

Generator Switch Requirements for Compliance with NEC 445.19 Emergency Shutdown of Prime Mover

Synopsis: Generator Emergency Stop Switches located at the service equipment in oneand two-family dwellings are now required in many jurisdictions. This requirement does not appear to be mandated in the 2023 NEC code but is apparently driven in each jurisdiction primarily by emergency first-responder requirements. In some cases, generator manufacturers have not provided specific guidelines regarding implementing this capability in their installations. This article discusses the various installation considerations for the installer in the absence of clear guidance from the manufacturer.

Where provided, the manufacturer's recommendations override this information and should be strictly followed in all cases.

NEC Section 445.19(C) requires the emergency shutdown device, generally a switch, to be located outside the dwelling unit at a readily accessible location. If the generator is not provided with an emergency shutdown device, or if provided but not readily accessible, such a device would need to be added to the installation. It is recommended that this device be installed in a separate enclosure designed to accept the switch. *Modifying enclosures containing other equipment such as a generator or transfer switch is NOT recommended*. Drilling a hole in these enclosures to mount the switch may create warranty and liability exposure for the equipment manufacturer and liability exposure for the individual who modified the enclosure.

NEC Section 445.18(A) requires the generator to have a disconnecting means. Most generators are equipped with a disconnecting means located inside the control cabinet. In some locations, the generator may be installed where the disconnecting means is not easily accessible. An example is where the generator's location must be a certain distance above the floodplain. Although the NEC does not require the disconnecting means to be readily accessible, the AHJ may determine that the disconnecting means not being easily accessible, creating an unsafe condition for workers needing to exercise lockout-tagout procedures. In those situations, the AHJ would not allow the disconnecting means inside the generator control cabinet to satisfy the requirement of 445.18(A). The solution to this problem resides in NEC Section 445.19(A), which permits the shutdown device to satisfy the requirements for a disconnecting means when it is capable of being locked in the open position. If the switch is a pushbutton, this requirement is satisfied by providing a lockable cover over the pushbutton. Given that the disconnecting means must be capable of being locked in the open position, compliance with NEC Section 110.25 is necessary. This section requires the provisions for locking to remain in place with or without the lock installed. The means to lock the pushbutton in the open position must be an integral part of the pushbutton or be an accessory that is not easily removed from the pushbutton.

An AHJ may require the shutdown device to be at a remote location for the benefit of first responders. The first choice of location will most likely be outside the dwelling unit near its service equipment. The preferred method for installation at this location is a switch installed in a separate enclosure designed to accept the switch. Using a separate enclosure has the benefit of selecting an enclosure that has a rating suitable for the environment and being able to maintain that rating by installing a switch having the same environmental rating as the enclosure. This ensures that the combination of enclosure and switch will provide the desired environmental protection. The switch may be a pushbutton provided with a lockable cover to satisfy the requirement for a disconnecting means as described in the preceding paragraph. The environmental rating for the switch must include the cover to ensure that the cover provides adequate environmental protection for the pushbutton

NEC Section 445.19(A)(1) requires the shutdown means to be connected in a way that disables the generator start control circuits and renders the generator incapable of starting. To comply with this requirement, the shutdown switch must be capable of connecting to the generator shutdown circuit at the generator or remotely from the generator. If the switch is installed at a remote location, it must be wired back to the generator. This could be accomplished easily using Type TC-ER cable and appropriate cable fittings suitably rated for the environment. If necessary, the cable may need to be protected against physical damage. The most common means of connection is via electrical PVC pipe. Conductors routed through a raceway provided with connectors suitably rated for the environment is another, less convenient, means of connection.

NEC 445.19(A)(2) requires the means of shutdown to have a mechanical reset. A switch that can latch when actuated and requires manual intervention to unlatch the switch will satisfy this requirement. The switch should have a minimum electrical rating of 10 amps, 24 volts AC minimum to be compatible with the generator transfer switch circuitry. The switch should have a mushroom-shaped head so that it can be easily activated with the palm of a hand. The actuator should be red in color so that it is clearly identifiable. The switch should be labeled "Generator Emergency Shutdown." The label must comply with NEC Section 110.21(B), which requires it to be of sufficient durability to withstand the environment involved, be permanently affixed to the equipment, and not be handwritten.

The switch should have evidence of a mark of conformity such as CE or CCC or a Declaration of Conformity citing compliance with appropriate standards. This ensures it has been evaluated and tested to a standard for control circuit devices such as UL 508 or IEC/UL 60947-5-1. A certification mark such as UL, VDE, or TUV indicating third-party compliance would be helpful but not required.

If the emergency shutdown switch is installed outdoors (outside the dwelling unit), the emergency shutdown switch and its enclosure must be rated for outdoor use. Typical outdoor ratings for this application are Type 3R and Type 4. The Type rating of the switch will need to support the Type rating of the enclosure. If the switch is installed on a Type 3R enclosure, the switch will need to be rated Type 3R, Type 4, or Type 4X. If the switch is installed on a Type 4 enclosure, it must be rated Type 4 or Type 4X.

If the emergency shutdown switch is provided with a lockable cover to satisfy the requirement for a generator disconnecting means, the cover should be suitable for maintaining the environmental rating of the switch.

The emergency shutdown switch and its enclosure may also have Ingress Protection (IP) ratings, such as IP65 (similar to Type 4.) If relying on IP ratings to satisfy the conditions of the application, the plastic materials of the switch exposed to the outdoor environment and its enclosure should be UV-rated, as IP ratings do not include UV protection.

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