



Electrical Safety and Generators

Preventing Electrocutions Associated with Portable Generators Plugged Into Household Circuits

When power lines are down, residents can restore energy to their homes or other structures by using another power source such as a portable generator. If water has been present anywhere near electrical circuits and electrical equipment, turn off the power at the main breaker or fuse on the service panel. Do not turn the power back on until electrical equipment has been inspected by a qualified electrician.

If it is necessary to use a portable generator, manufacturer recommendations and specifications must be strictly followed. If there are any questions regarding the operation or installation of the portable generator, a qualified electrician should be immediately contacted to assist in installation and start-up activities. The generator should always be positioned outside the structure.

When using gasoline- and diesel-powered portable generators to supply power to a building, switch the main breaker or fuse on the service panel to the "off" position prior to starting the generator. This will prevent power lines from being inadvertently energized by backfeed electrical energy from the generators, and help protect utility line workers or other repair workers or people in neighboring buildings from possible electrocution. If the generator is plugged into a household circuit without turning the main breaker to the "off" position or removing the main fuse, the electrical current could reverse, go back through the circuit to the outside power grid, and energize power lines or electrical systems in other buildings to at or near their original voltage without the knowledge of utility or other workers.

Effects of Backfeed

The problem of backfeed in electrical energy is a potential risk for electrical energy workers. Electrocutions are the fifth leading cause of all reported occupational deaths. Following the safety guidelines below can reduce this risk.

Safeguards against Backfeed

- **Extreme caution must be exercised by persons working on or in the vicinity of unverified de-energized power lines.** All persons performing this work should treat all power lines as "hot" unless they positively know these lines are properly de-energized and grounded. Because of the possibility of a feedback circuit, the person performing the work should personally ground all lines on both sides of the work area and wear the proper required protective equipment.
- **Linemen must be instructed to treat all power lines as energized unless they personally de-energize them** by establishing a visible open point between the load and supply sides of the line to be repaired, by opening a fused disconnect, by opening a fused switch, or by removing a tap jumper if the load permits.
- **Workers must verify that the power lines have been de-energized.**

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- **Workers must provide proper grounding for the lines.** Unless a power line is effectively grounded on both sides of a work area, it must be considered energized even though the line has been de-energized. Lines must be grounded to the system neutral. Grounds must be attached to the system neutral first and removed from the system neutral last. If work is being performed on a multiphase system, grounds must be placed on all lines. Lines should be grounded in sight of the working area and work should be performed between the grounds whenever possible. If work is to be performed out of sight of the point where the line has been de-energized, an additional ground should be placed on all lines on the source side of the work area.
- **Persons working on or in the vicinity of power lines should be provided with appropriate safety and protective equipment and trained in procedures that address all magnitudes of voltages to which they may be exposed.** Procedures should be established to perform a dual voltage check on the grounded load and supply sides of the open circuit. Once it has been determined that high voltage is not present, low voltage testing equipment, such as a glowing neon light or a light-emitting diode, should be used to determine if lower voltage is present.

Other Generator Hazards

Generator use is also a major cause of carbon monoxide (CO) poisoning. Generators should only be used in well ventilated areas. To learn more about preventing CO poisoning, see www.bt.cdc.gov/disasters/carbonmonoxide.asp.

For more information, visit www.bt.cdc.gov/disasters,
or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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