

- (2) *The building or structure is unoccupied and fire protection systems are fully functional and do not require an alternate power source.*
- (3) *Other temporary means can be substituted for the emergency system.*
- (4) *A permanent alternate emergency source, such as, but not limited to, a second on-site standby generator or separate electric utility service connection, capable of supporting the emergency system, exists.*

700.4 Capacity and Rating.

(A) Capacity. An emergency system shall have adequate capacity in accordance with Parts I through IV of Article 220 or by another approved method. The system capacity shall be sufficient for the rapid load changes and transient power and energy requirements associated with any expected loads.

The emergency system must be designed with adequate capacity and rating to safely carry, at one time, the entire load connected to it. The system must be capable of restarting emergency loads that have been interrupted, such as motors that may have stopped, and it must be suitable for the available fault current.

See also

517.31(D) for the requirement covering acceptable methods to calculate the electrical demand of a hospital's essential electrical system

Δ (B) Selective Load Management. The alternate power source shall be permitted to supply emergency, legally required standby, and optional standby system loads where the source has adequate capacity or where load management (that includes automatic selective load pickup and load shedding) is provided as needed to ensure adequate power to the following in order of priority:

- (1) Emergency circuits
- (2) Legally required standby circuits
- (3) Optional standby circuits

If a generator is used for peak load shaving, supplying backup power, and other uses, priority loads must be properly and reliably served. Selective load pickup and load shedding are not required where the generator has the capacity to supply all loads served.

If a generator is used for peak load shaving or in a cogeneration system, the increase in wear and tear will likely result in an increase in downtime for maintenance. Also, using the emergency generator on a regular basis for nonemergency loads provides assurance that the emergency generator will supply emergency power when needed.

N (C) Parallel Operation. Parallel operation of the emergency source(s) shall consist of the sources specified in 700.4(C)(1) and (C)(2).

N (1) Normal Source. The emergency source shall be permitted to operate in parallel with the normal source in compliance with

Part I or Part II of Article 705 where the capacity required to supply the emergency load is maintained at all times. Any operating condition that results in less than the required emergency source capacity shall initiate a system malfunction signal in accordance with 700.6(A).

Parallel operation shall be permitted for satisfying the test requirements of 700.3(B), provided all other conditions of 700.3 are met.

Informational Note: Peak load shaving is one application for parallel source operation.

N (2) Emergency Source. Emergency sources shall be permitted to operate in parallel where the necessary equipment to establish and maintain a synchronous condition is provided.

700.5 Transfer Equipment.

Double-throw automatic transfer switches (ATS) typically are used for emergency and standby power generation systems rated 1000 volts or less. These transfer switches do not normally incorporate overcurrent protection. ATS are available in ratings up to 38 kilovolts. For reliability, those used for emergency and legally required standby systems must be electrically operated and mechanically held. System grounding is determined by the type of transfer switch employed.

See also

250.30 and associated commentary regarding separately derived systems

Transfer switches should be located close to the load. It may be advantageous to use multiple transfer switches of lower current rating located near the loads rather than one large transfer switch at the point of incoming service. For information on time-delay devices for ATS, see the accompanying Closer Look feature.

CLOSER LOOK: Time-Delay Devices on Automatic Transfer Switches

The normal power source is usually a service, and the emergency power source is an automatically started engine generator set that starts when the normal source fails. Time-delay controls are essential to the operation of the ATS.

To avoid unnecessary starting and transfer to the alternate supply, a time delay can override momentary interruptions and temporary reductions in normal power source voltage but still allow starting and transfer if the reduction or outage is sustained. However, the time delay should be set fast enough to effectively operate the transfer switch.

The delay generally is set at 1 second but can be set higher if reclosers or circuit breakers on the utility power lines take longer to operate or if momentary power dips exceed 1 second. If longer delay settings are used, care must be taken to ensure that sufficient time remains to meet 10-second power restoration requirements. The AHJ might determine that an outage is