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PART 1. - GENERAL

1.1. GENERAL REQUIREMENTS

Terms and Conditions of the contract apply to the work of this section.

1.2. SECTION INCLUDES

This specification applies to tagging and identification for all mechanical, electrical, instrumentation, and process components for all systems.

1.3. RELATED WORK

1.3.1. Mechanical

This specification applies to all work covered in Divisions 11, 21, 22, 23 and 40.

1.3.2. Electrical

This specification applies to all work covered in Division 26 and 28.

Refer to 260519 Low Voltage Electrical Power Conductors and Cables for more requirements regarding cable and conductor tagging and identification.

Refer to 260573 Power Systems Studies for more requirements regarding arc flash and short circuit labeling requirements.

1.3.3. Instrumentation

This Specification applies to all work covered in Division 40.

Provide wire marking and tagging per Specifications 409050 and 409150.

1.3.4. Process

This Specification applies to all work covered in Division 41, 42, 43 and 45. Process specifications shall comply with the products and installation required under mechanical, electrical and instrumentation sections of this specifications.

1.4. SUBMITTALS

Submit the following items for Owner approval:

1. Product Data: Manufacturer's catalog cut sheets and other published technical data for each of the following:

    a. Nameplates, instructions plates, signs and labels.
    b. Fasteners.

2. Samples: Provide samples of each color, lettering style, and other graphic representation required for identification materials. Provide samples of labels and signs. No material is to be ordered without this approval.
3. Provide a listing of proposed names, abbreviations and other designations used in identification. Provide an electronic copy of the schedule of proposed tags, nameplates and engraving for Owner approval. No material is to be ordered without this approval.
4. Provide a final and complete, electronic listing of all applied tags, nameplates and engravings.
5. Provide a Hand Valve schedule as an electronic version in Microsoft Excel. Mark valves which are intended for emergency shut-off and similar special uses, by special flags, in margin of schedule. Furnish additional copies of schedule for Maintenance Manuals. Valve Schedule shall include the following information:

    a. Piping system
    b. System abbreviation (“CW”, “CHWS”, “RO”, “WFI”, etc.)
    c. Valve identification number
    d. Location of valve (room or space)
    e. Type of valve (gate, ball, automatic control, etc.)
    f. Manufacturer and manufacturer's catalog number
    g. Indicate valves intended for emergency shutoff or other special use

1.5. QUALITY ASSURANCE

1.5.1. General Requirements

Material shall be new, and conform to grade, quality and standards specified. Materials of same type shall be products of same manufacturer throughout.

Communicate with the Owner and obtain project requirements for compliance with existing standards, color selections and other areas of coordination specified in this section. Data shall be included with submittals.

1.5.2. Mechanical

ASME Standards: Comply with ASME A13.1-2015 for lettering size, length of color field, colors, and viewing angles of identification devices.

Compressed Gas Standards: Comply with NFPA 99 and CGA C-9 for identification of compressed gas systems.

1.5.3. Electrical

Identification materials shall be designed and installed in accordance with NFPA 70 (NEC), OSHA, UL 969, state codes, local codes and requirements of authorities having jurisdiction.

1.5.4. Instrumentation

Materials shall be designed and installed in accordance with NFPA 70 (NEC).

PART 2. - PRODUCTS

2.1. MECHANICAL

2.1.1. Acceptable Manufacturers

Subject to compliance with requirements, provide mechanical identification materials of one of the following:

Seton
Brady
Marking Services Incorporated

2.1.2. Mechanical Identification Materials

General

Provide manufacturer's standard pre-printed, color-coded products of categories and types required for each application.

Lettering and graphics

Coordinate names, abbreviations, and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering, and wording as indicated. If not otherwise indicated, submit proposal for approval by Owner. In cases of manufacturer variance with names specified, then nomenclature shall be as selected by Owner.

Multiple Systems

Where multiple systems of same generic name are shown and specified, provide individual system identification number as well as service. (For example: Boiler No. 3, Air Supply No. 1H, Standpipe F12).

2.1.3. Pipe Markers

Pressure-Sensitive Type

Provide permanent adhesive, pressure-sensitive vinyl pipe markers.

Underground Pipe Markers

Manufacturer's standard permanent, brightly-colored, continuously-printed multi-ply plastic tape, with solid aluminum foil core, intended for direct-burial service; not less than 6" wide and 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried pipe.

Size

Provide pipe markers with lettering size according to ASME A13.1-2015.

Banding Tape

Provide manufacturer's standard 2” wide, color-coded, pressure-sensitive, self-adhesive vinyl banding tape, with arrows. Thickness shall not be less than 3 mils.

Small Pipes

For external diameters less than 6" (including insulation if any), provide full-band pipe markers, extending 360° around pipe at each location.

Large Pipes

Provide either full-band pipe markers, or strip-type pipe markers, but not narrower than 3 times letter height (and of required length).

Arrows

Print each pipe marker with arrows indicating direction of flow, integrally with piping system service lettering. Where flow is possible in either direction in a piping system, arrows shall be installed to indicate both directions of flow.

Legend

The text of the legend shall use the pipe system "Description" as indicated on the "Piping System Application Table" (PSAT) in Section 230500, or shall match the existing facility text used on piping markers. The text shall be reviewed by the Owner prior to providing submittal for approval.

Pipe labels shall use the colors as shown in the following table and shall match the existing facility colors used on piping markers.

Plan Mark	Pipe System	Legend	Color	Background Color
ACID	Acid	“Acid”	Black	Yellow
AWFI	Ambient Water for Injection	“AWFI”	White	Green
CA	Compressed Air	“CA”	White	Green
CAUST	Caustic	“Caustic”	Black	Yellow
CGR	Chilled Glycol Water Return	“Chilled Glycol Wtr Ret”	Black	Yellow
CGS	Chilled Glycol Water Supply	“Chilled Glycol Wtr Sup”	Black	Yellow
CIPA	Clean-In-Place Acid	“CIP Acid”	Black	Yellow
CIPB	Clean-In-Place Base	“CIP Base”	Black	Yellow
CIPS	Clean-In-Place Supply	“CIP Supply”	Black	Yellow
CIPR	Clean-In-Place Return	“CIP Return”	Black	Yellow
CTFR	Cold Thermal Fluid Return	“Cold TF Return”	Black	Yellow
CTFS	Cold Thermal Fluid Supply	“Cold TF Supply”	Black	Yellow
CHTFR	Chilled Thermal Fluid Return	“Chilled TF Return”	Black	Yellow
CHTFS	Chilled Thermal Fluid Supply	“Chilled TF Supply”	Black	Yellow
CTWR	Cooling Tower Water Return	“Cooling Tower Water Return”	White	Green
CTWS	Cooling Tower Water Supply	“Cooling Tower Water Supply”	White	Green
CW	City Water	“City Water”	White	Green

Plan Mark	Pipe System	Legend	Color	Background Color
CWR	Chilled Water Return	“Chilled Water Return”	White	Green
CWS	Chilled Water Supply	“Chilled Water Supply”	White	Green
D	Drain	“Drain”	Black	Green
DC	Drain Condensate	“Drain Condensate”	Black	Green
DCW	Domestic Cold Water	“Domestic Cold Water”	Black	Yellow
DHW	Domestic Hot Water	“Domestic Hot Water”	Black	Yellow
FP	Fire Protection	“Fire Protection”	White	Red
HTFR	Hot Thermal Fluid Return	“Hot TF Return”	White	Green
HTFS	Hot Thermal Fluid Supply	“Hot TF Supply”	White	Green
HHWR	Heating Hot Water Return	“Htg Hot Wtr Return”	Black	Yellow
HHWS	Heating Hot Water Supply	“Htg Hot Wtr Supply”	Black	Yellow
HWFI	Hot Water For Injection	“HWFI”	White	Green
JTFR	Jacket Thermal Fluid Return	“Jacket TF Return”	White	Green
JTFS	Jacket Thermal Fluid Supply	“Jacket TF Supply”	White	Green
LPC	Low Pressure Condensate, < 60 psig	“Low Pressure Cond”	Black	Yellow
LPS	Low Pressure Steam, < 60 psig	“Low Pressure Steam”	Black	Yellow
MPC	Med. Pressure Condensate, 60-150 psig	“Med Pressure Cond”	Black	Yellow
MPS	Med. Pressure Steam, 60-150 psig	“Med Pressure Steam”	Black	Yellow
P	Product	“Product”	Black	Yellow
PCR	Pumped Condensate	“Pumped Condensate Rtn”	Black	Yellow
PD	Process Drain	“Process Drain”	Black	Yellow
PV	Process Vent	“Process Vent”	Black	Yellow
PW	Process Waste	“Process Waste”	Black	Yellow
RD	Roof Drain Piping	“Roof Drain”	Black	Green
RO	Reverse Osmosis Water	“RO”	Black	Yellow
SV	Steam Vent	“Steam Vent”	Black	Yellow
UTV	Utility Vent	“Utility Vent”	Black	Yellow
UTW	Utility Waste	“Utility Waste”	Black	Yellow
WFP	Waste Fire Water Collection	“Waste Fire Water”	Black	Green
WPD	Waste Process Drain	“Waste Process Drain”	Black	Yellow
WFI	Water For Injection	“WFI”	White	Green

2.1.4. Hand Valve Tags

Hand valves shall be tagged per section 2.3.2, “Instrument and Valve Tags”.

2.1.5. Duct Markers

Pressure-Sensitive Type

Provide permanent adhesive, pressure-sensitive vinyl markers.

Size

Provide duct markers with a minimum letter height of 3/4".

Duct label text shall be as shown in the following table:

Duct System	Legend	Letter Color	Background Color
Exhaust Air Ductwork	"Exhaust Air"	White	Blue
Outside Air Ductwork	"Outside Air"	White	Blue
Return Air Ductwork	"Return Air"	White	Red
Supply Air Ductwork	"Supply Air"	Black	Yellow
Cold Supply Air <45F	“Cold Supply Air”	Black	Yellow
Cold Supply Air <45F	“Cold Return Air”	White	Red

Nomenclature: Additionally duct markers shall include the following:

1. Main Supply ducts and branch ducts shall have a 4” yellow band/ring with Air handling unit number ID (e.g. A-018, etc.) and shall indicate airflow direction.
2. Supply branch ducts at the HEPA connection shall have a 4” yellow band/ring with Room #-HEPA # (ex. RM 82352-1, RM82352-2) and shall indicate airflow direction.
3. Main return ducts shall have a 4” Red band/ring with Air handling unit number ID and shall indicate airflow direction.
4. Return branch ducts shall have a 4” red band/ring with Room #-Rtn # (ex. RM 82352-1, RM82352-2) and shall indicate airflow direction.

2.1.6. Equipment Markers

Engraved Plastic Laminate Signs

Provide 1/16" thick, engraving stock melamine plastic laminate, in the sizes indicated. Signs shall be engraved with engraver's standard letter style of the sizes and wording indicated. Lettering shall be all caps.

Size

Markers shall be approximately 1-1/2" x 4", with 3/4" high lettering.

Color-coding

Provide signs for the following general categories of equipment and operational devices, with indicated color codes:

Equipment Type	Letter Color	Background Color
HVAC central supply equipment	White	Green
Heat exchangers and similar equipment	White	Blue
Exhaust fan equipment	Black	Yellow
Process equipment	Black	White
Boilers, stills, heaters, and similar equipment	White	Blue
Pumps, condensers, chillers, towers, and similar equip.	White	Blue
Reheat, air terminal boxes	White	Blue
Tanks and pressure vessels	Black	White
Fume hoods and bio-safety cabinets	Black	Yellow
Filters, humidifiers, water treatment, and similar equipment	White	Blue

Nomenclature

Equipment markers shall include the following:

Equipment Number

Fastening

Markers shall be fastened with contact-type permanent adhesive.

2.1.7. Access Panel Markers

General

Provide 3/4" x 2" x 1/16" thick, engraved plastic laminate panel markers, with abbreviations corresponding to fire dampers, fire/smoke dampers, emergency shutoff valves, safety valves, steam traps, or other critical mechanical components concealed above ceilings. Provide with 1/8" center hole to allow for attachment to panel.

Color-coding

Provide access panel markers with 1/4" high, white capital letters on a red background.

2.1.8. Plasticized Tags

General: Provide manufacturer's standard pre-printed or partially pre-printed accident-prevention tags, of plasticized card stock with matte finish suitable for writing. Tag shall include brass grommets and wire fasteners. (For example: DANGER, CAUTION, DO NOT OPERATE, etc.).

2.2. ELECTRICAL

2.2.1. Acceptable Manufacturers

Subject to compliance with requirements, provide mechanical identification materials of one of the following:

Seton
Brady
Marking Services Incorporated
Panduit
Kroy
[or approved equal]

2.2.2. Instruction Plates and Signs

Instruction plates shall be made using satin finish 2 or 3-ply, plastic laminate stock. Use 1/16 inch thickness for signs up to 20 square inches or 8 inches in length and 1/8 inch thickness for larger sizes. Engrave legend in white capital letters with black face. Provide red background with white capital letters for emergency powered systems.

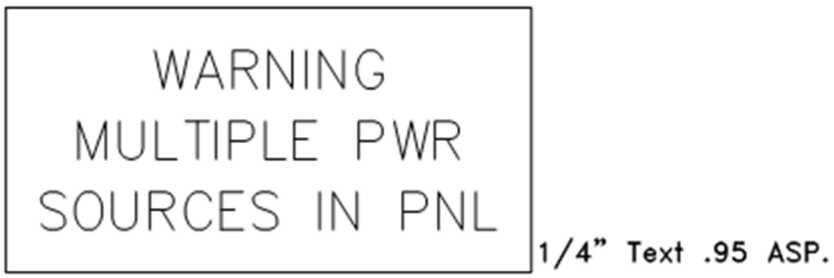
Danger and warning signs for interiors use shall be preprinted, aluminum or rigid vinyl, predrilled, with colors, legend and size as required for application. Signs shall meet the ANSI Z535.4 guidelines for design and durability.

Danger signs shall be worded "DANGER - ELECTRICAL HAZARD, AUTHORIZED PERSONNEL ONLY" for 600 volts and below. Size, material, and lamination options shall be selected appropriately for the installation environment.

Workspace clearance warning signs shall be worded as follows with the appropriate electrical code required working distance inserted: “WARNING – OSHA REGULATION – AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR *[DISTANCE PER ELECTRICAL CODE]* INCHES”. Contractor shall provide signs indicating the appropriate distance in accordance with OSHA and NFPA requirements.

Provide warning labels for equipment that is fed from multiple power sources. Use yellow-black-yellow phenolic laminated nameplates; engraved to show black lettering against yellow background with beveled edge. Reverse engraving from back is preferred. Use Template Type A in section 2.2.5.

Example:



Signs and instruction plates shall be preprinted, self-adhesive with adequate space for wording. Legend, colors and sizes as required for application.

2.2.3. Electrical Raceway and Cable Labels

All raceway and cable labels shall have black capital letters on a white background unless specifically noted otherwise.

Each wire shall be identified at each termination with wire numbers by means of a permanent wrap-on type marker. Wire numbers shall be as shown on the wiring diagrams. Refer to 260519 Low Voltage Electrical Power Conductors and Cables for vinyl tape of conductors when required. Refer to 260660 Packaged Requirements for Packaged Equipment for labeling of conductors within packaged equipment.

Bands and Tubes

Snap-Around, Color-Coding Bands for Raceways and Cables: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameters sized to suit diameters of raceways or cables they identify, and that stay in place by gripping action.

Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameters of and shrunk to fit firmly around cables they identify. Full shrink recovery occurs at a maximum of 200 deg F (93 deg C). Comply with UL 224.

Tapes and Stencils

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

Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide; compounded for outdoor use.

Floor Marking Tape: 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

Pull Boxes

Provide labels for all power system pull boxes. Label shall identify all power circuits contained within that pull box.

Engraved to show lettering against the background with a beveled edge. Reverse engraving from back is preferred. The information identified on the label shall be centered 1/8" capital lettered text indicating the following information on dedicated lines:

- Source panel and circuit number (separated by a forward slash "/")

The label color scheme shall be as indicated below unless directly indicated otherwise within this specifications or the construction drawings. Equipment with multiple power sources shall use the most critical power sources color scheme.

- Normal and Stand-by Power Equipment: White letters on a black background
- Fire Alarm Equipmentt: White letters on a red background
- Uninterruptible Power Equipment: White letters on Gray background

Use Template Type C in section 2.2.5. Locate the nameplate directly on the pull box. Install at a location for ease of visibility from the floor or accessible maintenance location. Use permanent adhesive cement suitable for the installed environment.

Examples:

RP-5801-03/24	HP-5801-01/3,5,7

Underground-Line Warning Tape

Tape: Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical [and communications] utility lines.

Printing on tape shall be permanent and shall not be damaged by burial operations.

Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

Color and Printing: Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".

Inscriptions for Orange-Colored Tapes: "[TELEPHONE CABLE], [CATV CABLE], [COMMUNICATIONS CABLE],[OPTICAL FIBER CABLE]".

Non-Detectable Buried Line Tape: 3" wide, 4 mil polyethylene, bright colored tape with continuous-printed on one side with the inscription of the utility. Compounded for direct-burial service.

Detectable Buried Line Tape: 3" wide, 5 mil polyethylene laminated with solid aluminum-foil core, bright colored, continuous-printed on one side with the inscription of the utility. Compounded for direct-burial service.

2.2.4. Electrical, Low Voltage, and Communications Cable Tray

Provide a 1-1/2" high, black capital lettering on yellow background with legend "WARNING! NOT TO BE USED AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL."

2.2.5. Electrical Nameplates

Electrical Distribution Equipment Nameplates

Provide nameplates for all electrical equipment, including but not limited to substations, switchgear, switchboards, distribution panelboards, branch circuit panelboards, transformers, motor control centers, uninterruptable power supplies, inverters, circuit breaker enclosures, transfer switches, generators, etc.

Engraved to show lettering against the background with a beveled edge. When possible, reverse engraving from back is preferred. The information identified on the label shall be left aligned 1/4" capital lettered text indicating the following information on dedicated lines:

- Equipment name and/or designation
- [Equipment description]
- Equipment voltage, phase, and number of wires
- Equipment source(s) panelboard or overcurrent protective device designation

Use Template Type B in Section 2.2.5. Locate the nameplate directly attached to the top equipment housing. Locate in other locations attached to the equipment only where the top is obstructed from view while standing at the equipment access point or floor level.

Examples:

LP-5801-08 [LIGHTING PANEL] 480/277V 3ø 4w FED FROM: HDP-5801-03	PDP-5802-03B [PWR DIST PANEL] 480/277V 3ø 4w FED FROM: MSB-5801-01
UPS-LP-5801-01 [UPS MDF PANEL] 208/120V 3ø 4w FED FROM: UPS-5801-01	EHDP-4800-01 [EM DIST PANEL] 480V 3ø 3w FED FROM: ATS-4800-01

See example below for equipment with multiple power sources.

ATS-1100-02
[AUTO TRANSFER SW]
480/277V 3ø 4w
FED FROM: HDP-1100-01
FED FROM: GEN-1100-01

The label color scheme shall be as indicated below unless directly indicated otherwise within this specifications or the construction drawings. Equipment with multiple power sources shall use the most critical power sources color scheme.

- Normal and Stand-by Power Equipment: White letters on a black background
- Fire Alarm Equipmentt: White letters on a red background
- Uninterruptible Power Equipment: White letters on Gray background

Provide labels for all electrical service equipment disconnecting means, rated 1200A and more, showing the nominal system voltage, maximum available fault current, clearing time of the overcurrent protection devices, and date the label was applied. Label shall indicate maximum available fault current in symmetrical root mean square amperes, and the date of the fault current calculation. Use Template Type D in Section 2.5. Use die cut matte vinyl "print-and-peel" label resistant to moisture and wash down with OSHA/ANSI compliant hazard alerting safety message in black text on orange background at top of label and black lettering against white background indicated fault current and date at bottom of label. Mount the label on the equipment with self-adhesive backing.

Electrical Devices and Fixture Nameplates

Provide nameplates for all electrical devices and fixtures, including but not limited to receptacles, light switches, pushbuttons, power supplies, indicating lights, plugmold, floor boxes, etc.

Engraved to show lettering against the background with a beveled edge. When possible, reverse engraving from back is preferred. The information identified on the label shall be centered 1/8" capital lettered text indicating the following information on dedicated lines:

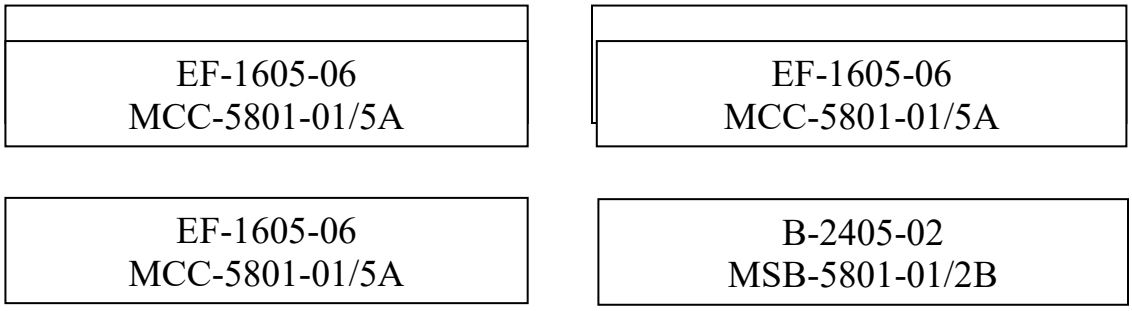
- Device name or load served (where applicable)
- Source panel and circuit number (separated by a forward slash "/")

The label color scheme shall be as indicated below unless directly indicated otherwise within this specifications or the construction drawings. Equipment with multiple power sources shall use the most critical power sources color scheme.

- White letters on black background

Use Template Type C in section 2.2.5. Locate the nameplate directly above the device or fixture attached to the faceplate or housing. Where space does not allow for mounting to the housing or faceplate, mount to the wall directly above or below the device or fixture. Install at a location for ease of visibility from the floor or accessible maintenance location.

Examples:



Disconnects and Motor Controller Nameplates

Provide nameplates for all disconnects and motor controllers, including but not limited to motor starters, variable frequency drives, fusible and non-fusible disconnect switches, etc.

Engraved to show lettering against the background with a beveled edge. When possible, reverse engraving from back is preferred. The information identified on the label shall be centered 1/8" capital lettered text indicating the following information on dedicated lines:

- Equipment designation and/or number (matching designation load served)
- Equipment description and/or function (matching description of load being served)
- Source panel and circuit number

The label color scheme shall be as indicated below unless directly indicated otherwise within this specifications or the construction drawings. Equipment with multiple power sources shall use the most critical power sources color scheme.

- Normal and Stand-by Power Equipment: White letters on a black background
- Fire Alarm Equipmentt: White letters on a red background
- Uninterruptible Power Equipment: White letters on Gray background

Use Template Type A in section 2.2.5. Mount the nameplate using corrosion resistant screws or a suitable permanent adhesive cement.

Examples:

P-2311-01 JCKT CIRC PUMP MCC-5801-03/3A	CIP-2001-01 CIP SKID HP-2101-01/24,26,28

Control Panel Nameplates

Provide nameplates for all instrument, process, and other low voltage control panels.

Engraved to show lettering against the background with a beveled edge. Reverse engraving from back is preferred. The information identified on the label shall be left aligned 1/8" capital lettered text indicating the following information on dedicated lines:

- Equipment designation and/or number (matching designation load served)
- Instrument tag number (where applicable)
- Equipment description and/or function (matching description of load being served)
- Source panel and circuit number

The label color scheme shall be as indicated below unless directly indicated otherwise within this specifications or the construction drawings. Equipment with multiple power sources shall use the most critical power sources color scheme.

- Normal and Stand-by Power Equipment: White letters on a black background
- Fire Alarm Equipmentt: White letters on a red background
- Uninterruptible Power Equipment: White letters on Gray background

Use Template Type A in section 2.2.5.

Examples:

CP-5801-08 [INSTMNT TAG NUMBER] FMS CONTROL PANEL FED FROM: UPS-RP-5801-03	LRP-2101-01 [INSTMNT TAG NUMBER] LTG RELAY PANEL FED FROM: LP-2101-01

Control Panel Interior Mounted Nameplates

Provide an interior legend within each control panel.

Engraved to show lettering against the background with a beveled edge. Reverse engraving from back is preferred. The information identified on the label shall indicate the Instrument Tag Number, terminal strip number or device description as indicated on drawings.