

# Sizing and Safety Tips for Standby Power Generators

**Bob Schultheis**  
Natural resource engineering  
specialist Webster County

Missouri's geographical location midway between northern and southern weather systems often means surprise amounts of ice and snow accumulations in the winter. They are a cold reminder of the difficulties involved in running a modern farm when the power goes out, even for just a few minutes or hours. A standby power generator can be good insurance to keep critical facilities running. But several critical factors need consideration when buying, installing and using a generator.

First, notify your local electric utility company if you plan to use a standby generator during power failures, and follow the manufacturer's maintenance instructions for the generator, which include regularly scheduled warm ups to keep it in working order.

The National Electrical Safety Code requires that a double-pole, double-throw transfer switch be installed to disconnect the consumer's load from the power supplier's utility grid. Make sure this transfer switch is properly installed by a licensed electrician, to prevent electricity made by the generator from mistakenly flowing out onto utility lines where it could electrocute members of the repair crew.

The switch must have the capacity to carry the total load of the farm or building it feeds, even though the generator has less capacity. Ensure that the generator is capable of providing adequate power at the correct voltage without putting occupants or utility workers at risk.

Generators are rated in kilowatts, or KW. One kilowatt equals 1,000 watts. If the nameplate has two kilowatt ratings, the larger number is the short-time overload capacity. The smaller is the continuous-output rating.

A portable generator with 4- to 5-kilowatt rating is the minimum size needed for a typical three-bedroom home, and prices can range from \$600 to \$4,000. More expensive units run quieter, are more durable and have larger fuel tanks.

The generator may be a direct-connected engine-driven unit or one driven by a tractor power-take-off (PTO).

Electric motors draw three to five times more power when starting than when running under full load, so proper generator sizing is critical to avoid motor burnouts. The ampere rating of equipment needing power can be converted to watts by multiplying its voltage by its amperage as given on the nameplate.

Sizing the generator depends upon whether it's an automatic- or manual-start unit.

To size automatic-start units, add the wattage of all motors connected to the generator and multiply this number by 3.5. Then add the wattage of all other connected equipment. To size manual-start units, you need to know the starting wattage of your largest motor, then add the maximum running- and starting-wattage demand on the generator at any point in the system to get the required generator size.

For example, a 5-horsepower, 5,000-watt running-load motor has a starting wattage of 17,500 watts, so an 18 KW generator is needed to start the motor. For PTO-driven units, the tractor should have a horsepower rating at least twice the kilowatt capacity of the generator. A 15 KW generator requires at least a 30-horsepower tractor to drive it at full load.

Don't forget to store fuel in approved containers, and never inside the home or garage. The generator should always be operated outdoors to avoid carbon monoxide poisoning from the engine exhaust.

## Related MU Extension publications

- EMW1016, Generator Safety Concerns Video  
<http://extension.missouri.edu/p/EMW1016>

Order publications online at <http://extension.missouri.edu/explore/shop/> or call toll-free 800-292-0969.



■ Issued in furtherance of the Cooperative Extension Work Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. Director, Cooperative Extension, University of Missouri, Columbia, MO 65211  
■ an equal opportunity/ADA institution ■ 573-882-7216 ■ [extension.missouri.edu](http://extension.missouri.edu)