

Design For SAFETY

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This is part 1 of an ongoing series intended to give tips and suggestions to the electrical design engineer to design electrical distribution systems with safety for the end user as the primary concern. The concern with the worker's safety continues to increase and there are numerous items which can be specified and designs which can be implemented which will increase a worker's safety.

Main Devices versus 6 Handle Rule

The concern with the worker's safety continues to increase. This has resulted in arc flash studies, which calculate the arc flash hazard present and recommends appropriate PPE (personal protective equipment) that the worker should implement. Arc flash studies are performed to determine and provide the information to educate the worker on the hazards of working on the energized electrical equipment. The key point to consider is the working on energized equipment. The designer can increase worker safety by specifying equipment with features that provide a means to eliminate the need to work on energized equipment.

The NEC (National Electric Code) in Article 230.71 allows the use of not more than 6 switches or circuit breakers per service for the disconnection of power at the service entrance location. Many times the services are small enough that OPD (overcurrent protective device) of sufficient amperage are available to provide a single point disconnect for the service. One advantage of a switchboard utilizing the 6 handle rule is reduced cost because a large device is not purchased. Smaller footprints are achieved in many instances because the large main device is not provided. Many people also feel that continuity of service is better with the 6 handle service boards than with a single main device. The reasoning is that a fault including ground faults downstream will not have the opportunity to disconnect the entire service by causing the main OPD to trip. With a 6 handle board only the single main serving the faulted load will generally trip.

There are many services installed annually across the country that utilize a 6 handle service entrance switchboard for some, or all of the reasons listed above. However there are numerous downsides to this type of arrangement.

If one of the OPD that are part of the 6 service disconnects is required to be removed for service, the electrician may work on an energized piece of equipment. He also may be tempted to work on energized equipment if a space for one of the 6

disconnects was designed into the project and is being added at a later date. The electrician may be tempted to work on the energized equipment because of the hassle involved with getting a shutdown. The only way to de-energize the equipment is coordination with the local utility. Many times the electrician will not want to wait on the utility to get to the site or pay the disconnect/reconnect fee that many utilities charge. The electrician might then decide to work on the equipment energized despite the manufacturer's instructions and safety notices.

If the service entrance equipment is provided with a main device, the electrician is at least given a readily available option to de-energize the equipment. As an added safety feature, the main device should also be located in a separate switchboard section without load side cables coming anywhere near line side conductors. Additional benefits are present with the main device. As the facility grows additional breakers or switches can be added to the main service entrance switchboard. If all of the 6 disconnects were utilized in the initial design, the owner is faced with an expensive upgrade instead of a simple additional device.

If during the design process cost and space become a concern to the owner or the architect, the designer should adequately inform the decision makers of the possible hazards that could exist with the 6 handle service equipment in lieu of a single main device. Regardless of the service entrance design chosen, the user should always be encouraged to follow the manufacturer's instructions, recommended industry safety standards and all posted safety notices. The workers safety should always be of the utmost concern.

