

## Using Standby Generators

Extended power outages can disrupt activities that are typically essential for proper operation of homes, businesses and farms. During an ice storm or a tornado when power is disrupted, we experience how vital electricity is. Even brief outages are often costly, high risks for livestock operations such as dairy, poultry and other confined animals.

### Generator Selection

When selecting a generator don't focus only on the price per kilowatt of generator capacity. When selecting the size of generator to purchase, add the essential electric loads to determine the kilowatt capacity. Whether the generator is manual, semi-automatic or automatic influences the correct load rating and the cost. To reduce cost, size the generator to power only essential electric loads.

### Types of Generators

**Engine-driven generators** – Both the generator and the engine powering the generator are often sold together as a single package or “genset.” It can be an automatic-start standby generator or a manual start (pull cord) design. They are sized according to a KW (power) rating. Engine-driven generators range from large permanently mounted diesel units that are used for standby systems to small portable gasoline engine generators just large enough to power vital appliances.

**Tractor-driven generators** – These generators are powered from an agricultural tractor's power-take-off (PTO) shaft. These models have a lower initial cost and are expected to require less maintenance because an engine is eliminated. Tractor-powered generators are often mounted on a trailer; they may routinely be towed to different locations to power welders or other equipment in areas remote from electrical power or a transformer and a permanent service entrance (service drop).

### Connections

An electrician should make all connections to a home electrical circuit. Power from the transformer energizes the service entrance. A licensed electrician

or utility repairman should disconnect power so that the terminals aren't “hot.”

Temporary generator connections may be direct to the equipment through extension cords, may use a double throw switch or may connect through the utility electric meter base on the outside of the house to, potentially, feed all house circuits.

To connect through the electric meter, pull the electric meter, plug the cable equipped with a male connector into the posts on the house side of the meter housing. Again, the power supply side of the meter connections may be “hot” and is a potential source of electrocution.

- Always pull the meter or switch the double throw switch to the “off” position, before connecting the generator to any service. The meter should remain pulled and the switch disconnecting the power supply must remain “OFF” until after the generator male connection is plugged in.
- If a generator feeds both sides (240 v.) of an electrical breaker box, care should be taken to balance the load between the two bars in the breaker box.
- All breakers should be opened, i.e., left in the OFF position except the essential circuit.
- The ground wire should be connected carefully, according to the operator's manual, to avoid a potentially serious electrical shock while operating the generator.
- Turn electrical loads on in the proper sequence. Start with the largest electric motor, then a smaller motor and connect lighting last. Motors require from three to five times as much current to startup compared to their typical full running load.
- All connections exposed to the weather, should be covered with a durable, nonconductive, water-proof barrier. Apply electrical tape, plastic sheeting, etc., carefully so that the layers shed rather than trap water.

## Safety Practices

- Always pull the meter or disconnect the power supply by correctly setting the double throw switch before connecting the generator to any service. The meter should remain “pulled” or the double throw switch disconnected from the power supply line until the generator is no longer in use.
- Never run a generator in an enclosed area.
- Keep all guards and shields in place to protect the operator from moving parts.
- Always check for downed power lines or damaged circuits before connecting a generator.
- Use extreme caution, especially under wet conditions.
- Turn off the tractor engine before attaching or detaching PTO driven units.
- On PTO driven units, always set the tractor brake before starting the generator.
- Never refill (fuel) a generator engine that is hot or running. Never shut off the generator under load.
- Never store gasoline indoors or near the generator where gas vapors could be ignited by a spark from the generator.

## Terminology

**Amperage (amps)** – A number (on the nameplate) indicating the load or flow of electrical current.

**Automatic-start standby generator** – A generator that starts automatically when the electric utility line voltage drops to about 70 percent of normal. Generator cycles on and off without any operator assistance.

**Battery-crank starters** – Option available for engines on larger generators.

**Gensets** – Shortened terminology for a complete generator and engine that are inseparable, i.e., sold together.

**Double throw switch** – Power supply switch that the operator can place or “throw” into two different positions. One position feeds power from the electric utility system to the load. The other position feeds power from the standby generator to the load; in this position the electric utility supply is disconnected from the generator, preventing an electrical shock from a downed power line.

**Kilovolt-amperes (kVA)** – Denotes the power needed for inductive loads, such as motors, fluorescent lighting and other electrical devices using transformers.

**Kilowatts (KW)** – Electrical power term that specifies the generator size; the most common standby generator rating. Sizing generators by the KW load provides adequate power capacity.

**Load** – The electricity used. It is the electricity generated.

**Overload rating** – The ability of a generator to handle short, intermittent periods of overload. This is particularly important during initial start-up.

**Standby generator** – A generator and starting control system designed to provide power during electric utility supply outages.

**Transfer switch** – Double throw switch that selects which power source energizes the connected load. The transfer switch rating must be sized to accommodate the largest amperage (typically, the electric utility feed).

**Voltage** – The potential that “forces” electricity to flow or power a load; for example, 120 or 240 v.