BASIS OF DESIGN

This section applies to the requirements for identification of electrical raceways, conductors, and equipment.

Design Criteria

Review and modify the attached guide specification, “Electrical Identification,” as required to meet the project requirements.

Design Evaluation

The following information is required to evaluate the design:

- **Schematic Design Phase:** Outline specifications
- **Design Development Phase:** Draft specifications
- **Construction Documents Phase:** Complete specifications

Submittals

Refer to the attached guide specification, “Electrical Identification.”

Installation, Fabrication, and Construction

Refer to the attached guide specification, “Electrical Identification.”

END OF DESIGN INFORMATION SECTION
GUIDE SPECIFICATION

The following specification is intended as a guide only. The Consultant shall write the specifications to meet the project needs in consultation with the Owner.

ELECTRICAL — ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 DESCRIPTION

A. Purpose

1. The purpose of this section is to provide electrical identification for electrical equipment, raceways, and conductors.

B. General

1. Provide labels, nameplates, panel directories and color-coding as specified herein and according to attached electrical identification drawings.

1.02 RELATED SECTIONS

A. The work under this section is subject to the requirements of the Contract Documents, including the General Conditions and Special Conditions, and sections under Division 1, General Requirements.

1.03 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI A13.1, Operational and Warning Signs.

1.04 SUBMITTALS

A. General

1. Submittals shall be in accordance with the Conditions of the Contract and Division 1 specification sections.

2. Before making nameplates, submit a complete schedule indicating nameplate size, lettering size, color, and actual nameplate information.

1.05 MEETINGS

A. Within one month after the “Notice to Proceed,” schedule a meeting with UC representatives to review electrical identification requirements.
PART 2 PRODUCTS

2.01 EQUIPMENT NAMEPLATES AND DEVICE LABELS

A. Materials

1. Provide nameplates constructed of $\frac{1}{16}$-inch-thick plastic laminated material. Engrave through colored surface material to contrasting colored sublayer.

2. Use receptacle labels by electronic labeler Brother P-Touch, model PT-20/25, Dymo-Tape, or approved equal.

B. Provide the following:

1. Equipment identification labels for all electrical equipment including, but not limited to, switchgear, switchboards, panels, transfer switches, disconnect switches, transformers, capacitors, fixed equipment, motor starters, motor control centers (MCCs), motors, etc.

2. Subclassification labels for all emergency power system equipment as listed for equipment identification labels, and for all junction and pull boxes.

3. Fire alarm equipment per the fire alarm specification.

4. Cubicle/space labels for all MCCs, substations, and distribution switchboards.

5. Identification of fuse type and size on the cover of fusible equipment.

6. Special equipment outlet labels ($\frac{1}{4}$-inch letters).

7. Ground fault circuit interrupter (GFCI) receptacles: "Series GFCI Protected."

8. Time delays: Provide 1/8-inch lettering at the control location to identify a motor having a time delay relay: “Time Delay Start to Limit System Inrush.”


10. Fixed equipment labels: In addition to receptacle labels, provide labels for fixed equipment at a visible location mounted on or near the equipment. Examples of fixed equipment are refrigerators, water fountains, hoods, ranges, and dishwashers. Coordinate location of labels with the University.

2.02 RACEWAY LABELS

A. Identify medium- and high-voltage conduits within buildings and electrical rooms by painting on their full lengths the following:

1. Stenciling in 2-inch black letters: Stencil to be placed once in each room and at a minimum of every 50 feet. Place where convenient for tracing. Exception: Stencil not required if conduit does not exit room.
   a. Stencil to include source equipment name, voltage, and load equipment name (i.e., PCU-BB01-E01/4160V/TR-SW01-E01).

2. Paint colors for medium-voltage conduits: Emergency system conduit (4.16 kV and 2.4 kV), red; normal system conduit (13.8 kV), yellow. For other medium-
or high-voltage systems, contact UC Construction Management for the color scheme.

B. Feeder and branch circuit conduits

1. No labeling is required for raceways with readily identifiable terminations within the same room.

2. In accessible ceiling spaces and 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. Use a black indelible marker and hand print label in a clear workmanlike manner, or use stencil and black paint to provide a clearly legible label.

C. Empty conduits

1. Provide labels with description of purpose, and location of opposite end, on each end of conduits provided for future.

2. Equipment or those abandoned as a result of this contract: Cardboard or plastic handwritten tags are permissible. Note accurately on as-built drawings.

2.03 BRANCH CIRCUIT PANELBOARD DIRECTORIES

A. Provide neatly typed schedule under plastic jacket or protective cover for protection from damage or dirt.

1. Number each single pole space: Odd-numbered circuits on left side or top, even on right side or bottom.

2. Securely mount on inside face of panelboard door.

3. When there is no cover, provide individual nameplates for each overcurrent and other device.

4. Define briefly, but accurately, nature of connected load (i.e., Lighting Office, Receptacles, Mechanical/Electrical Room, etc.) as approved.

5. Provide room locations for all loads and indicate panel name on the schedule.

6. Multipole circuits: Use first pole space number as circuit number.

B. Confirm room numbers with UC Construction Management before noting on schedules.

C. Spare circuit breakers and space positions shall be noted in pencil.

D. Panel schedules and as-built circuit numbers shall agree.

2.04 WIRE AND CABLE LABELING

A. Control wiring

1. All control-wire terminations are to be identified by tubular sleeve heat shrink-type markers to agree with wire marking identification on manufacturer's equipment drawings.
B. Power conductor wire, cable, and buses

1. Buses, feeders, branch circuit conductors, and medium-voltage cables shall be properly phased and identified throughout. Individual conductors shall be color coded as noted below.

<table>
<thead>
<tr>
<th>Conductor</th>
<th>102/208V and Medium Voltage</th>
<th>277/480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase A</td>
<td>Black</td>
<td>Brown</td>
</tr>
<tr>
<td>Phase B</td>
<td>Red</td>
<td>Orange</td>
</tr>
<tr>
<td>Phase C</td>
<td>Blue</td>
<td>Yellow</td>
</tr>
<tr>
<td>Neutral</td>
<td>White</td>
<td>Gray</td>
</tr>
<tr>
<td>Ground</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Isolated Ground</td>
<td>Green/Yellow</td>
<td>Green/Yellow</td>
</tr>
</tbody>
</table>

a. Buses and connections shall be identified left to right, top to bottom, or front to rear; shall read A-B-C; and shall be color-coded per the table above.

b. Feeders for all new construction shall have color-coded phase identification at all junction boxes and wherever feasible, and shall have solid color-coded insulation for phase designation. Where the proper color wire insulation cannot be obtained, black insulation shall be used and the conductors shall be coded with plastic vinyl tape, 3M #190-A, ¾ inch or equal.

c. Identify color-coded conductors with appropriately colored plastic vinyl tape (3M #190-A) in the panel when branch circuits are reconnected for balancing panel load.

C. "Low voltage" cable and special systems

1. See individual functional specification sections.
### 2.05 COLOR SCHEME FOR LABELS

See attached standard drawings for examples.

<table>
<thead>
<tr>
<th>System</th>
<th>Label Color</th>
<th>Lettering Color</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4 kV and 4.16 kV emergency</td>
<td>Red</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>13.8 kV normal</td>
<td>Yellow</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>2.4 kV normal</td>
<td>Orange</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>Normal power and control</td>
<td>White</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>Emergency power and control:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency – life safety</td>
<td>Red</td>
<td>White</td>
<td>&quot;EM - LS&quot;</td>
</tr>
<tr>
<td>Emergency – critical</td>
<td>Red</td>
<td>White</td>
<td>&quot;EM - CR&quot;</td>
</tr>
<tr>
<td>Emergency – legally required standby</td>
<td>Red</td>
<td>White</td>
<td>&quot;EM - LRS&quot;</td>
</tr>
<tr>
<td>Emergency – optional standby</td>
<td>Red</td>
<td>White</td>
<td>&quot;EM – OS&quot;</td>
</tr>
<tr>
<td>Fire alarm</td>
<td>Red</td>
<td>White</td>
<td>&quot;FA&quot;</td>
</tr>
<tr>
<td>Halon</td>
<td>Dk. Blue</td>
<td>White</td>
<td>&quot;FP&quot;</td>
</tr>
<tr>
<td>Security</td>
<td>Green</td>
<td>Black</td>
<td>&quot;SEC&quot;</td>
</tr>
<tr>
<td>Intercom, public address, nurse call</td>
<td>Orange</td>
<td>Black</td>
<td>&quot;IC&quot;, &quot;PA&quot;, or &quot;NC&quot; (as app.)</td>
</tr>
<tr>
<td>Clock</td>
<td>Lt. Blue</td>
<td>Black</td>
<td>(Symbol for Clock)</td>
</tr>
<tr>
<td>TV</td>
<td>Yellow</td>
<td>Black</td>
<td>&quot;TV&quot;</td>
</tr>
<tr>
<td>Communication data</td>
<td>Black</td>
<td>White</td>
<td>&quot;C/D&quot;</td>
</tr>
</tbody>
</table>
Drawing 1: Equipment Label Format and Location
ELECTRICAL: GUIDE SPECIFICATION

Electrical Identification

November 2004

Drawing 2: Equipment “Fed From” Label

TYPE:
PDM = POWER CENTER MAIN
PCD = DISTRIBUTION PANEL
PCB = BRANCH PANEL
MCC = MOTOR CONTROL CENTER
TR = TRANSFORMER
SWA = NON-FUSED SWITCH
LDF = FAN LOAD
LDC = COMPRESSOR LOAD

ITEM DESIGNATION:
N = NORMAL
E = EMERGENCY
THREE DIGIT ITEM NUMBER
e.g. N01, E25

CIRCUIT OR CUBICLE #
e.g. (5), (4,6,8), 1A, 3C

* SEE SD–E–141 FOR FOR PLACEMENT AND SIZING

EQUIPMENT DESIGNATION EXAMPLES*

XXX–XXXX–XXX

EQUIPMENT CIRCUIT DESIGNATION EXAMPLES*

XXX–XXX–XXX

EA04–N03–9,11
GG03–N32–4
SF–1
LDF–SE07–E03
fed from
MCC–SE02–E05–3C

EF–14
LDF–SW08–E02
fed from
SW01–E11–6,8,10

NE02–N15–5,7,9

SF–1
LDF–SE07–E03
fed from
MCC–SE02–E05–3C

EF–14
LDF–SW08–E02
fed from
SW01–E11–6,8,10

HP
OR
HP

SD–E–154
ELECTRICAL: GUIDE SPECIFICATION

Electrical Identification

November 2004

160 AT3
208Y/120V
EMER. FED FROM 160CB3
NORM. FED FROM MCC1
LOAD: PANEL E1

5"H X 8"W LABEL
1" LETTERING FOR LINE 1
1/2" LETTERING FOR REMAINDER

160 CB3
150A
FED FROM 160 TR3
FEEDS 160 AT3

5"H X 8"W LABEL
1" LETTERING FOR LINE 1
1/2" LETTERING FOR REMAINDER

160 TR3
2400-208Y/120V
FED FROM 160 PS3
FEEDS 160 CB3

5"H X 8"W LABEL
1" LETTERING FOR LINE 1
1/2" LETTERING FOR REMAINDER

FEEDER G5 - 2.4kV
160 PS3
VIA UC7 LB2
LOAD:160 TR3

FEEDER G5 - 2.4kV
1" LETTERING FOR LINE 1
1/2" LETTERING FOR REMAINDER

1-1/2"H X 3-1/2"W LABEL
3/8" LETTERING

FROM:
NE9 LB3
VIA G5

EMERGENCY
15kV NORMAL
2.4kV NORMAL

POWER
WHITE
BLACK
WHITE

BACKGROUND
RED
YELLOW
ORANGE

LETTERS

COLOR SCHEME NOTES

1. USE BLOCK LETTERS WITH BOLD TYPE.
2. CENTER ALL LINES ON LABEL.
3. BEVEL EDGES.
4. USE 3M VHB ADHESIVE OR EQUIVALENT.
5. CLEAN SURFACE WITH ALCOHOL PRIOR TO APPLICATION.

Drawing 3: Medium Voltage Equipment Label

SD—E—166

DESIGN GUIDELINES AND STANDARDS

EI — 9