

Generator Safety

Lives Are On The Line

When a storm knocks out power for extended periods of time, many of those affected turned to backup generators to help keep food safe, lights on, and safety and medical equipment operating. Several million generators are now in homes and small businesses across the nation.

However, only a small percentage of generators are hooked up or used correctly. SafeElectricity.org urges consumers to understand proper generator safety steps.

“Generators can be a lifesaver for some and can improve the quality of life after a natural disaster such as a hurricane, tornado, or earthquake,” explains Molly Hall, executive director of the Safe Electricity program. “However, it’s critical that proper safety precautions be taken to prevent accidents that could affect you, a family member, neighbor, or lineworker.”

Generators can be temporarily or permanently installed. A permanent generator is wired into a house by a qualified electrician using a transfer switch. This protects the owner, his neighbors, and repair crews from electricity backfeeding onto power lines. Backfeeding can seriously injure anyone near those lines, especially co-op crews working to restore power. A temporary generator fired by gasoline or diesel fuel should not be attached to a circuit breaker, fuse, or outlet.

The improper use of a standby generator can lead to injury or death. Always notify Lyntegar EC when installing a permanent generator and always install a double throw switch.

SafeElectricity urges members to follow these tips when using a generator:

- Notify Lyntegar EC you are installing a generator so it can be noted on your account for the safety of lineworkers.
- Follow all manufacturer instructions to properly ground the generator.
- Standby generators should have a transfer safety switch installed by a professional. Portable generators should never be plugged directly into a home outlet or electrical system—use an extension cord to plug appliances into an outlet on the generator.
- Never operate a generator in a confined area, such as a garage. Generators produce gases, including deadly carbon monoxide. They require proper ventilation.
- When venturing outside after a severe storm, whether to check a generator or for any other reason, stay away from downed power lines. Assume that any dangling wires you encounter are electrical, and treat all downed or hanging power lines as if they are energized.
- Generators pose electrical risks, especially when operated in wet conditions. Use a generator only when necessary when the weather creates wet or moist conditions. Protect the generator by operating it under an open, canopy-like structure on a dry surface. Always ensure that your hands are dry before touching the generator.
- When you refuel the generator, make sure the engine is cool to prevent a fire, should the tank overflow.
- Nothing should be plugged into the generator when you turn it on. This prevents a surge from damaging your generator and appliances.
- Keep children and pets away from the generator to avoid burns.

For more information on the use of generators and safety after a storm, go to [SafeElectricity.org](https://www.safeelectricity.org).

Sources: NRECA and Safe Electricity

Generators: The Double-Throw Switch Is An Essential Element*

*Consult a qualified electrician for assistance, and be sure any new wiring is inspected.

Adding a standby generator to the electrical system of a home, farm or business requires a suitable transfer switch to disconnect the electric loads from the electric utility grid. This is a requirement of the National Electrical Code (see NEC Article 702.6). It is also required by your electric power supplier, for

two very good reasons: (1) It prevents the back flow of current into the utility's lines during an outage, which could electrocute line workers attempting to restore power; and (2) It prevents damage to the generator when regular electric service has been restored, which can destroy the generator. **BACKUP GENERATORS CAN TURN INTO LETHAL HAZARDS FOR LINE WORKERS, IF THEY ARE NOT CONNECTED PROPERLY.**

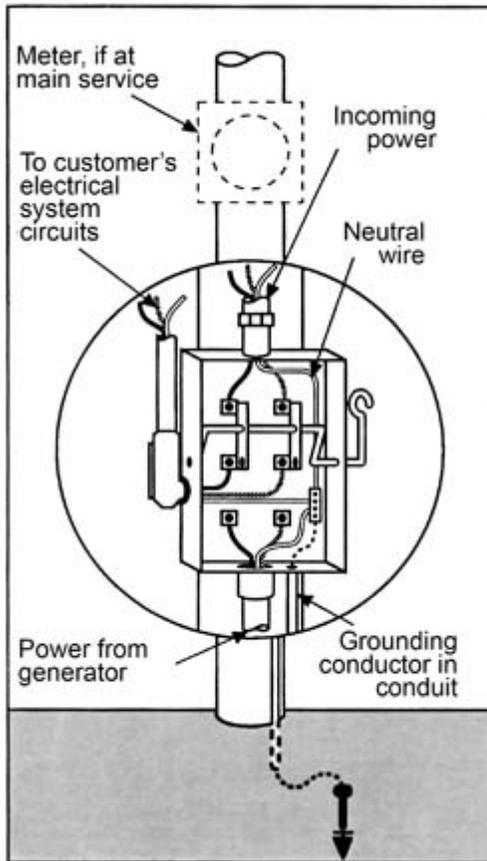
For single-phase, 120/240 volt power, the transfer switch should be a double-pole, double-throw type. Double pole means that there are two pairs of wire lugs available for connection of hot conductors (see Fig. 1). The third wire (neutral wire) is continuous through the transfer enclosure, and is typically not switched. The grounding wire also passes through the switch enclosure to provide a safe and continuous ground connection. The term double-throw means that the operator can place or "throw" the switch into two different positions. One position feeds power from the utility system to the load (the home or business). The other position feeds power from the standby generator to the load. Such a switch will prevent the standby generator from being simultaneously connected to both the customer's load, and to the utility's grid. A three-phase generator would require a three-pole, double-throw switch.

Some electric services may also use current transformer (CT) metering. This may require the use of a pole-top transfer switch. The operation of pole-top switches is essentially the same, except that a manual switch lever extends to ground level, which allows the user to operate the switch.

For smaller portable generators used to power household appliances (refrigerator, freezer, lights or other equipment) that can plug directly into the generator, a transfer switch is not necessary. But any time a generator powers loads through the permanent wiring system of the home, farm or business, a transfer switch must be used.

When a transfer switch is called for, it is commonly located between the utility meter and the loads to be served.

Figure 1 shows an exterior installation (on a pole or exterior wall). Protect the switch within a weatherproof enclosure when installed outside (NEC Article 404.4). The switch should be within 25 feet or less of the generating unit for convenience and safety.

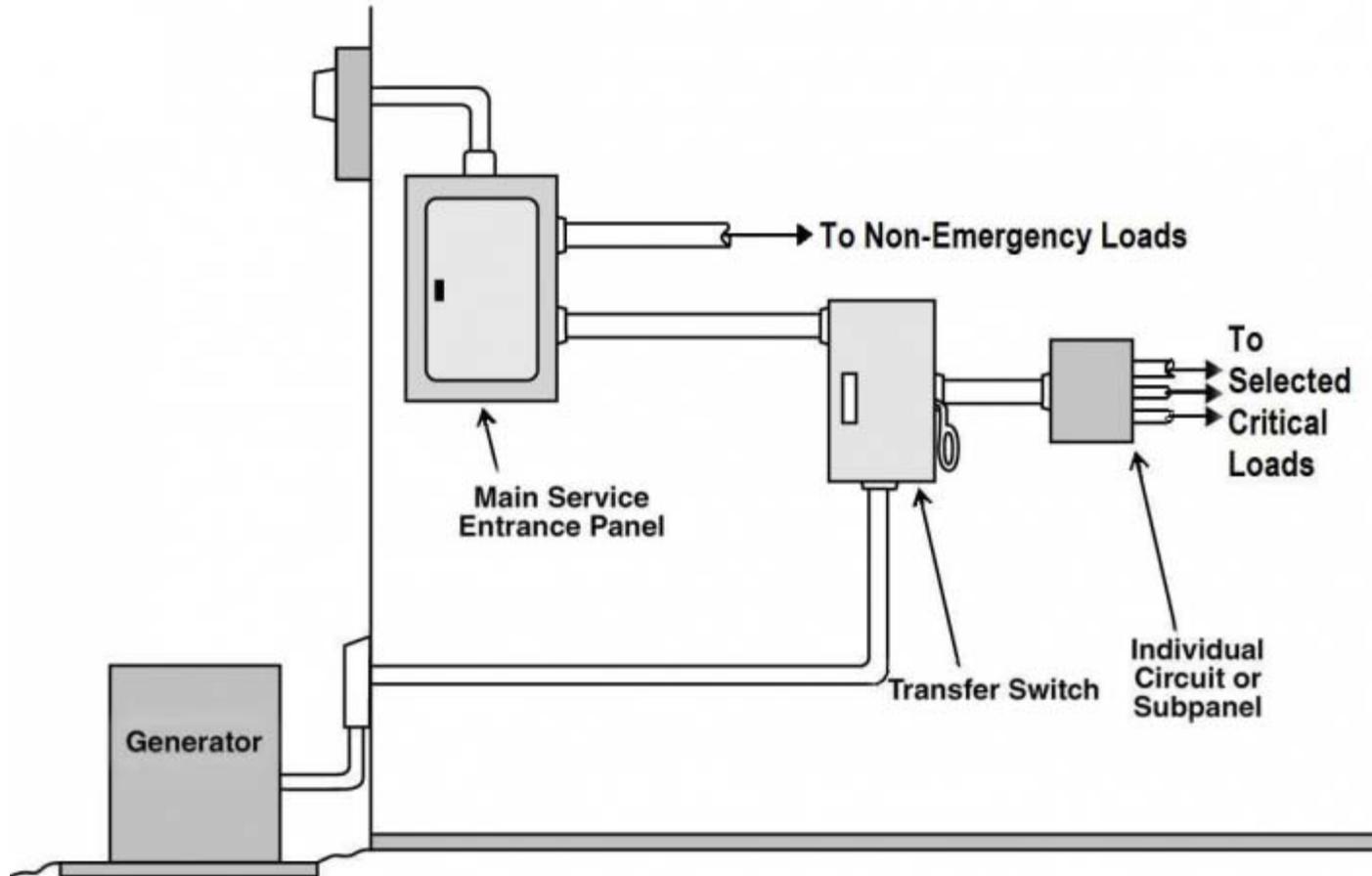


[Figure 1 Typical Double Throw Switch]

The size of the transfer switch (rating in amps) is not determined by the size of the generator, but by the rating of the circuits it serves. If a central meter location is used, the transfer switch rating must be equal to the size of the main service (typically 100, 200, or 400 amperes). This may seem like an excessively large switch if a small generator is used, but it prevents undersizing the switch if a larger generator is used in the future.

If only a few critical circuits in a building need to be powered during an outage, it is possible to connect only those circuits to the transfer switch. Figure 2 illustrates the correct way to install the transfer switch and generator. With this layout, the transfer switch can be smaller than the main service, since the switch is sized to the current rating of the circuits that it serves. This smaller switch size means lower cost, so the Figure 2 layout may be preferred.

When a standby generator will serve loads using the permanent on-site wiring system, a sign must be placed at the service entrance (NEC 702.8). This tells your utility, or electrician, that a generator may be providing power during an outage.



[Figure 2 Double Throw Switch Layout]

Figure 2: Double-throw switch controlling individual circuits or subpanel.

A permanently installed generator should be grounded using #6 copper wire to connect the generator to the existing grounding network of the premises. This existing grounding system will have at least one, 8-foot ground rod (or other approved grounding electrode). The generator should be properly bonded to the electrical grounding system with an approved clamp/connection to assure good electrical contact.

Other safety features to remember:

- Keep all guards and shields in place to protect the operator from moving parts;
- Never run a generator in a basement or other enclosed area. Fumes that are not easily detected can be lethal to occupants;
- Never shut off the generator under load;
- Never store fuel near the generator, unless a proper container or fuel tank is used;
- Never re-fuel a generator when hot or while the engine is running;
- Use extreme care under wet conditions; making your body a path to ground can cause a fatal shock;
- On tractor-driven units, always turn off the tractor and PTO control to service the generator. Set the tractor brake before starting the generator.

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