Raceways:
  - 1. For other than fire alarm systems, locate tags at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
  - 2. For fire alarm systems, provide factory painted red conduit with matching fittings and outlet boxes throughout (such as Steel City Fire Alarm series).
- G. Cable Ties: 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 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.
- I. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

### 3.02 Identification Schedule

- A. Accessible Raceways and Cables (Except Fire Alarm) 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, panel number and circuit number.
- B. Accessible Fire Alarm Raceways and Cables within Buildings: Provide factory painted red conduit with matching fittings and outlet boxes throughout (such as Steel City Fire Alarm series). All fire alarm cable shall be red (see Division 28 for additional requirements).

- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in 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 all conductors.
    - a). Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
    - 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 or white with colored stripe.
      - 5). Ground: Green with white 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.
- D. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- E. 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.
- F. Locations of Underground Lines: Identify with underground-line warning tape for all power, lighting, communication, and control wiring and optical fiber cable.

- G. **Workspace Indication:** Install Federal Safety Yellow-Orange floor paint in oblique stripes 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.
- H. **Warning Signs and Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting:**
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.
- I. **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.
- J. **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/or load shedding.
- K. **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. 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.
    - b). **Outdoor Equipment:** Engraved, laminated acrylic or melamine label or stenciled legend 4 inches (100 mm) 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 engraved, laminated acrylic or melamine label.
- b). Enclosures and electrical cabinets.
- c). Access doors and panels for concealed electrical items.
- d). Switchgear.
- e). Switchboards.
- f). Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- g). Substations.
- h). Emergency system boxes and enclosures.
- i). Motor-control centers.
- j). Enclosed switches.
- k). Enclosed circuit breakers.
- l). Enclosed controllers.
- m). Variable-speed controllers.
- n). Push-button stations.
- o). Power transfer equipment.
- p). Contactors.
- q). Remote-controlled switches, dimmer modules, and control devices.
- r). Battery-inverter units.
- s). Battery racks.
- t). Power-generating units.
- u). Monitoring and control equipment.
- v). UPS equipment.

End of Division 26 0553

**This section of the NIU Design and Construction Standards establishes minimum requirements only. It should not be used as a complete specification.**