Section 16075

Electrical Identification

PART 1: General

1.1 *Summary* – This Section includes the following:

1.1.1 Identification for raceway

1.1.2 Identification for conductors and communication and control cable

1.1.3 Underground-line warning tape

1.1.4 Warning labels and signs

1.1.5 Instruction signs

1.1.6 Equipment identification labels

1.1.7 Miscellaneous identification products

1.2 *Submittals* –

1.2.1 *Product Data* – For each electrical identification product indicated.

1.2.2 *Identification Schedule* – An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.2.3 *Samples* – For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

1.3 *Quality Assurance* –

1.3.1 Comply with ANSI A13.1 and ANSI C2

1.3.2 Comply with NFPA 70

1.3.3 Comply with 29 CFR 1910.145

1.4 *Coordination* –

1.4.1 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.

1.4.2 Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

1.4.3 Coordinate installation of identifying devices with location of access panels and doors.

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PART 2: Products

2.1 *Raceway Cable Identification Materials* –

2.1.1 *Standards* – 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.

2.1.2 *Color for Printed Legend* –

2.1.2.1 Power Circuits: Black letters on an orange field

2.1.2.2 Legend: Indicate system or service and voltage, if applicable

2.1.3 *Self-Adhesive Vinyl Tape* – Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.2 *Conductor and Communication and Control-Cable Identification Materials* –

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

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

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2.3 *Underground-Line Warning Tape* –

2.3.1 *Description* – Permanent, bright-colored, continuous-printed, polyethylene tape.

2.3.1.1 Not less than 6 inches wide by 4 mils thick

2.3.1.2 Compounded for permanent direct-burial service

2.3.1.3 Embedded continuous metallic strip or core

2.3.1.4 Printed legend shall indicate type of underground line

2.4 *Warning Labels and Signs* –

2.4.1 *Standards* – Comply with NFPA 70 and 29 CFR 1910.145.

2.4.2 *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.

2.4.3 *Signage* – Warning label and sign shall include, but are not limited to, the following legends:

2.4.3.1 *Multiple Power Source Warning*: "DANGER - ELECTRICAL SHOCK HAZARD – WEAR PRTOECTIVE GEAR PRIOR TO OPENING PANEL DOOR."

2.5 *Instruction Signs* –

2.5.1 Engraved, laminated acrylic or melamine plastic, minimum 1/16-inch thick for signs up to 20 square inches and 1/8-inch thick for larger sizes.

2.5.1.1 Engraved legend with black letters on white face

2.5.1.2 Punched or drilled for mechanical fasteners

2.5.1.3 Framed with mitered acrylic molding and arranged for attachment at applicable equipment

2.6 *Equipment Identification Labels* – Shall be 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* –

2.7.1 *Cable Ties* – Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

2.7.1.1 Minimum Width: 3/16 inch

2.7.1.2 Tensile Strength: 50 lb., minimum

2.7.1.3 Temperature Range: Minus 40 to plus 185°F

2.7.1.4 Color: Black, except where used for color-coding

2.7.2 *Paint* – See applicable codes and Standards for paint materials and application requirements and specifications.

2.7.2.1 *Exterior Ferrous Metal* –

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

2.7.2.1.1.1 Primer: Exterior ferrous-metal primer

2.7.2.1.1.2 Finish Coats: Exterior semi-gloss alkyd enamel

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

PART 3: <u>Execution</u>

3.1 *Application* –

3.1.1 *Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A* – Identify with weatherproof, orange self-adhesive vinyl label rated for exterior use.

3.1.2 *Accessible Raceways and Cables of Auxiliary Systems* – Identify the following systems with color-coded, weatherproof, self-adhesive vinyl label rated for exterior use:

3.1.2.1 Electrical Supervisory System: Green and blue.

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3.1.2.2 Control Wiring: Green and red.

3.1.3 *Power-Circuit Conductor Identification* – For secondary conductors No. 1/0 AWG and larger in pull and junction boxes, and hand holes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

3.1.4 *Branch-Circuit Conductor Identification* – Where there are conductors for more than two branch circuits in the same junction or pull box, use. Identify each ungrounded conductor according to source and circuit number.

3.1.5 *Auxiliary Electrical Systems Conductor Identification* – Identify field-installed alarms, control, signal, and data connections.

3.1.5.1 Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

3.1.5.2 Use system of marker tape designations that is uniform and consistent with system used by Manufacturer for factory-installed connections.

3.1.5.3 Coordinate identification with Project Drawings, Manufacturer's wiring diagrams, and Operation and Maintenance Manual.

3.1.6 *Locations of Underground Lines* – Identify with underground-line warning tape for power, lighting, and control wiring. Install underground-line warning tape for both direct-buried cables and cables in raceway.

3.1.7 *Instruction Signs* –

3.1.7.1 *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.

3.1.7.2 *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.

3.1.8 *Equipment Identification Labels* – On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment and control panels.

3.1.8.1 *Labeling Instructions* –

3.1.8.1.1 Outdoor Equipment: Engraved, laminated acrylic or melamine label.

3.1.8.1.2 Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

3.1.8.2 *Equipment to Be Labeled* –

3.1.8.2.1 Control panel sections with access doors

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3.1.8.2.2 Disconnect switches

3.1.8.2.3 Motor starters

3.1.8.2.4 Push-button stations

3.1.8.2.5 Power transfer equipment

3.1.8.2.6 Contactors

3.1.8.2.7 Power-generating units

3.1.8.2.8 Monitoring and control equipment

3.1.8.2.9 Uninterruptible power supply equipment

3.1.8.2.10 Terminals for signal and control functions

3.1.8.2.11 Miscellanies equipment and devices located within control panel

3.2 *Installation –*

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3.2.1 Verification – Verify identity of each item before installing identification products.

3.2.2 *Location* – Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Apply identification devices to surfaces that require finish after completing finish work.

3.2.3 *Self-Adhesive Identification Products* – Clean surfaces before application, using materials and methods recommended by Manufacturer of identification device.

3.2.4 *Non-Adhesive Identification Products* – Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

3.2.5 *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.

3.2.6 *Color – Coding for Phase and Voltage Level Identification, 600 V and Less* – Use the colors listed below for ungrounded conductors.

3.2.6.1 Color – Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.

3.2.6.1.1 *Colors for 240-208/120-V Circuits –*

3.2.6.1.1.1 *Phase A:* Black

3.2.6.1.1.2 *Phase B:* Red (Orange for 240V Stinger Leg)

3.2.6.1.1.3 *Phase C:* Blue

3.2.6.1.2 *Colors for 480/277-V Circuits –*

3.2.6.1.2.1 *Phase A:* Brown.

3.2.6.1.2.2 *Phase B:* Orange.

3.2.6.1.2.3 *Phase C:* Yellow.

3.2.6.2 *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, and for a minimum width of 2 inches. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

3.2.7 *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 exceeds 16 inches overall.

3.2.8 *Painted Identification* – Prepare surface and apply paint according applicable codes and standards.

PROPOSED