

**GENERAL:**

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1. The scope of this document is to provide requirements for low voltage switchgear.
2. For these guidelines, Switchgear design is defined as the use of draw out breakers.
3. Switchgear design shall be used when high reliability and ease of maintenance of the installation is required for the facility being served and requires approval of the Project Manager.
4. See section 26 2116 Electrical Service Entrance for guidelines governing design of building low voltage service entrance.

**DESIGN GUIDELINES:**

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1. Switchgear shall be designed, to provide ease of maintenance and testing without service interruption.
2. The assembly and location shall allow for future additions and modifications.
3. All switchgear shall be located in a dedicated, lockable electrical room.
4. Enclosure
  - 4.1. It shall be a vertical free standing rigid metal enclosure with “compartments” used for additions and removal of circuit breakers and other equipment devices.
  - 4.2. Shall be floor mounted with front & rear access with hinged doors.
  - 4.3. Assemblies shall have barriers between all breakers.
  - 4.4. Rear of switchgear shall have barriers between each vertical section.
  - 4.5. Draw out breakers shall have automatic shutters to guard connections when breaker is removed.
  - 4.6. Enclosure shall prevent the entry of a #12 AWG wire.
  - 4.7. Each device shall be capable of being operated without opening any door.
  - 4.8. All trip indications, trip resets and metered values shall be displayed on the front of the assemblies without removal of any covers.
  - 4.9. Assembly temperature ratings
    - 4.9.1. Ambient: -30° C minimum ,40° C maximum
    - 4.9.2. Full load rise of 65° C maximum above ambient.
    - 4.9.3. Full assembly shall achieve rated capabilities without the use of forced air ventilation.
  - 4.10. Infrared inspection windows shall be provided to allow energized inspection of all connections.
5. Electrical
  - 5.1. All bus bar (phase, neutral, and ground) shall be 98% conductivity copper.
  - 5.2. Copper bus current density shall not exceed 1,000 amperes per square inch.
  - 5.3. Main/Source busing shall be fully insulated.
  - 5.4. Neutral bus bar shall be fully rated (100% of phase bus bars).
  - 5.5. All power and ground lugs shall be compression-type, long-barrel double –hole, copper type lugs.

- 5.6. Assemblies shall be provided with local instrumentation and control system for automatic and manual operation of the system and for monitoring and control during operation.
- 5.7. Assemblies shall be equipped with appropriate devices for local testing, monitoring and lock-out tag-out.
- 5.8. Each assembly shall include digital metering and local display of voltage, power quality and event logging.
- 5.9. All settable relays or other devices mounted inside the assemblies shall be installed in compartments with a hinged cover.
6. Switchgear shall have a minimum of 20% spare capacity for future loads. Spare Capacity is defined as additional continuous load and space for installing future circuit breakers or fused switches within the panel.
7. Provide permanently attached nameplate displaying, at a minimum, the name, voltage, phase and supply circuit origin. Label each overcurrent protection device to show the load it supplies. Include permanent one-line diagram mimic bus.
8. Main-Tie-Main assemblies shall have interlocks to prevent a condition of all three breakers closed at the same time.