**Eaton Guide Specification**

**Notes and instructions to specwriter**

The following guide specification is offered for your assistance in specifying this product as part of a CSI (Construction Specification Institute) compliant document.

This guide specification has been created in MS Word and uses Word features including **Styles** and **Review** to assist in editing and formatting. You may also find it helpful to view the document in **Outline** mode when editing or selecting sections to copy/paste into your base document.

**Styles**

Styles are provided for all paragraph types described in the CSI Masterformat. Applying a Style to text will provide the correct indentation, paragraph letter/number, font, capitalization, etc…. Styles are shown on the right-hand side of the Word “Home” ribbon.



**Review**

“Notes to Specwriter” (when available) are provided using the Reviews feature in Word. To view “Notes to Specwriter” select “All Markup” in the Tracking dropdown menu on the Review ribbon. To hide notes, select “No Markup”. You can advance from one note to the next using the Previous and Next buttons on the same ribbon.



**Outline view**

The Outline view within Word is often helpful when editing or copying sections from this Guide Specification. Also, when pasting sections from this document into a base document the specwriter may want to consider using right-click and “Merge Formatting’ or ‘Keep Text Only” features.

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Panelboards

# general

## Scope

### The Contractor shall furnish and install the panelboards as specified and as shown on the contract drawings.

## References

### The panelboards and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL as follows:

#### UL 67 – Panelboards

#### UL 50 – Cabinets and boxes

#### NEMA PB1

#### Fed. Spec. W-P-115C

#### UL98 – Fusible Switches

## Submittals – for Review/approval

### The following information shall be submitted to the Engineer:

#### Breaker layout drawing with dimensions indicated and nameplate designation

#### Component list

#### Conduit entry/exit locations

#### Assembly ratings including:

##### Short-circuit rating

##### Voltage

##### Continuous current

#### Cable terminal sizes

#### Product data sheets

## Submittals – for construction

### The following information shall be submitted for record purposes:

#### Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process

#### Installation information

#### Seismic certification and equipment anchorage details as specified

## Qualifications

### The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

### For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

### The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

### Provide Seismic tested equipment as follows:

#### The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the latest International Building Code (IBC).

#### The project structural engineer will provide site specific ground motion criteria for use by the manufacturer to establish SDS values required.

#### The IP rating of the equipment shall be 1.5

#### The structural engineer for the Site will evaluate the SDS values published on the manufacturer’s website to ascertain that they are "equal to" or "greater than" those required for the Project Site.

#### The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.

##### The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon the above criteriato verify the seismic design of the equipment.

##### The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.

##### The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

## Regulatory Requirements

### Panelboard overcurrent protective devices shall be selectively coordinated with all supply side overcurrent protective devices as required for this project by the National Electrical Code/NFPA 70 Articles 645.27, 700.27, 701.27 and 708.54.

### The panelboards shall be UL labeled.

## Delivery, Storage and Handling

### Equipment shall be handled and stored in accordance with manufacturer’s instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

## Operation and Maintenance Manuals

### Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and renewal parts lists where applicable, for the complete assembly and each major component.

# products

## manufacturers

### Eaton

### \_\_\_\_\_\_\_\_\_\_

### \_\_\_\_\_\_\_\_\_\_

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

## ratings

### Panelboards rated 240 Vac or less shall have short-circuit ratings as shown on the drawings or panelboard schedules, but not less than 10,000 amperes RMS symmetrical.

### Panelboards rated 480 Vac shall have short-circuit ratings as shown on the drawings or panelboard schedules, but not less than 14,000 amperes RMS symmetrical.

### Panelboards shall be labeled with a UL short-circuit rating. Series rated panelboards shall be provided with a label or manual stating the conditions of the UL series ratings. Information in the manual shall include, at minimum:

#### Size and type of upstream device

#### Branch devices that can be used

#### UL tested and listed series short-circuit rating

## construction

### Interiors shall be completely factory assembled. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.

### Trims for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semi flush cylinder lock and catch assembly. Door-in-door trim shall be provided. Both hinged trim and trim door shall utilize three point latching. No tools shall be required to install or remove trim. Trim shall be equipped with a door-actuated trim locking tab. Equip locking tab with provision for a screw such that removal of trim requires a tool, at the owner’s option. Installation shall be tamper resistant with no exposed hardware on the panelboard trim.

### Distribution panelboard trims shall cover all live parts. Switching device handles shall be accessible.

### Surface trims shall be same height and width as box. Flush trims shall overlap the box by 3/4 of an inch on all sides.

### A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door.

### All locks shall be keyed alike.

## bus

### Main bus bars shall be tin-plated copper [aluminum] sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum.

### A system ground bus shall be included in all panels.

### Full-size (100%-rated) insulated stand-off neutral bars shall be included for panelboards shown with neutral. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection. 200%-rated neutrals shall be supplied for panels designated on drawings with oversized neutral conductors.

## branch circuit Panelboards – Circuit breaker

### The minimum short-circuit rating for branch circuit panelboards shall be 10,000 amperes symmetrical at 240 volts, and 14,000 amperes symmetrical at 480 volts, or as indicated on the drawings. Panelboards shall be [fully rated] [series rated]. Panelboards shall be Eaton type Pow-R-Line 1X, Pow-R-Line 2X or Pow-R-Line 3X.

### Bolt-on type, heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein, shall be provided for each circuit with toggle handles that indicate when unit has tripped.

### All circuit breakers shall be thermal-magnetic type with common handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100-ampere frame. Ratings through 100-ampere trip shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits.

#### Circuit breaker handle locks (ON position) shall be provided for all circuits that supply exit signs, emergency lights, energy management, and control system (EMCS) panels and fire alarm panels.

## branch circuit panelboards – fusible

### The minimum short-circuit rating for branch circuit panelboards shall be as specified herein or as indicated on the drawings. Panelboards shall be fully rated. Panelboards shall be Eaton type Pow-R-Line 3FQS, Bussman Type QSCP, or engineer approved equal.

### Panelboard shall have an integrated spare fuse compartment for up to (6) spare CUBEFuses as standard.

### Branch circuit disconnecting means shall be bolt-on Bussmann Type CCPB with Bussmann Low-Peak CUBEFuses utilized for overcurrent protection. Ratings shall be available from 15-100A with minimum interrupting rating of 300kA symmetrical and 200kA short circuit current assembly rating.

### Branch circuit devices shall include a non-defeatable interlock to prevent removal of fuse under load. Provide a fuse ampacity rejection feature to prevent overfusing of branch disconnect. Fuses shall be indicating type with permanently installed neon indicating light. Branch devices shall be finger-safe when panelboard trim is removed. Provide lockout/tagout provision for each branch circuit position.

## dISTRIBUTION PANELBOARDS – CIRCUIT BREAKER TYPE

### Distribution panelboards equipped with bolt-on devices shall have interrupting ratings as indicated on the drawings. Panelboards shall be [fully rated] [series rated]. Panelboards shall be Eaton type Pow-R-Line 3X or Pow-R-Line 4X. Panelboards shall have molded case circuit breakers as indicated below.

### Where indicated, provide circuit breakers UL listed for application at 100% of their continuous ampere rating in their intended enclosure.

### Main breakers, if furnished, shall be equipped with microprocessor based trip units that have integral Arc Flash Reduction trip feature. The use of zone selective interlocking to emulate this function does not meet the intent of this specification and will not be allowed.

### Distribution circuit breakers shall be fixed mounted type and equipped with either microprocessor based trip units or thermal magnetic trip units as scheduled on the contract drawings.

### Provide shunt trips, bell alarms, and auxiliary switches as shown on the contract drawings.

## distribution panelboards – fusible switch type

### Distribution panelboards shall be equipped with main and branch fusible switches and include fuses with ratings indicated on the drawings. Fusible distribution panelboards shall be Eaton type Pow-R-Line 4F.

## panelboard submetering

### Where shown on the drawings, supply a UL listed microprocessor-based Multi-Point Metering System (MPM), Eaton type PX Multipoint Meter or approved equal having the specified features.

### MPM shall have 60 channels for current sensor input. Meter shall auto-detect sensor rating and have standard tamper detection.

### MPM shall calculate power and energy consumption in accordance with ANSI C12.20 (0.5%) metering specification and store metered data in nonvolatile memory.

### MPM shall store the following per phase and system total for each metering point

#### Voltage, Current, and Frequency (system total only)

#### Watts, VAR, VA, and power factor

#### Watt hours including forward and reverse

### MPM shall store energy profile information for each metering point in non-volatile memory. The demand profile time period shall be adjustable from 1, 5, 15, 30 and 60 minutes for fixed method and 1, 5, and 15 minutes for sliding method. The MPM shall have the ability to sync with external input to the on board demand input. The MPM shall be able to save a minimum of 1 year of load profile data for all 60 meter points on a 15 minutes basis.

### MPM shall be provided with multiple communications ports and protocols, including the following capability:

#### RS-485 remote display port

#### RS-485 Modbus RTU

#### USB Local Configuration Port

#### HTML web pages

#### File transfer protocol (ftp)

#### RJ-45 10/100Base-T Ethernet network port

#### Modbus TCP

#### BACnet/IP

#### SMTP(Simple Mail Transfer Protocol) for email support

#### SNMP(Simple Network Management Protocol) MIB support

#### Ethernet TCP/IP

#### NTP(Network Time Protocol) support

## surge protective devices

### SPD shall comply with ANSI/UL 1449 4th Edition or later listing by Underwriters Laboratories (UL).

### SPD shall be factory installed integral to the panelboard by the original equipment manufacturer, and shall be a product of the same manufacturer as the panelboard and breakers.

### The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable single-mode modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

### Electrical Requirements:

#### Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.

#### Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.

#### The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards. End of life mode to be open circuit. Unit with end of life short-circuit mode are not acceptable.

#### Unit shall operate without the need for an external overcurrent protection device (OCPD), and be listed by UL as such. Unit must not require external OCPD or replaceable internal OCPD for the UL Listing.

#### Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

|  |  |
| --- | --- |
|  | Protection Modes |
| Configuration | L-N | L-G | L-L | N-G |
| Wye | ● | ● | ● | ● |
| Delta | N/A | ● | ● | N/A |
| Single Split Phase | ● | ● | ● | ● |
| High Leg Delta | ● | ● | ● | ● |

#### Nominal Discharge Current (In) – All SPDs applied to the distribution system shall have a 20kA In rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an In less than 20kA shall be rejected.

#### ANSI/UL 1449 4th Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 4th Edition VPR for the device shall not exceed the following:

|  |  |  |  |
| --- | --- | --- | --- |
| Modes | 208Y/120 | 480Y/277 | 600Y/347 |
| L-N; L-G; N-G | 700 | 1200  | 1500 |
| L-L | 1200  | 2000  | 3000 |

## enclosure

### Enclosures shall be at least 20 inches wide made from galvanized steel. Provide minimum gutter space in accordance with the National Electrical Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.

### NEMA 1,3R,3R316SS,4X

### Enclosures shall be provided with blank ends.

### Where indicated on the drawings, branch circuit panelboards shall be column width type.

## nameplates

### Provide an engraved nameplate for each panel section.

## finish

### Surfaces of the trim assembly shall be properly cleaned, primed, and a finish coat of gray ANSI 61 paint applied to N1 & N3R. N4X 316SS RAL9003 Signal White preferred. Brushed is also available.

# execution

## factory testing

### The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.

## installation

# The Contractors shall install all equipment per the manufacturer’s recommendations and the contract drawings.