SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1   STIPULATIONS

    A.   The specification sections "General Conditions of the Construction Contract", "Special Conditions", and "Division 1 - General Requirements" form a part of this section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2   SUMMARY

    A.   This Section includes the following:

        1.   Identification for raceway and metal-clad cable.
        2.   Identification for conductors and communication and control cable.
        3.   Underground-line warning tape.
        4.   Warning labels and signs.
        5.   Instruction signs.
        6.   Equipment identification labels.
        7.   Miscellaneous identification products.

1.3   SUBMITTALS

    A.   Product Data: For each electrical identification product indicated. Submit as required in section 01300.

1.4   QUALITY ASSURANCE

    A.   Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

    B.   Comply with ANSI A13.1 and ANSI C2.

    C.   Comply with NFPA 70, National Electrical Code.

    D.   Comply with 29 CFR 1910.145.

1.5   COORDINATION

    A.   Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, 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

2.1   RACEWAY 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.   Color for Printed Legend:

1.   Power Circuits: Black letters on an orange field.
2.   Legend: Indicate system or service and voltage, if applicable.

C.   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.

2.2   CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

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

B.   Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.3   UNDERGROUND-LINE WARNING TAPE

A.   Description: Permanent, bright-colored, continuous-printed, polyethylene tape.

1.   Not less than 6 inches wide by 4 mils thick.
2.   Compounded for permanent direct-burial service.
3.   Embedded continuous metallic strip or core.
4.   Printed legend shall indicate type of underground line.

2.4   WARNING LABELS AND SIGNS

A.   Comply with NFPA 70 and 29 CFR 1910.145.

B.   Self-Adhesive Warning Labels for interior use: 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 for interior use: Preprinted aluminum signs, 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.

D. Metal-Backed, Butyrate Warning Signs for exterior use: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396 inch galvanized-steel backing; and with colors, legend, and size required for application. 1/4 inch grommets in corners for mounting. Nominal size, 10 by 14 inches.

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."
3. Standard Arc Flash labels on all electrical equipment, complete with information coordinated with the requirements of 260573.

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. in. and 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.

2.6 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.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch.
2. Tensile Strength: 50 lb, minimum.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

B. Paint: Paint materials and application requirements are specified in "Exterior Painting" specification section 099113 and "Interior Painting" specification section 099123.

1. Exterior Concrete, Stucco, and Masonry (Other Than Concrete Unit Masonry):

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Exterior concrete and masonry primer.
2) Finish Coats: Exterior semi-gloss acrylic enamel.

2. Exterior Concrete Unit Masonry:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over block filler.

    1) Block Filler: Concrete unit masonry block filler.
    2) Finish Coats: Exterior semi-gloss acrylic enamel.

3. Exterior Ferrous Metal:

a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.

    1) Primer: Exterior ferrous-metal primer.
    2) Finish Coats: Exterior semi-gloss alkyd enamel.

4. Exterior Zinc-Coated Metal (except Raceways):

a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.

    1) Primer: Exterior zinc-coated metal primer.
    2) Finish Coats: Exterior semi-gloss alkyd enamel.

5. Interior Concrete and Masonry (Other Than Concrete Unit Masonry):

a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.

    1) Primer: Interior concrete and masonry primer.
    2) Finish Coats: Interior semi-gloss alkyd enamel.

6. Interior Concrete Unit Masonry:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over block filler.

    1) Block Filler: Concrete unit masonry block filler.
    2) Finish Coats: Interior semi-gloss acrylic enamel.

7. Interior Gypsum Board:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

    1) Primer: Interior gypsum board primer.
    2) Finish Coats: Interior semi-gloss acrylic enamel.

8. Interior Ferrous Metal:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

    1) Primer: Interior ferrous-metal primer.
    2) Finish Coats: Interior semi-gloss acrylic enamel.

9. Interior Zinc-Coated Metal (except Raceways):

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

    1) Primer: Interior zinc-coated metal primer.
    2) Finish Coats: Interior semi-gloss acrylic enamel.

C. 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 APPLICATION

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A: Identify with orange self-adhesive vinyl label, snap-around label, or self-adhesive vinyl tape applied in bands.

B. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands, or snap-around, color-coding bands:

1. Fire Alarm System: Red.
2. Fire-Suppression Supervisory and Control System: Red and yellow.
3. Combined Fire Alarm and Security System: Red and blue.
4. Security System: Blue and yellow.
5. Mechanical and Electrical Supervisory System: Green and blue.
6. Telecommunication System: Green and yellow.
7. Control Wiring: Green and red.

C. Power-Circuit Conductor Identification: For primary and secondary conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape, marker tape, aluminum wraparound marker labels, or metal tags. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

D. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape, marker tape, aluminum wraparound marker labels, or metal tags. Identify each ungrounded conductor according to source and circuit number.

E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data 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 Operation and Maintenance Manual.

F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable. Install underground-line warning tape for direct-buried cables, cables in raceway, and cables in concrete encased duct banks.

G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels, baked-enamel warning signs, or metal-backed, butyrate warning signs. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. 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.

   2.   Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

H.   Instruction Signs:

   1.   Operating Instructions: 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.
   2.   Emergency Operating Instructions: 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 or load shedding.

I.   Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with drawings, wiring diagrams, schedules, and 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 high letters on 1-1/2 inch high label; where 2 lines of text are required, use labels 2 inches high.
       b.   Outdoor Equipment: Engraved, laminated acrylic or melamine label; legend 4 inches high.
       c.   Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

   2.   Equipment to Be Labeled:

       a.   Panelboards, electrical cabinets, and enclosures.
       b.   Access doors and panels for concealed electrical items.
       c.   Electrical switchgear and switchboards.
       d.   Transformers.
       e.   Emergency system boxes and enclosures.
       f.   Disconnect switches.
       g.   Enclosed circuit breakers.
       h.   Motor starters.
       i.   Push-button stations.
       j.   Power transfer equipment.
       k.   Contactors.
       l.   Voice and data cable terminal equipment.
       m.   Fire-alarm control panel and annunciators.
       n.   Security and intrusion-detection control stations, control panels, terminal cabinets, and racks.
       o.   Monitoring and control equipment.
       p.   Terminals, racks, and patch panels for voice and data communication and for signal and control functions.

3.2   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 non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F.   System Identification Color Banding for Raceways and Cables: Each color 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.

G.   Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

   1.   Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
   2.   Colors for 208/120-V Circuits:

      a.   Phase A: Black.
      b.   Phase B: Red.
      c.   Phase C: Blue.

   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.

H.   Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I.   Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line 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.

J.   Painted Identification: Prepare surface and apply paint according to "Interior Painting" specification section 099123.

END OF SECTION 260553