

GENERAL

The scope of this document is to provide requirements for low voltage service entrance.

DESIGN GUIDELINES

1. In new installations, only one service entrance per voltage or double ended w/tie breaker setup may be installed, unless approved by the Project Manager.
2. Where the service entrance main breaker frame size is 1,200 amps or larger, NEC article 240.87 requires arc energy reduction by one of listed methods. The preferred method is the energy-reducing maintenance switch. Maintenance switch shall be a two position, lockable device with a locally mounted blue strobe beacon enabled when in maintenance mode. System shall have one spare set of contacts for future use. Alternative methods may be considered on a case by case basis.
3. All 480-volt service entrance main breakers or fused switches that are rated 1,000 amps or higher are required to have Ground Fault Protection (GFP). This equates to 665 KVA with a single main breaker of standard design.
4. Where the service entrance disconnect has GFP, all feeder breakers in the main distribution panel shall have GFP. Single unit (zero sequence) sensors shall NOT be used. Indication of GFP trip shall be visible on the front side of the switchboard without removal of any covers.
5. Where the service entrance disconnect is equipped with GFP, the consultant shall provide time and current setting for the GFP. The service entrance GFP will coordinate with feeder circuits that have GFP and small feeder breakers (such as 20 or 30 amps) to insure the feeder circuit will open before the GFP can trip the main breaker.
6. Low voltage service entrance shall consist of a service entrance main circuit breaker installed in a dedicated section and a main distribution section. The service entrance main breaker enclosure shall be physically separated from the main distribution panel as shown in the service entrance detail drawings (refer to Section 26 2400: Design Guidelines for Switchboards and Panelboards).
7. Typical installations would be molded case circuit breaker design with switchgear types as follows:

Amps	Voltage	Service Entrance (SE)
Less than 1200	120/208V	Panelboard
1200 & over	120/208V	Switchboard
All	277/480V	Switchboard

NOTE: Draw out breakers may be used for increased reliability and maintainability if required for the type of loads and breaker duty. The use of draw out breakers needs approval of University project manager.

8. The Service Entrance shall be UL listed as suitable for use as a service entrance.
9. The service entrance main breaker shall include a motor operator to automatically charge the trip and close mechanism, and electrically operated trip and close solenoids to allow remote trip/close from a pushbutton station. Regardless of whether required by code, provisions shall be made to lock the breaker in a safe operating (open) condition using a padlock.
10. The service entrance shall include: electrically operated main circuit breaker, control power, and a pushbutton station designed for remote operation (both trip and close) of the service entrance main breaker including the ability to disable the remote (close) pushbutton function during lockout procedures.
11. The service entrance main breaker shall be Square-D Powerpact Series, or approved equal. Proposed equals shall be submitted for review and approval prior to bid opening. The main breaker shall include a true RMS sensing electronic trip unit with; adjustable long time pickup, adjustable long time delay, adjustable short time pickup, adjustable short time delay, I_{2tin} and I_{2tout}, adjustable instantaneous pickup, and targets to show cause of breaker trip. Where ground fault trip function is used it shall be part of the circuit breaker electronic trip unit and include; adjustable pickup, adjustable delay, I_{2tin} and I_{2tout}.
12. Service entrance switchboards shall have three phase voltage monitoring relay to trip the main in the event of single phase, phase loss, phase reversal or phase unbalance in excess of 8 percent with time delay of 3 seconds. The voltage monitoring relay shall include a stored energy device such as a trip capacitor. The voltage monitoring relay shall NOT operate when power is lost to all three phases. Indication of relay trip and manual reset shall be visible on the front side of the switchboard without removal of any covers.
13. Control power for the service entrance main breaker shall be supplied from the incoming (source) feed to the main breaker, and include two (2) separate levels of short circuit protection that are physically separated from each other. The first control power short circuit fuse/circuit breaker shall reduce the arc-flash hazard at the second fuse/circuit breaker to ensure that the second device may be operated with a maximum arc-flash hazard/risk category of 2 as defined in NFPA 70E (Standard for Electrical Safety in the Workplace). The first control power fuse/circuit breaker shall fully coordinate with the second to ensure that any short circuit on the control circuit will trip the second fuse/circuit breaker but NOT trip the first device. Where the service entrance main breaker frame size is 1,200 amps or larger, 2017 NEC article 240.87 requires arc energy reduction by one of listed methods. The preferred method is the energy-reducing maintenance switch. Alternative methods may be considered on a case by case basis.
14. All Bus Bars (phase, neutral, and ground) shall be copper.

15. Service entrance main shall be equipped with voltage and current metering for all phases. Metered values shall be visible on the front side of the switchboard without removal of any covers.

NOT PERMITTED

Aluminum bus bar shall NOT be used.